



The map displays the Houston Ship Channel project area. Key locations include Houston, Pasadena, South Houston, League City, Galveston, and the Gulf of Mexico. The Houston Ship Channel is highlighted, showing its path from the Gulf of Mexico through Galveston Bay to the Houston area. The map includes labels for various locations like Houston, Pasadena, South Houston, League City, Galveston, and the Gulf of Mexico. The Houston Ship Channel is highlighted, showing its path from the Gulf of Mexico through Galveston Bay to the Houston area. The map includes labels for various locations like Houston, Pasadena, South Houston, League City, Galveston, and the Gulf of Mexico. The Houston Ship Channel is highlighted, showing its path from the Gulf of Mexico through Galveston Bay to the Houston area.

PROJECT LOCATION

VICINITY MAP

STATE MAP

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SHT NO.	SHEET ID	SHEET TITLE
GENERAL		
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NAVIGATION AIDES		
19	CN106	NAVIGATION AIDES PLAN
PLACEMENT AREA		
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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 and letters are rendered in a stylized, metallic-looking font. Surrounding the central design is a thick, dark rope-like border. The text 'PORT OF HOUSTON AUTHORITY' is written in a serif font along the top inner edge of the border, and 'HOUSTON, TEXAS' is written along the bottom inner edge.

CONSULTANT:

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ENGINEER: Ashley P. Judith
E NO: 112988
TE: 09-30-2021

ENGINEER: Chester W. Hedderman
E NO: 100209
TE: 09-30-2021

PROVED: _____
DATE: _____

PORT CONTRACT REPRESENTATIVE
IMAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

PROJECT 11:
EDFISH TO SOUTH
BOATERS CUT
SC STA 98+000 TO
SC STA 45+000

TITLE SHEET, STATE AND VICINITY MAPS, INDEX TO DRAWINGS

[illegible]

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

DRAWING NO.	
C90-D13-P11-004-GI001	
SHEET NO.	REV. NO.
1	0

95% SUBMITTAL

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

AC	ACRES
AO	ALLOWABLE OVER DEPTH
A.O.R.	ANGLE OF REPOSE
APPROX	APPROXIMATE
ATON	AIDES TO NAVIGATION
BIM	BIRD ISLAND MARSH
BRC	BOLIVAR ROADS CHANNEL
BSC.....	BAYPORT SHIP CHANNEL
CL	CENTERLINE
DRM	DOLLAR REEF MITIGATION
EXIST	EXISTING
FT	FEET
HSC.....	HOUSTON SHIP CHANNEL
LB I	LONG BIRD ISLAND
LT	LEFT
NO.....	NUMBER
OS	OFFSET
P.I.	POINT OF INTERSECTION
N	NORTHING
E	EASTING
MLLW.....	MEAN LOWER LOW WATER
N.I.P.	NOT IN PACKAGE
P.C.	POINT OF CURVATURE
PHA	PORT OF HOUSTON AUTHORITY
P.T.	POINT OF TANGENCY
RD	REQUIRED DEPTH
RO	REQUIRED OVER DEPTH
RT	RIGHT
SLM	SAN LEON MITIGATION
STA	STATION
TYP	TYPICAL
TOE	CHANNEL TOE

CL CHANNEL & STATIONING

CHANNEL TOE (EXISTING)

CHANNEL TOE (WIDENING)

OUTSIDE LIMITS OF BARGE LANE

CHANNEL WIDENING DREDGE LIMITS

BARGE RELOCATION DREDGE LIMITS

STRIP DREDGE LIMITS TO -30.0 FT MLLW (PLAN VIEW)

STRIP DREDGE LIMITS TO -40.0 FT MLLW (PLAN VIEW)

STRIP DREDGE LIMITS (SECTION VIEW)

GEOTECHNICAL INVESTIGATION LOCATION

HISTORICAL BORINGS



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ENGINEER: Ashley P. Judith
E NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
E NO: 100209
DATE: 09-30-2021

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

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

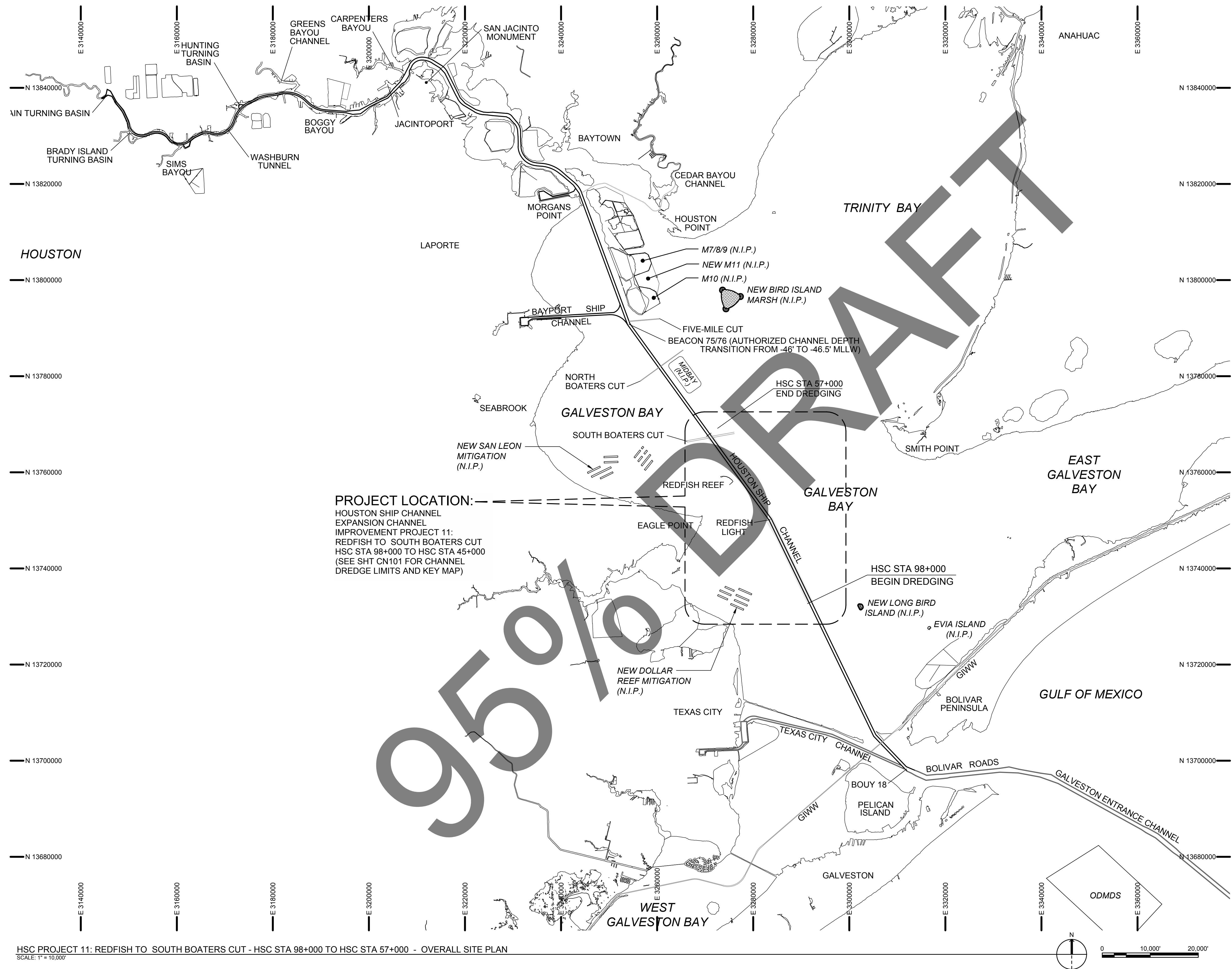
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
ISC STA 98+000 TO
ISC STA 45+000

GENERAL NOTES, LEGEND AND ABBREVIATIONS

[illegible]

DRAWING NO.	
C90-D13-P11-004-GI002	
SHEET NO.	REV. NO.
2	0

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NOTES:

1. HORIZONTAL COORDINATES SHOWN ARE REFERENCED TO NAD 83 TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE 4204, U.S. SURVEY FEET.
2. HOUSTON SHIP CHANNEL (HSC) STATIONING REFERS TO CHANNEL CENTERLINE.



**PORT OF HOUSTON
AUTHORITY**

CONSULTANT:

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SHEET TITLE:
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BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

OVERALL SITE PLAN

[illegible]



SCALE: 1" = 10,000



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MANAGING DIRECTOR - ENGINEERING
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EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

PROJECT 11:
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BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

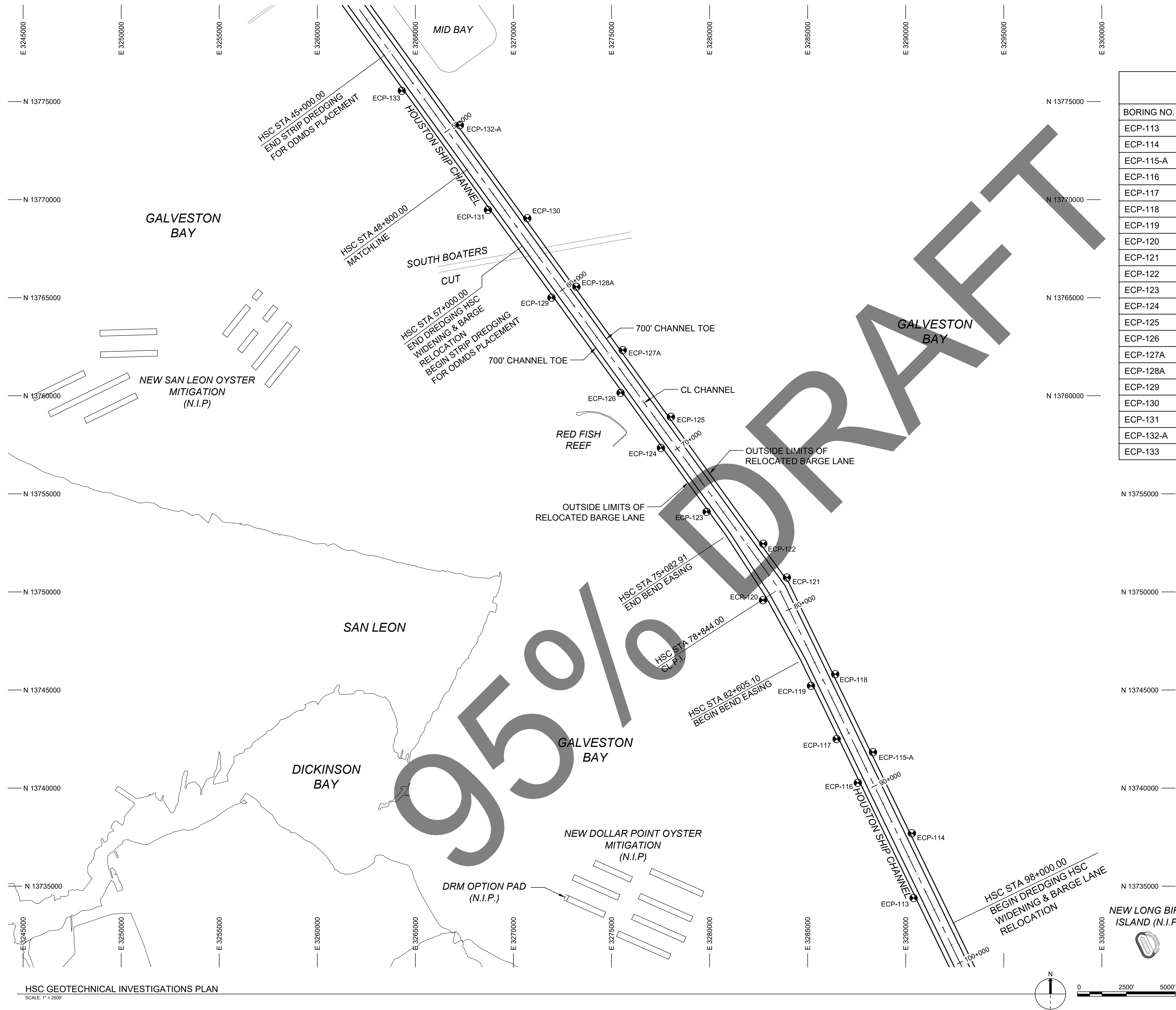
GEOTECHNICAL INVESTIGATIONS PLAN

[illegible]

DESIGNER:	NM
CADD:	BSC
CHECKER:	NM/AJ
DATE:	DEC. 2020
SCALE:	1" = 2500'

DRAWING NO.	
C90-D13-P11-004-B-101	
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REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000**

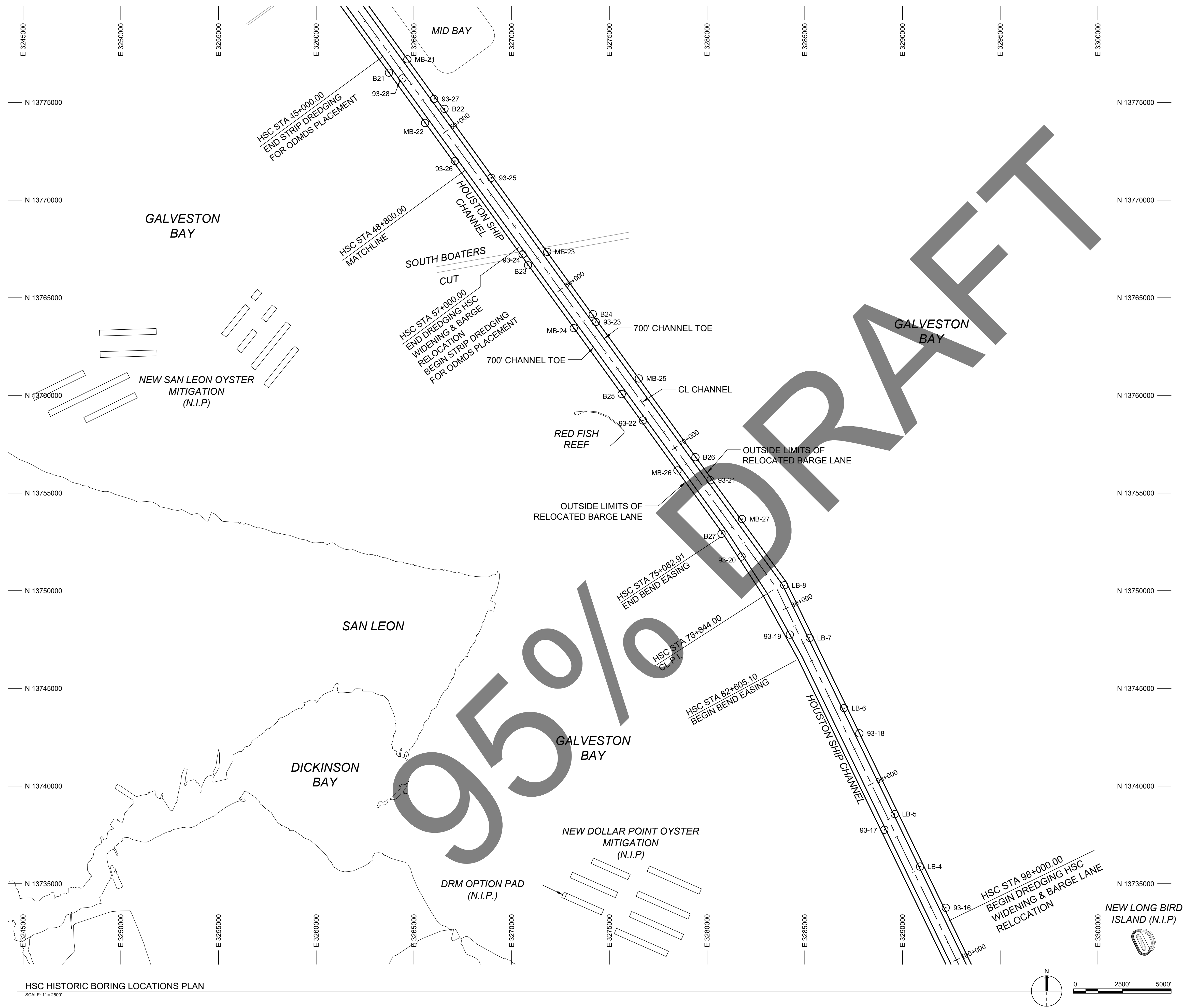
HISTORICAL BORING LOCATIONS PLAN

[illegible]

DESIGNER:	NM
CADD:	BSC
CHECKER:	NM/AJ
DATE:	DEC. 2020
SCALE:	1" = 2500'

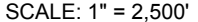
DRAWING NO.	
C90-D13-P11-004-B-102	
SHEET NO.	REV. NO.
6	0

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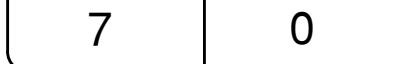


NOTES:

1. THE HISTORICAL BORINGS SHOWN ARE APPROXIMATE LOCATIONS. REFER TO BORING LOGS FOR FURTHER INFORMATION.
2. NOT ALL HISTORICAL BORINGS ARE SHOWN. ADDITIONAL BORING LOGS ARE INCLUDED BY ATTACHMENT TO THE CONTRACT SPECIFICATIONS.








3 ENVIRONMENTALLY SENSITIVE AREA - MIDBAY





4. ABANDONED PIPELINE
OBSTRUCTIONS TO DREDGING
TO BE REMOVED BY OTHERS
PRIOR TO WORK AND UNDER
SEPARATE CONTRACT.

 PL
 EXISTING
 ABANDONED PL
 LISTED ON TRRC
 HISTORIC OR TRRC
 PL DATA. ACTIVE,
 ABANDONED, OR
 REMOVAL HAS NOT
 BEEN CONFIRMED
 DELINEATED MAG.
 ANOMALY AREAS
 (HTI)
 MAGNETOMETER
 GRATIO CONTOURS
 (HTI)

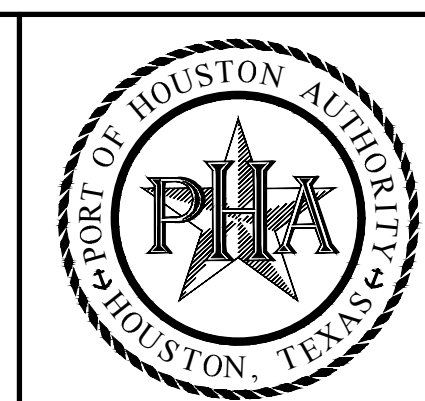
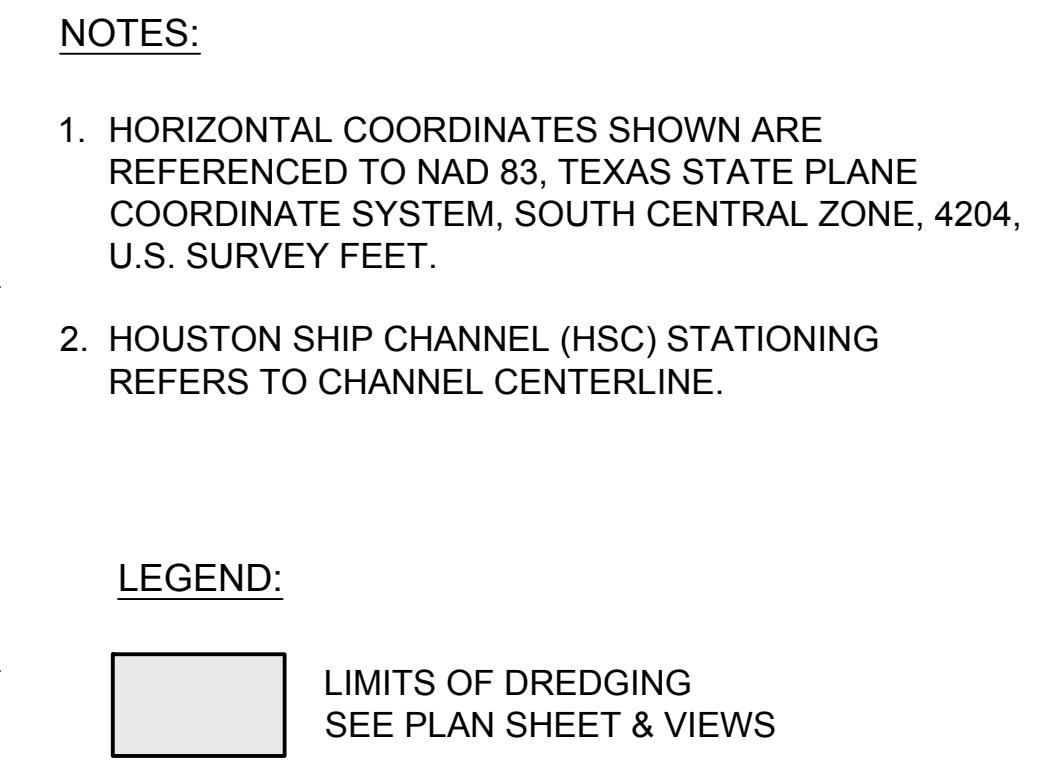
SHEET TITLE:
**PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000**

UTILITIES PLAN

[illegible]

DESIGNER:	DC
ADD:	RK
CHECKER:	NK/SH
DATE:	DEC 2020
SCALE:	1:100'

DRAWING NO.	
C90-D13-P11-004-VU101	
SHEET NO.	REV. NO.
8	0

PORT OF HOUSTON
AUTHORITY

CONSULTANT:

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P.E. NO: 112988

DATE: 09-30-2021

ENGINEER: Chester W. Hedderman

P.E. NO: 100209

DATE: 09-30-2021

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:

PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

OVERALL DREDGING PLAN AND KEY MAP

[illegible]

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

DRAWING NO.
C90-D13-P11-004-CN101

SHEET NO.	REV. NO.
9	0

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MANAGING DIRECTOR - ENGINEERING
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CHANNEL (HSC)**

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HEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL
DREDGE PLAN - 2
HSC STA 83+400 TO
HSC STA 66+600**

[illegible]

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

DRAWING NO.

SHEET NO.	REV. NO.
11	0

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SCALE: 1" = 300'



CHANNEL WIDENING
DREDGE LIMITS

BARGE RELOCATION
DREDGE LIMITS

NO.	NORTHING	EASTING
4.6	13746609.02	3284871.39
4.7	13746497.33	3284664.37
4.8	13750146.95	3283547.98
4.9	13750283.44	3283776.32
4.10	13750327.23	3283849.56
4.11	13750450.18	3284051.13
4.12	13750010.45	3283319.63
4.13	13749867.74	3283075.69
4.14	13749747.09	3282873.86
4.15	13752987.72	3281058.33
4.16	13752858.25	3280861.93



SCALE: 1" = 300'



TIME: 12-09-20 - 9:14am User: kaulr DWG: C:\Projects\60618786 - Project 11 Design\900 CADD\20-Sheets\C90-D13-P11-004-CN103.dwg

CONSULTANT:

AL:
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E NO: 112988

DATE: 09-30-2021

ENGINEER. Chester W. Hedderman

E. NO: 100209

DATE: 09-30-2021

APPROVED: _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

CHANNEL
DREDGE PLAN - 3
HSC STA 66+600 TO
HSC STA 57+000

[illegible]

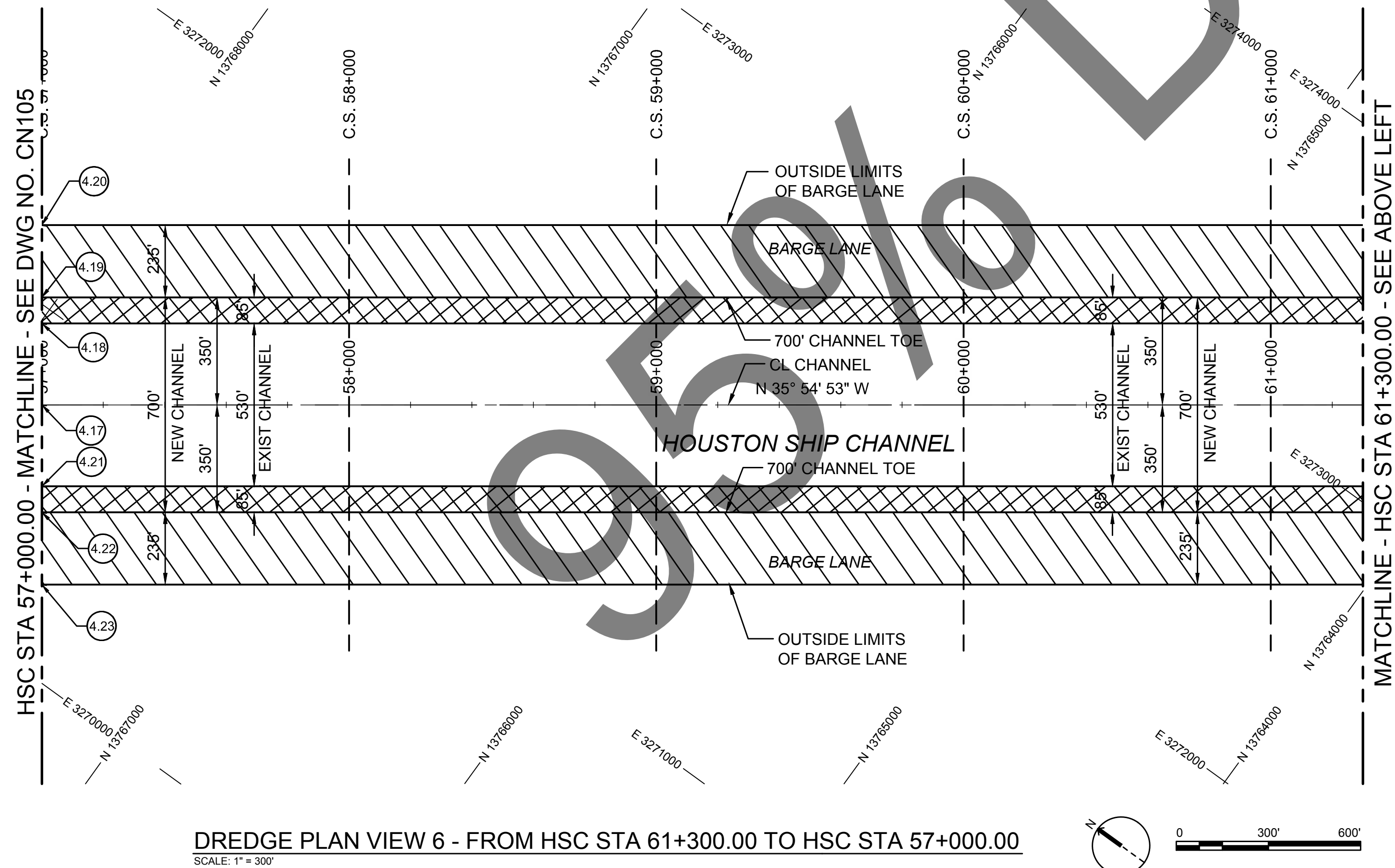
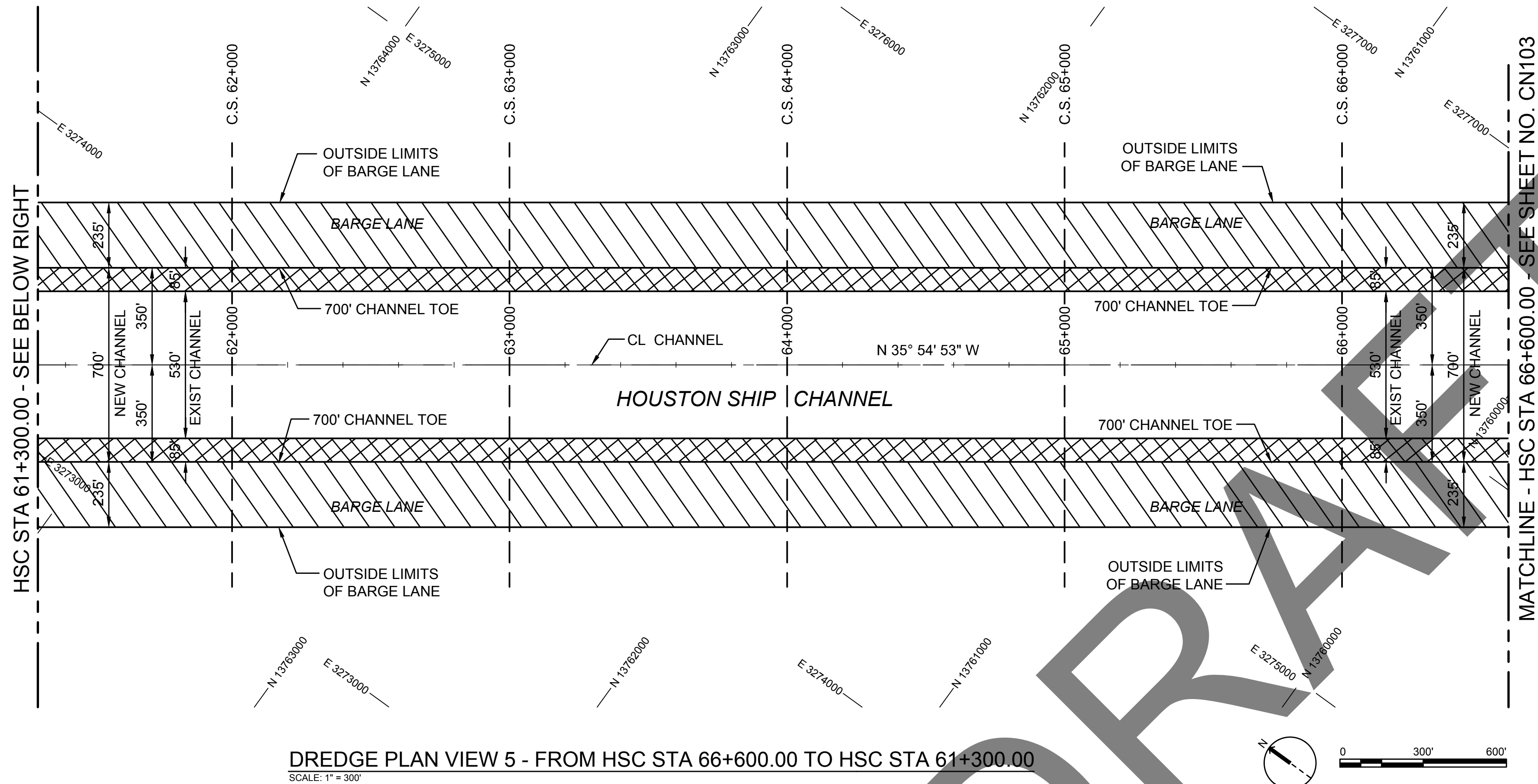
DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	DEC 2020
SCALE:	1" = 300'

DRAWING NO.

90-D13-P11-004-CN104

HEET NO.	REV. NO.
12	0

95% SUBMITTAL



NO.	NORTHING	EASTING
4.17	13767838.20	3270734.70
4.18	13767993.64	3270949.32
4.19	13768043.50	3271018.16
4.20	13768181.35	3271208.49
4.21	13767682.76	3270520.08
4.22	13767632.90	3270451.24
4.23	13767495.05	3270260.92

LEGEND:



CHANNEL WIDENING DREDGE LIMITS



BARGE RELOCATION DREDGE LIMITS

FALSE:

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ENGINEER: Ashley P. Judith

112988

00 30 3031

DATE: 09-30-2021

ENGINEER: Chester W. Hedderman

100209

09-30-2021

地址: _____

APPROVED: _____
DATE

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

HEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL
DREDGE PLAN - 4
HSC STA 57+000 TO
HSC STA 45+000**

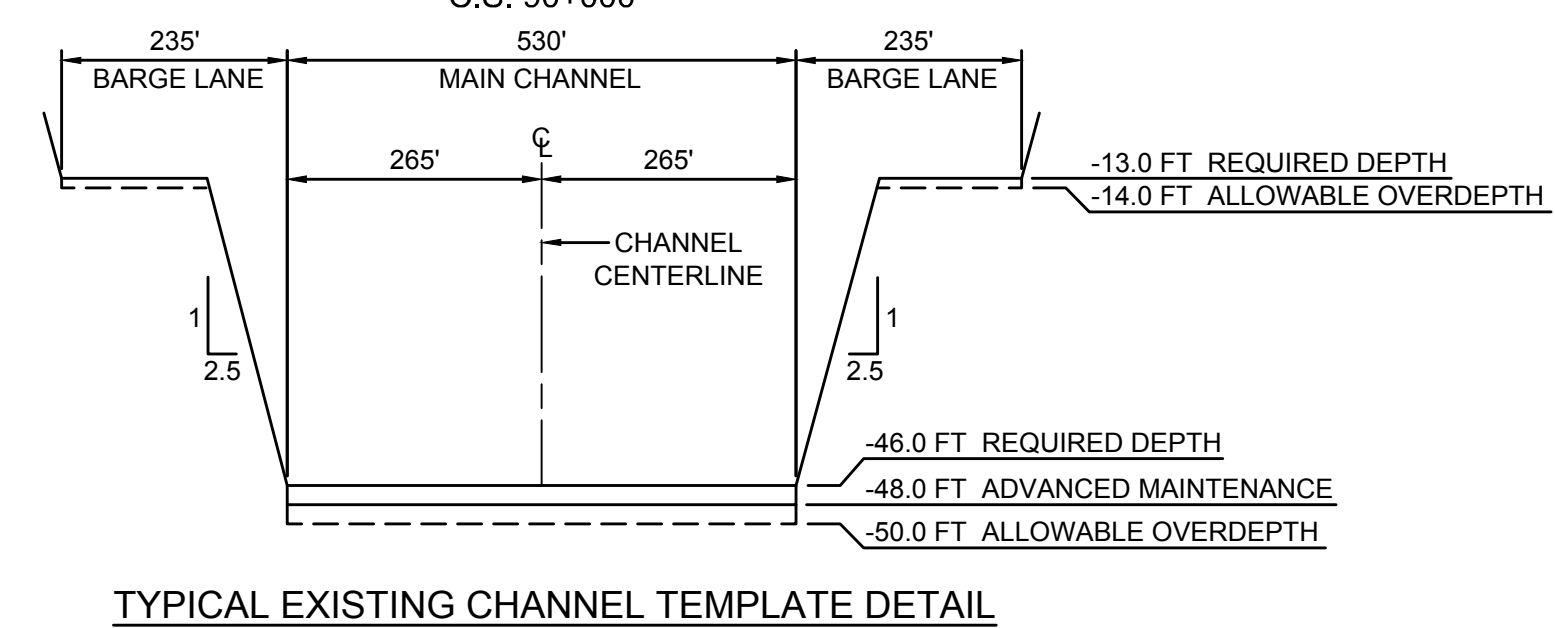
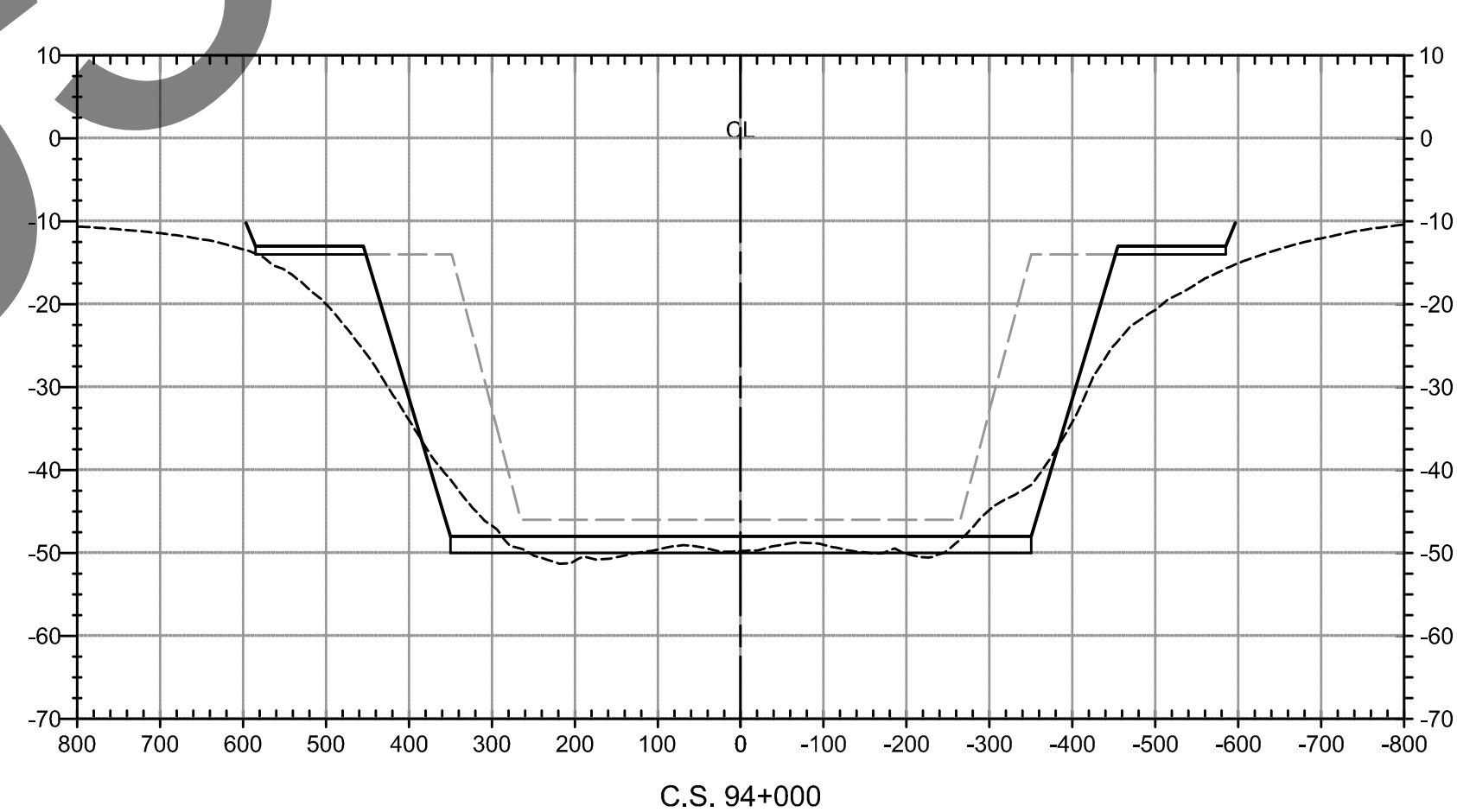
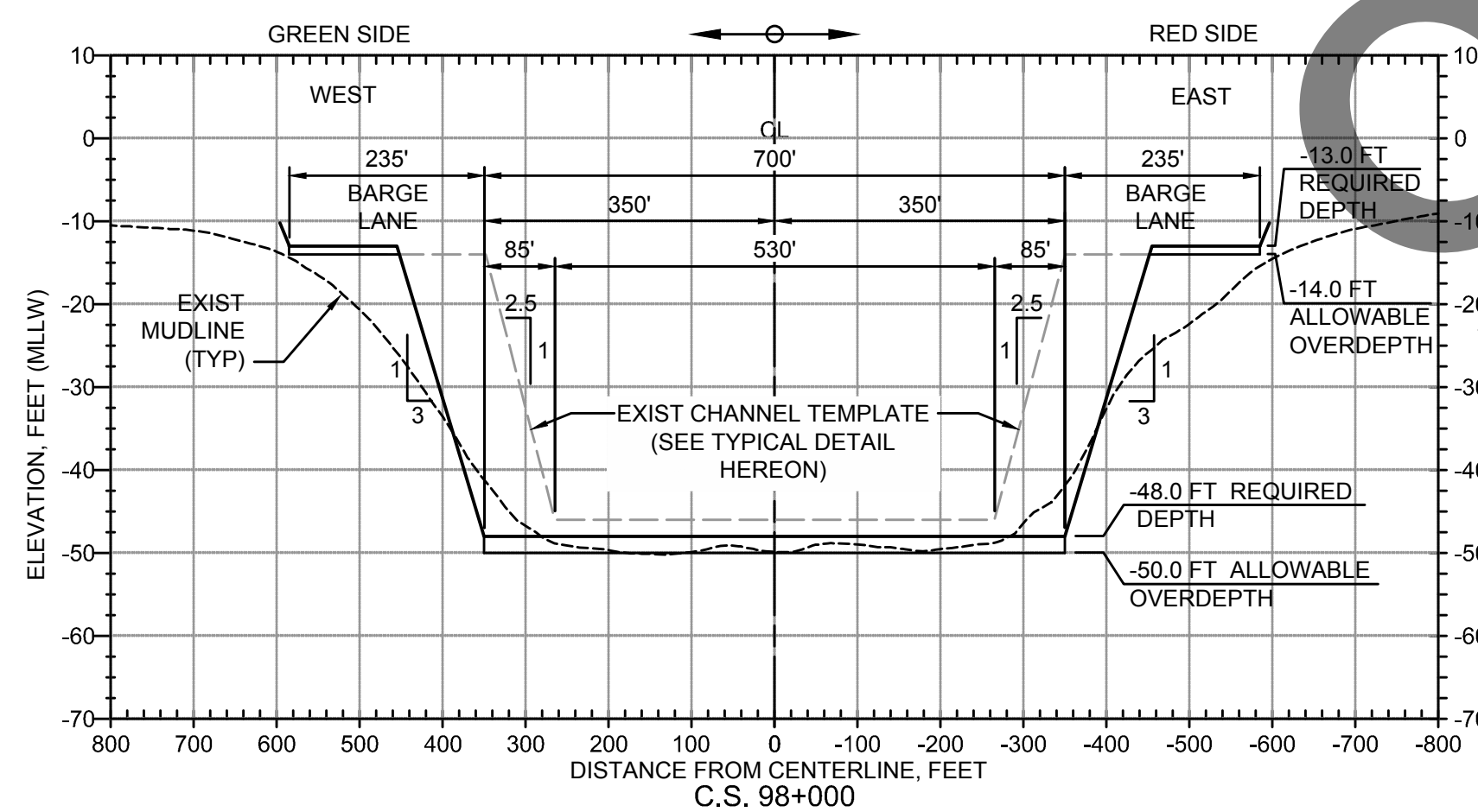
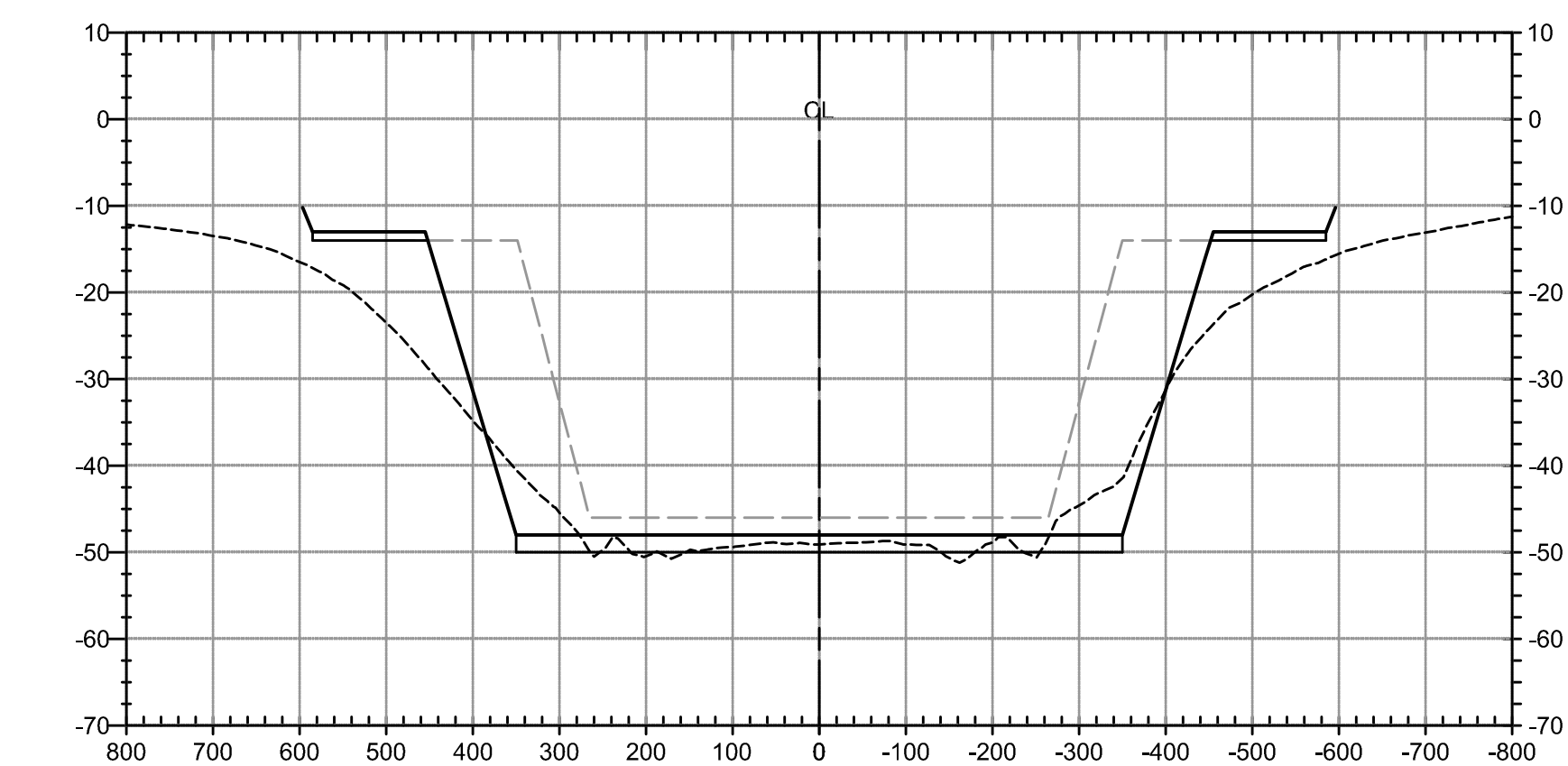
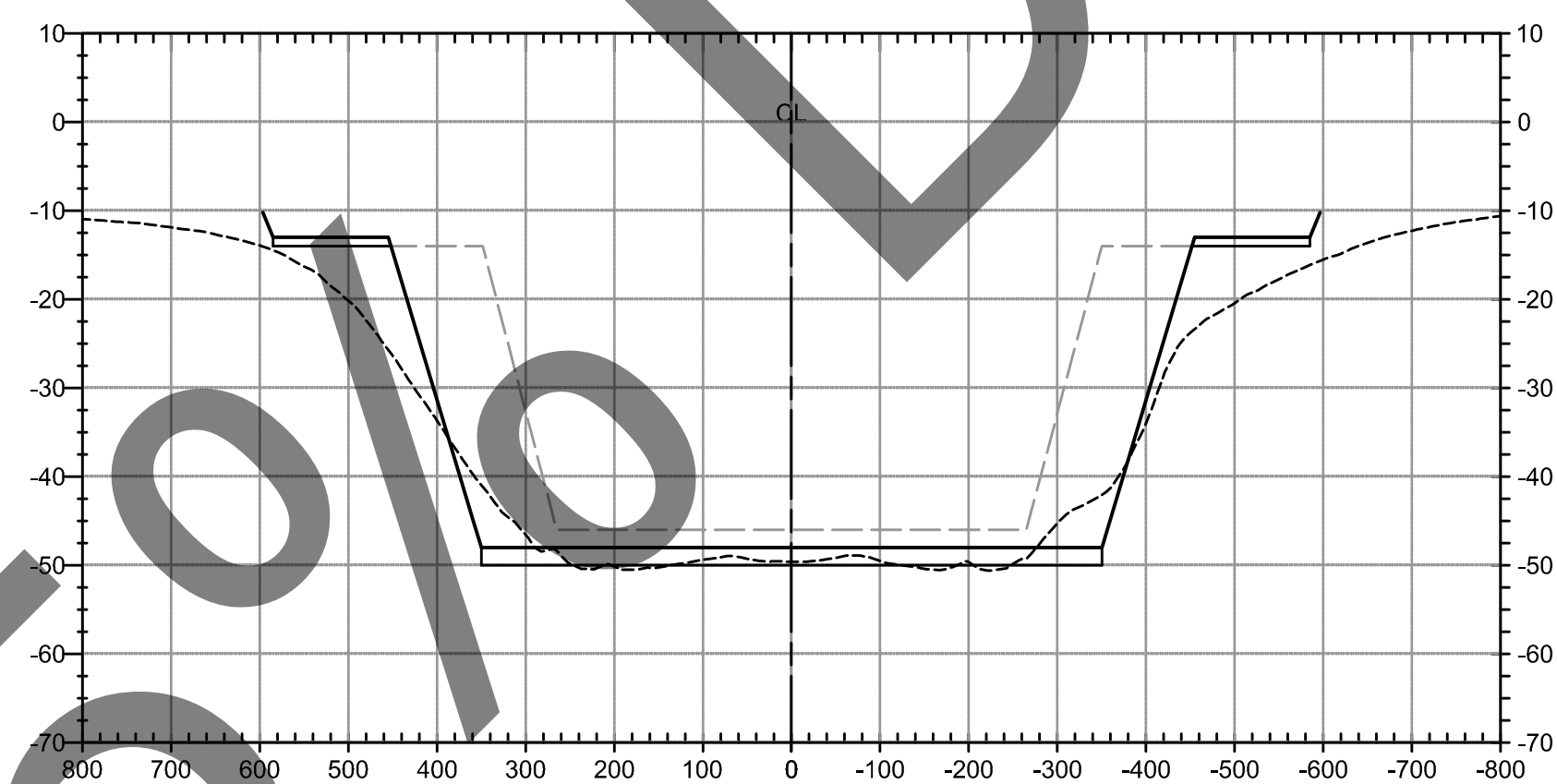
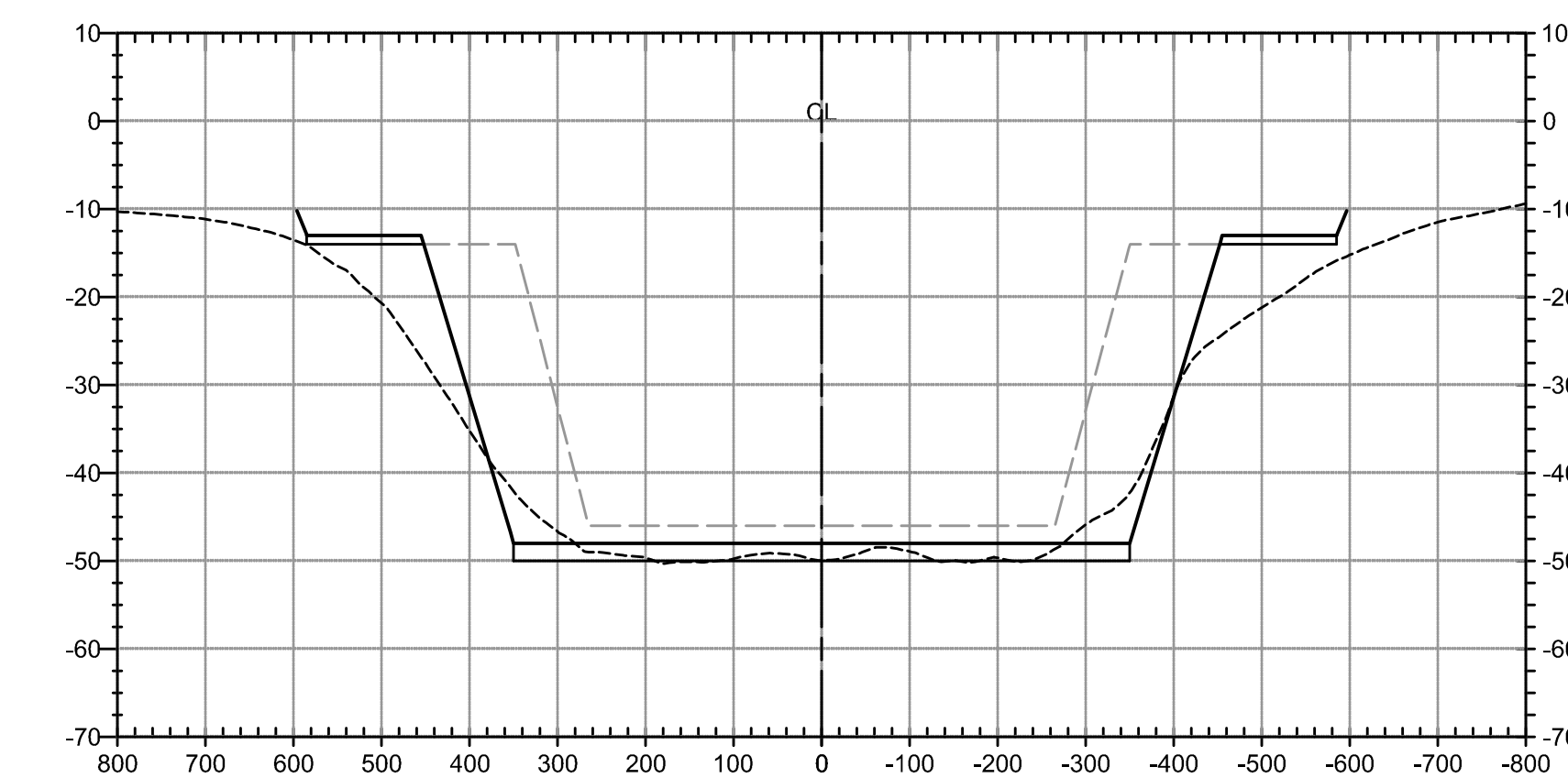
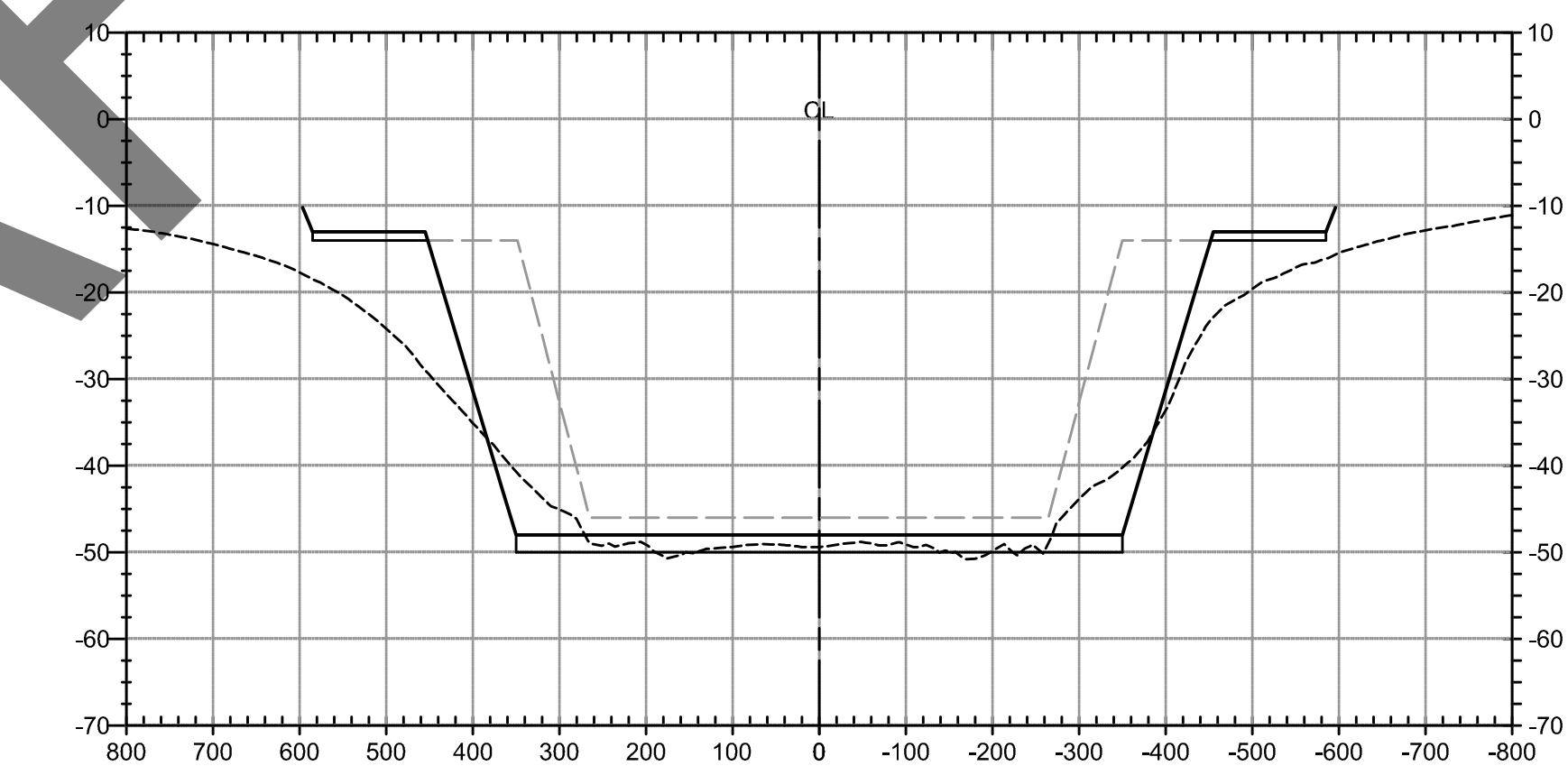
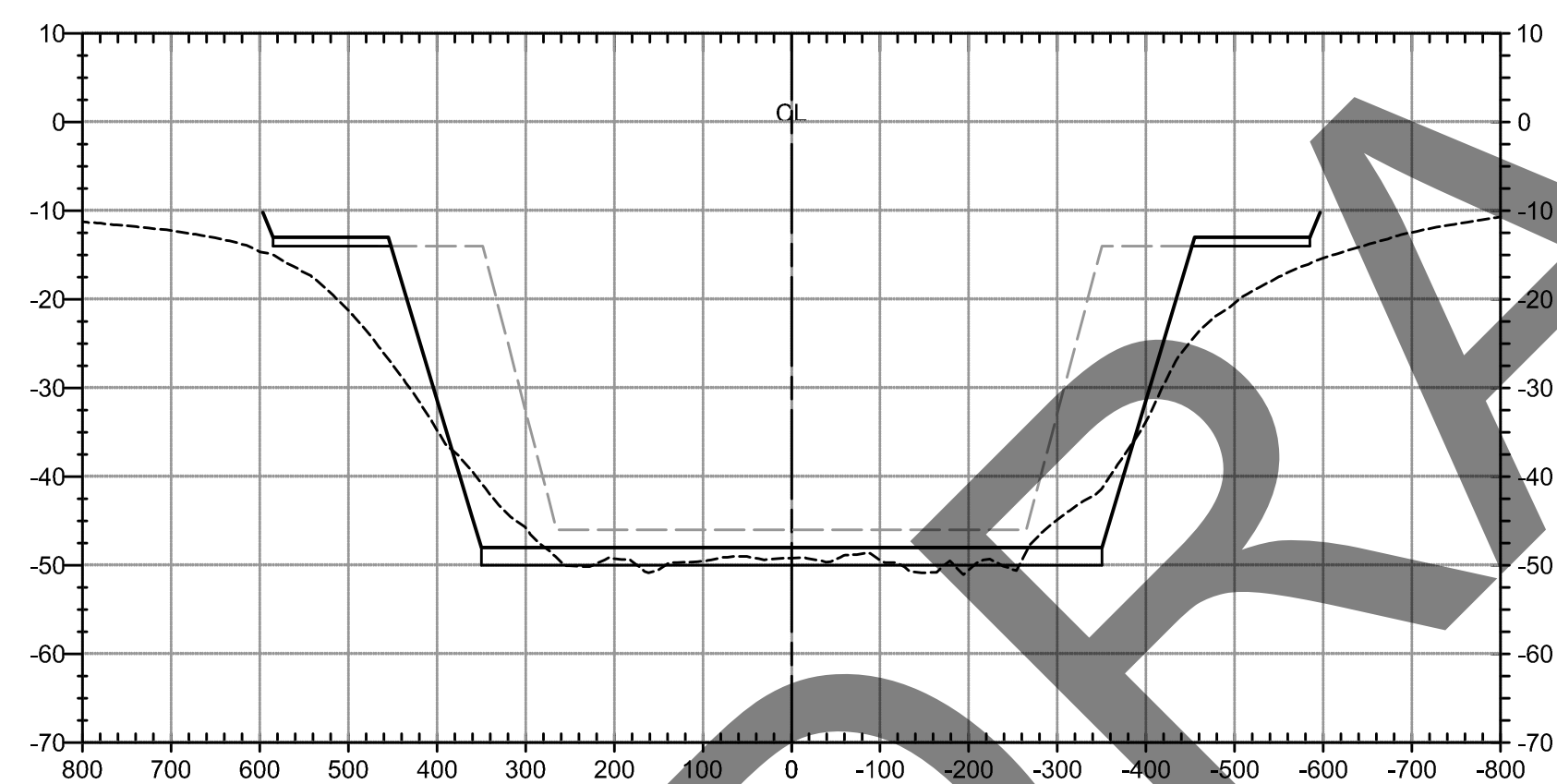
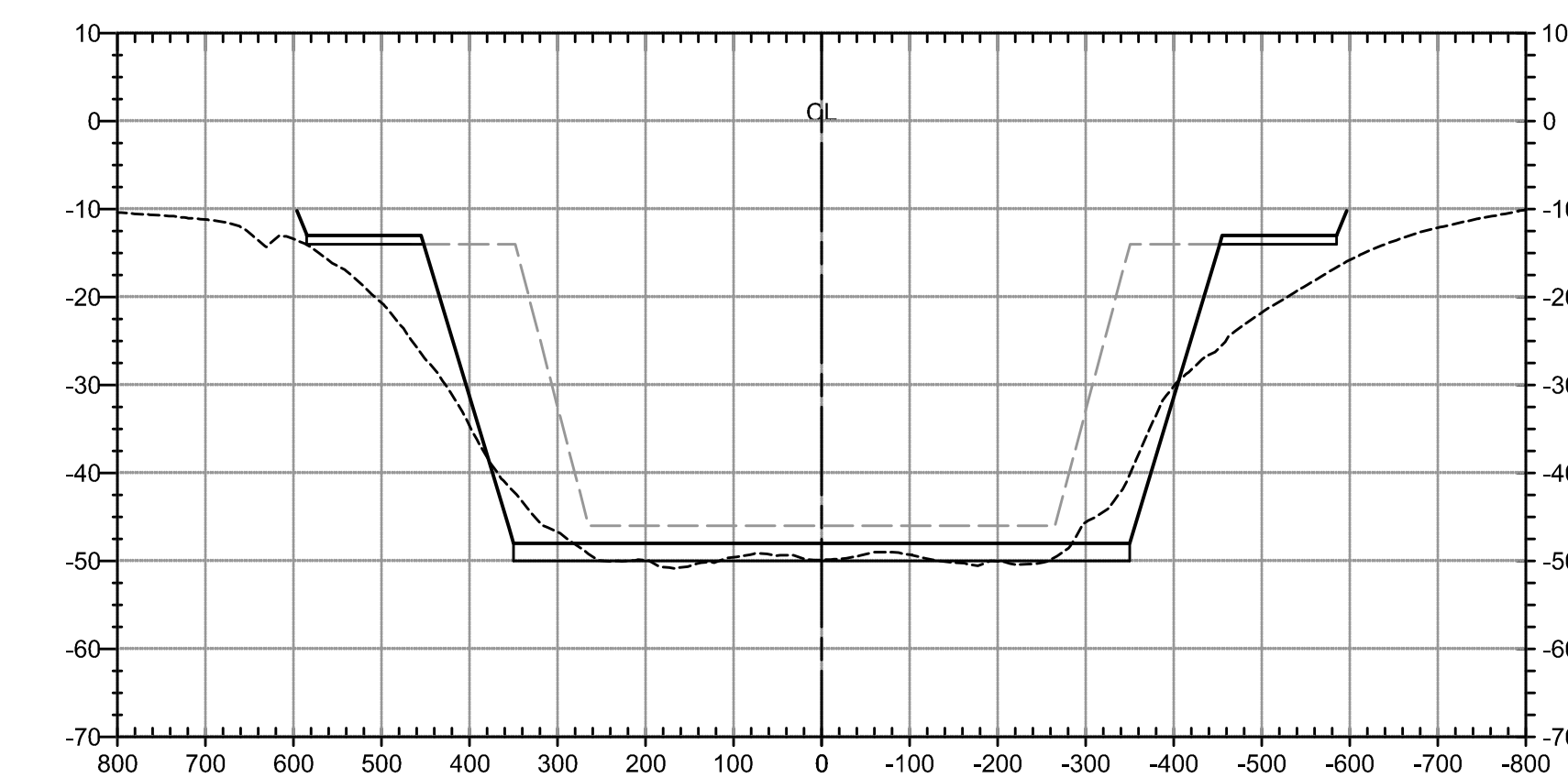
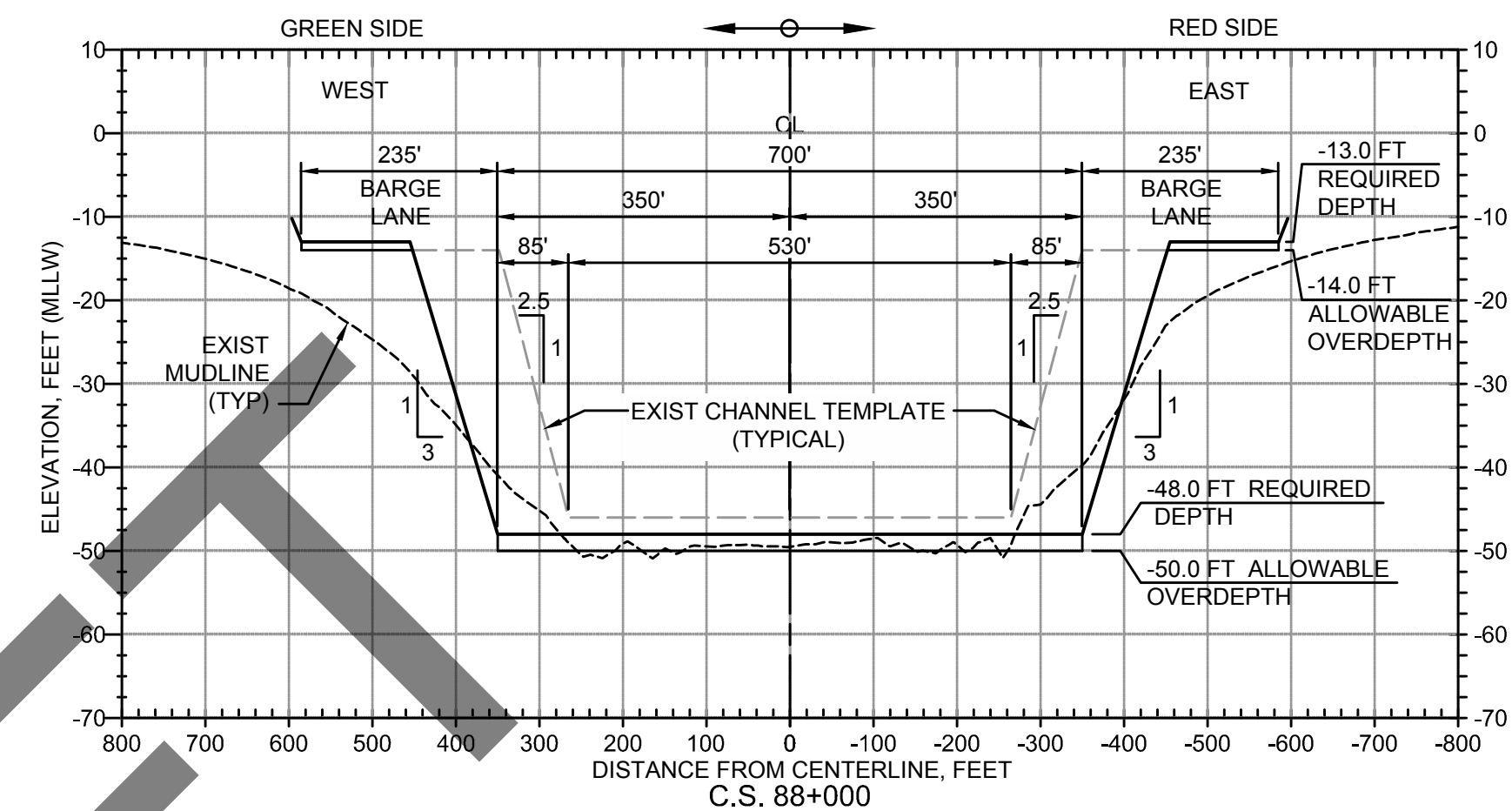
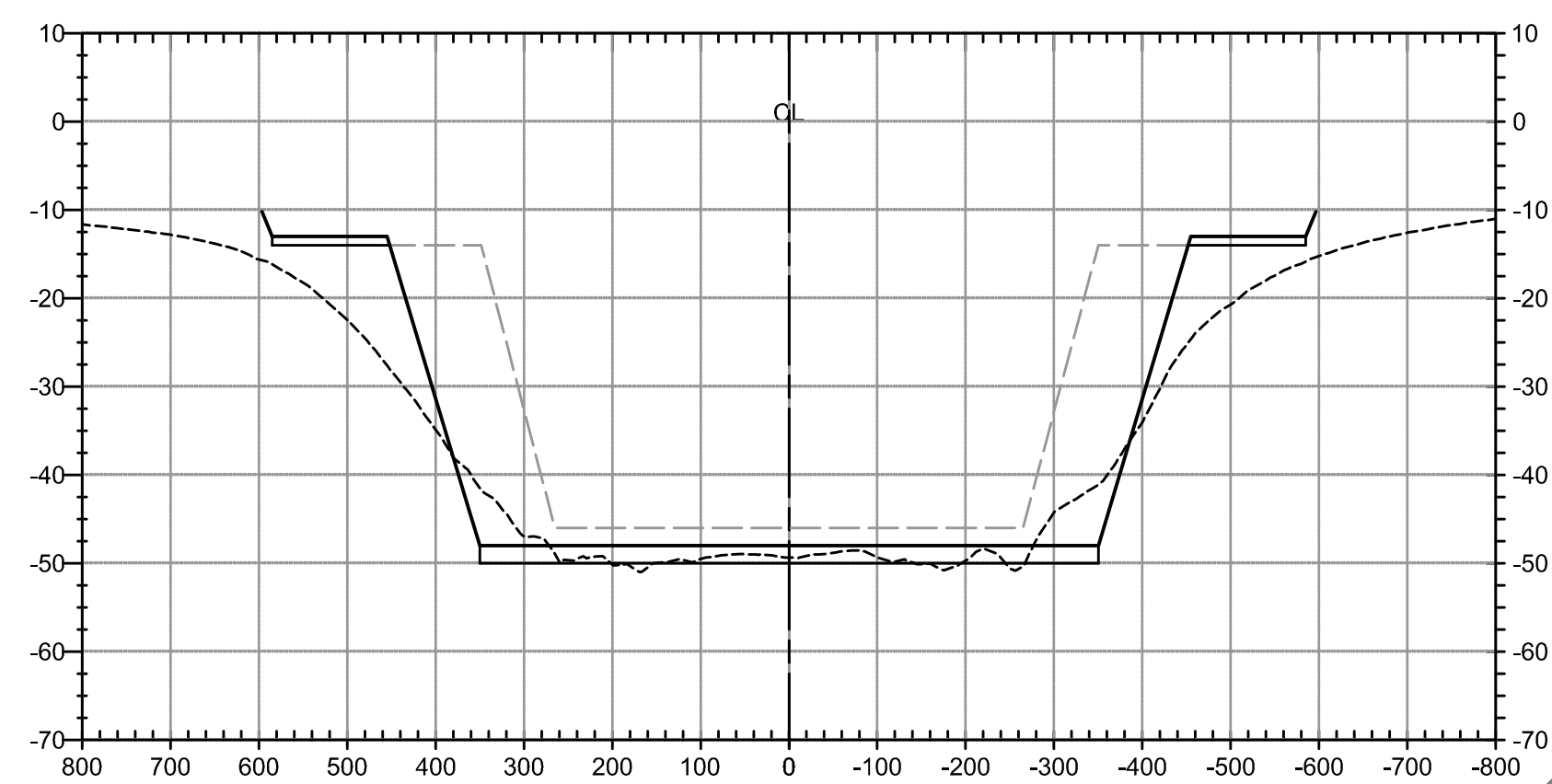
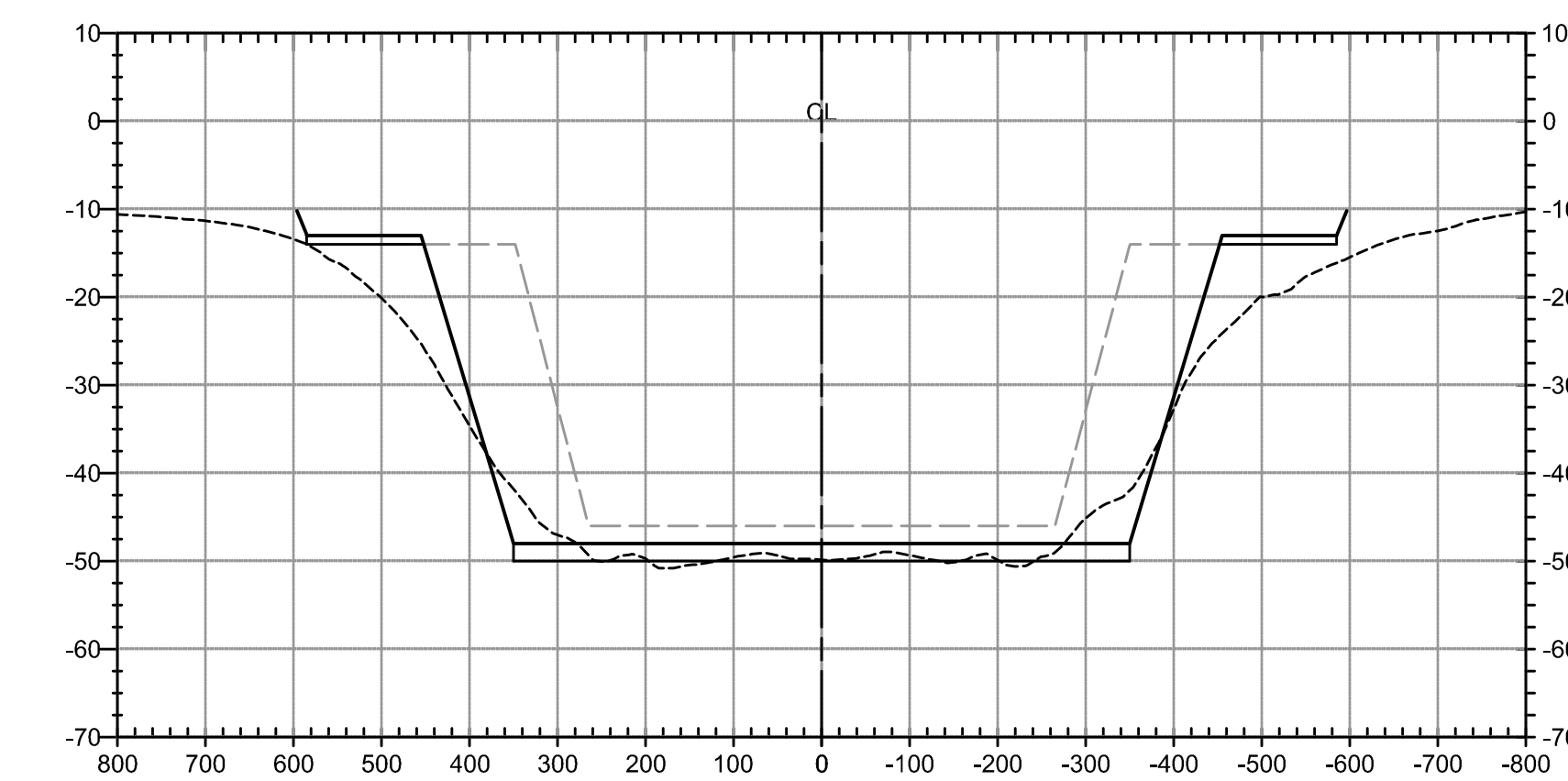
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DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	DEC 2020
SCALE:	1" = 300'

DRAWING NO.	
C90-D13-P11-004-CN105	
SHEET NO.	REV. NO.
13	0

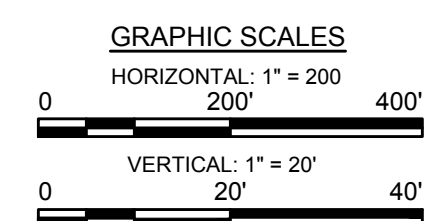
95% SUBMITTAL





NOTES:

1. ALL ELEVATIONS ARE SHOWN IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW).
2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.
4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.



**PORT OF HOUSTON
AUTHORITY**

CONSULTANT:

SEAL:

95% PRELIMINARY

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ENGINEER: Ashley P. Judith
P.E NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E NO: 100209
DATE: 09-30-2021

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

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

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:

PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL DREDGE
CROSS SECTIONS - 1
HSC STA 98+000 TO
HSC STA 88+000**

[illegible]

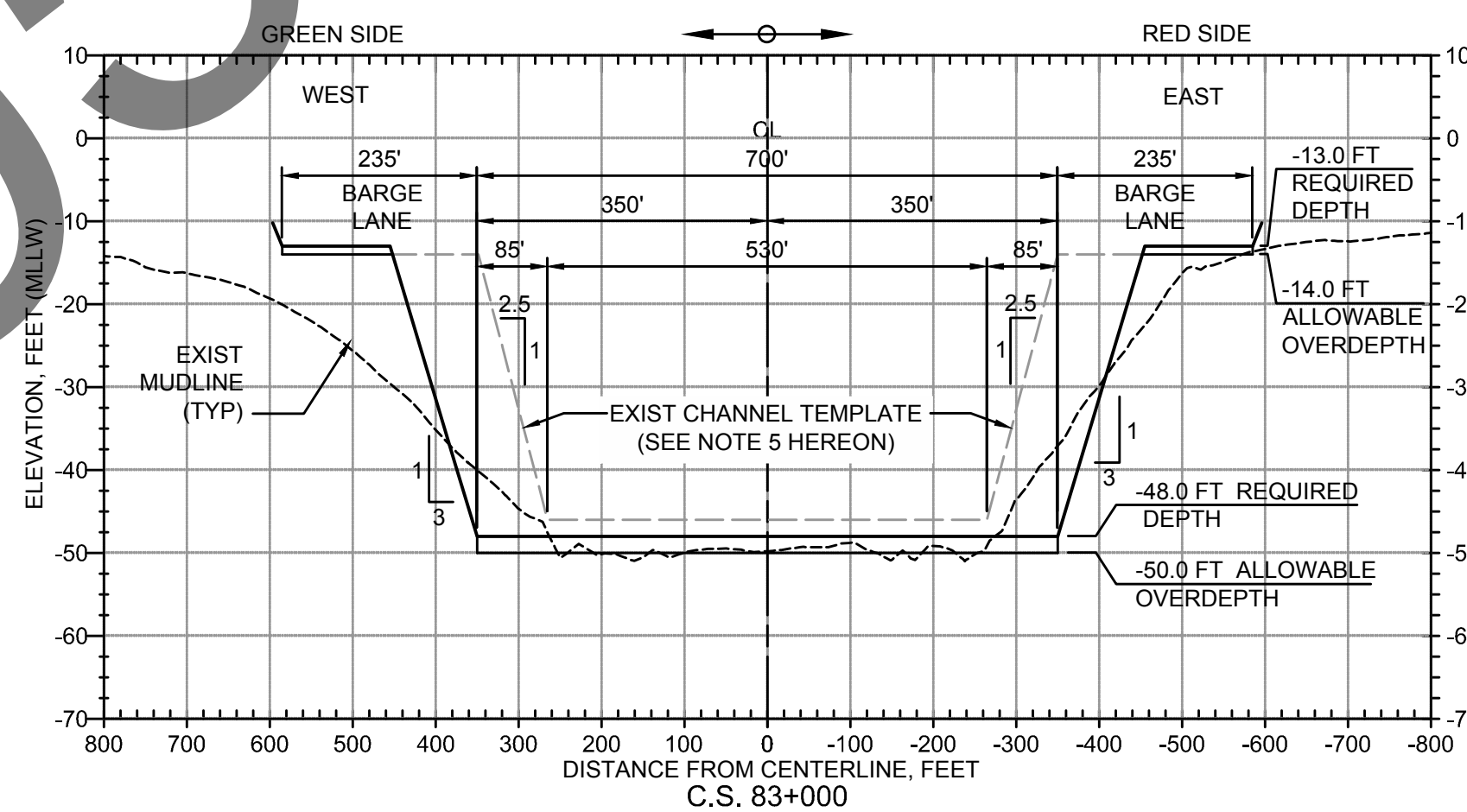
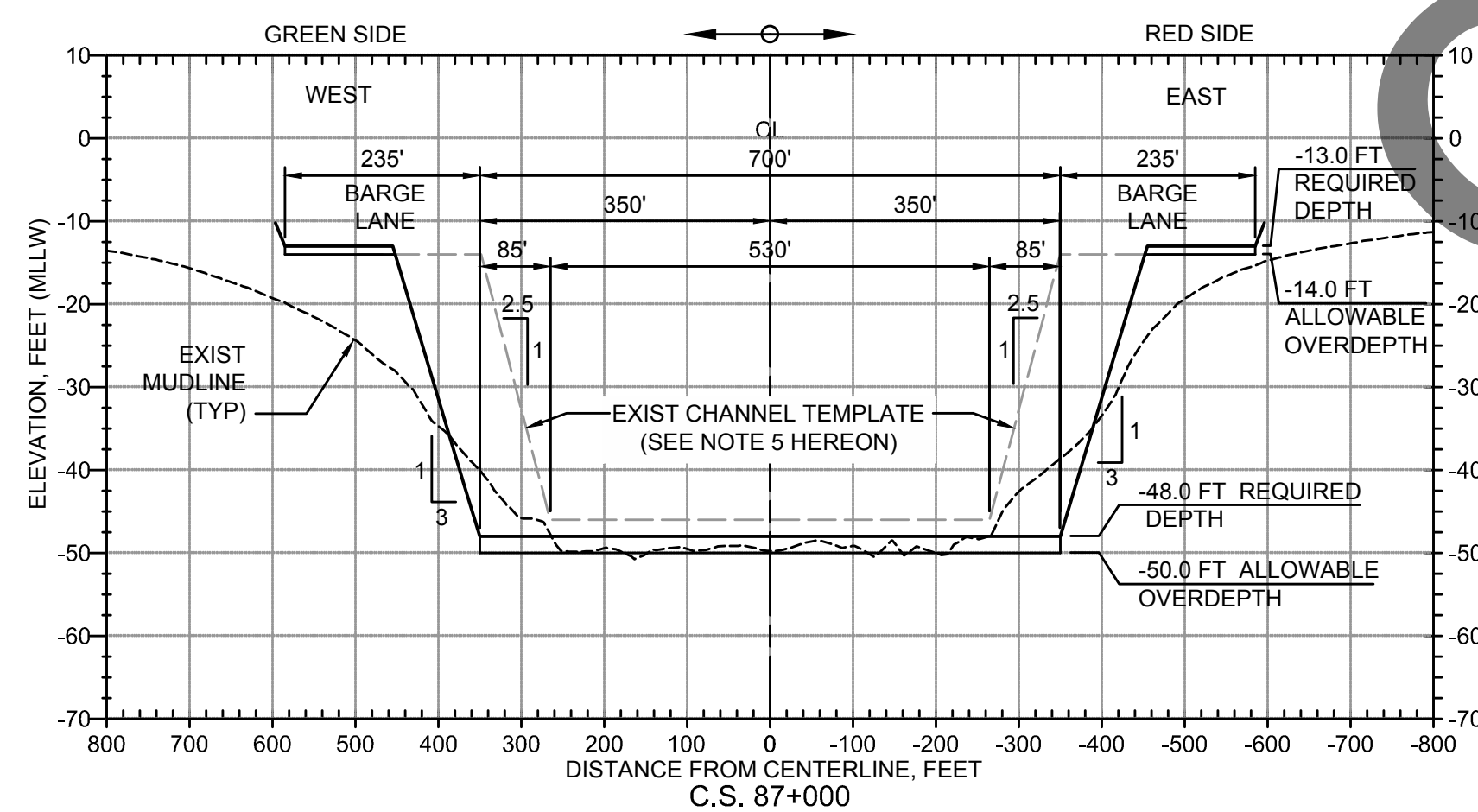
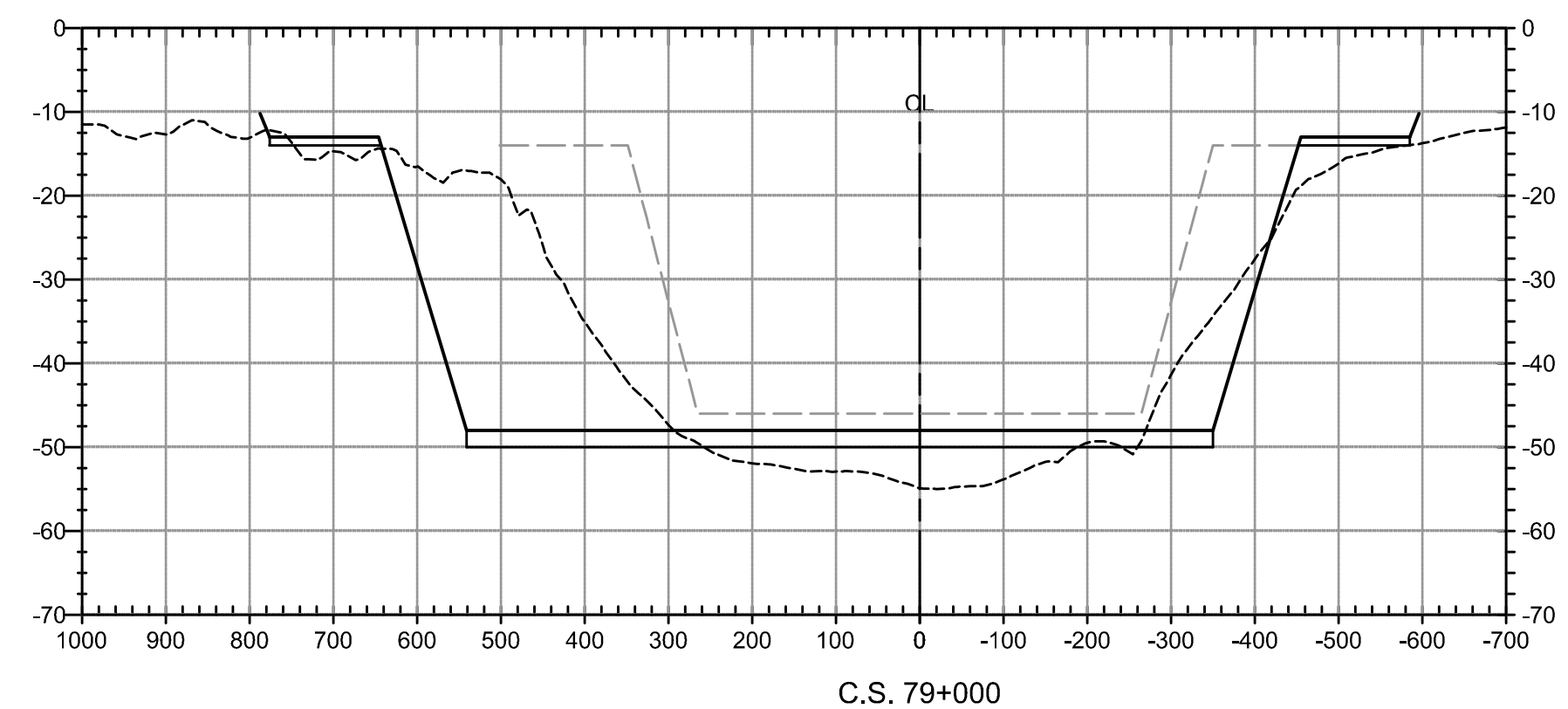
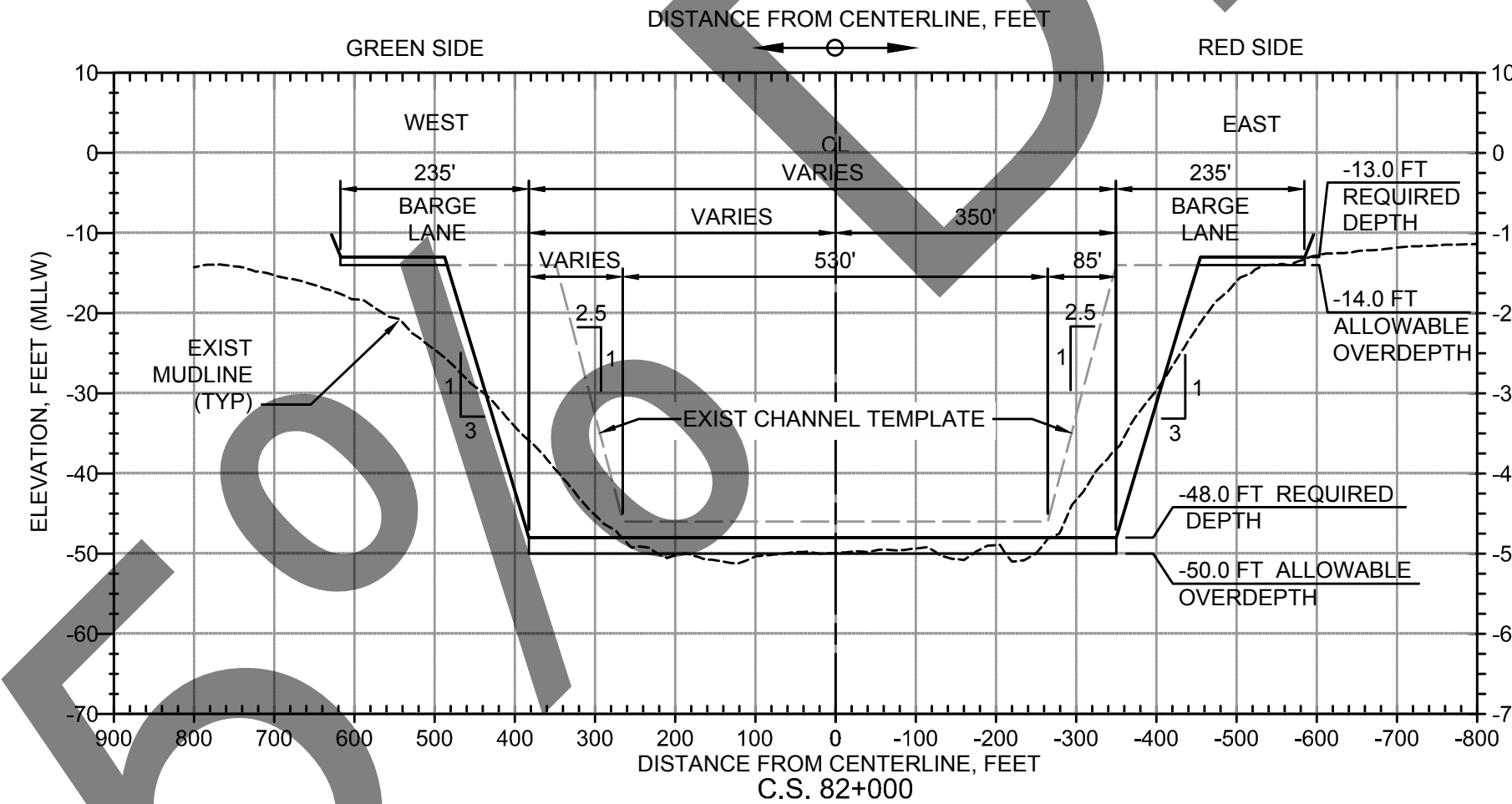
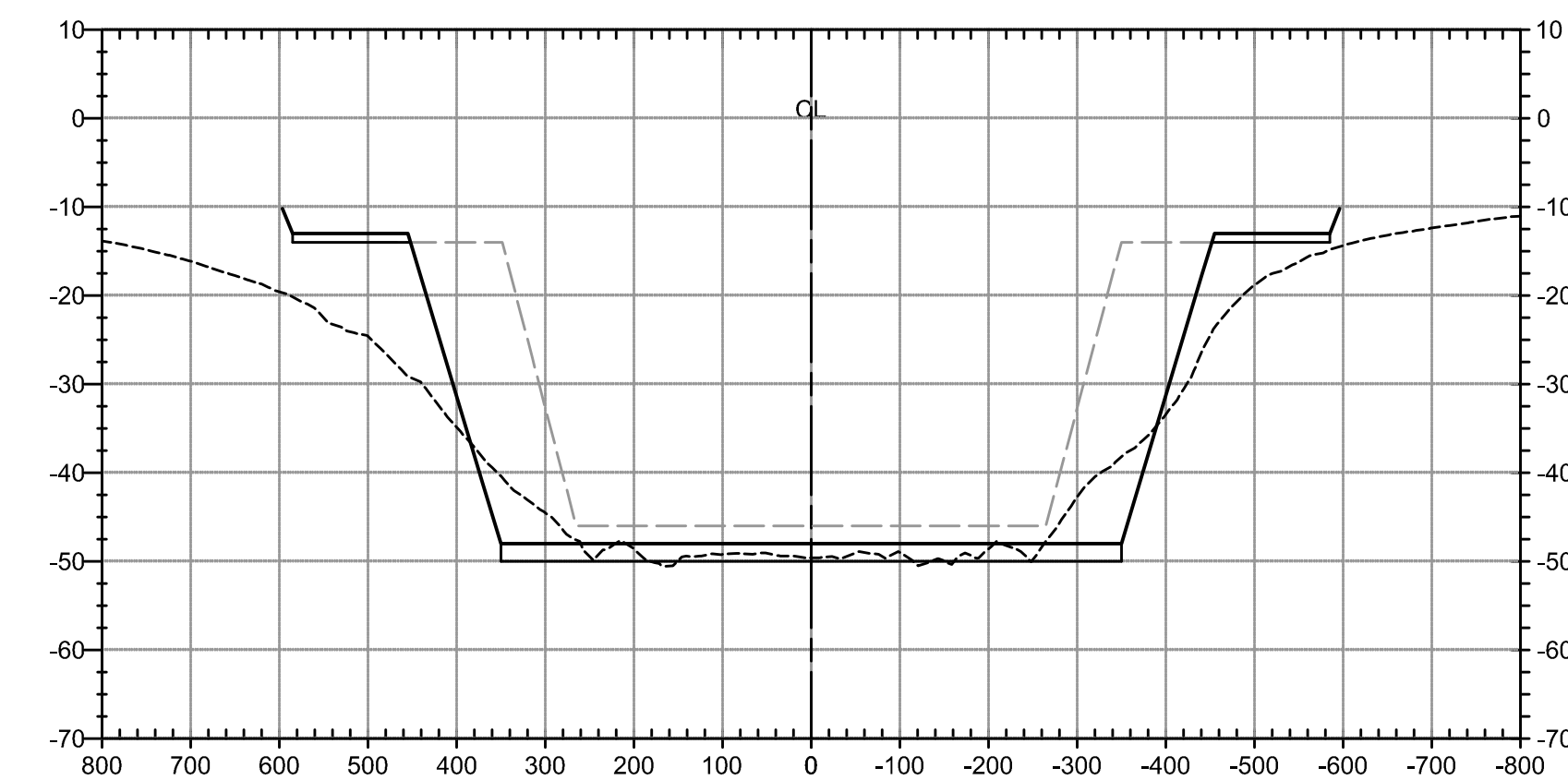
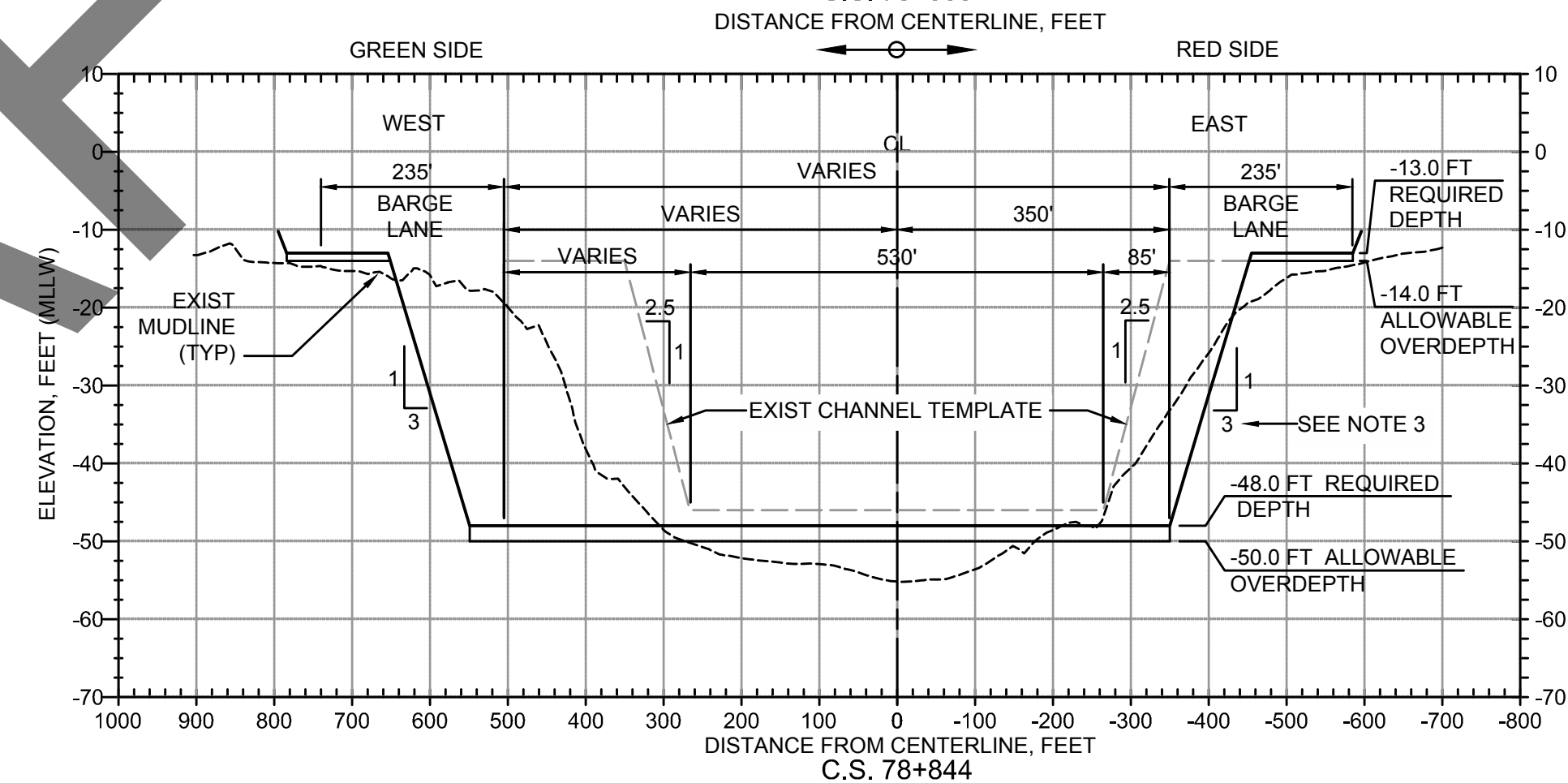
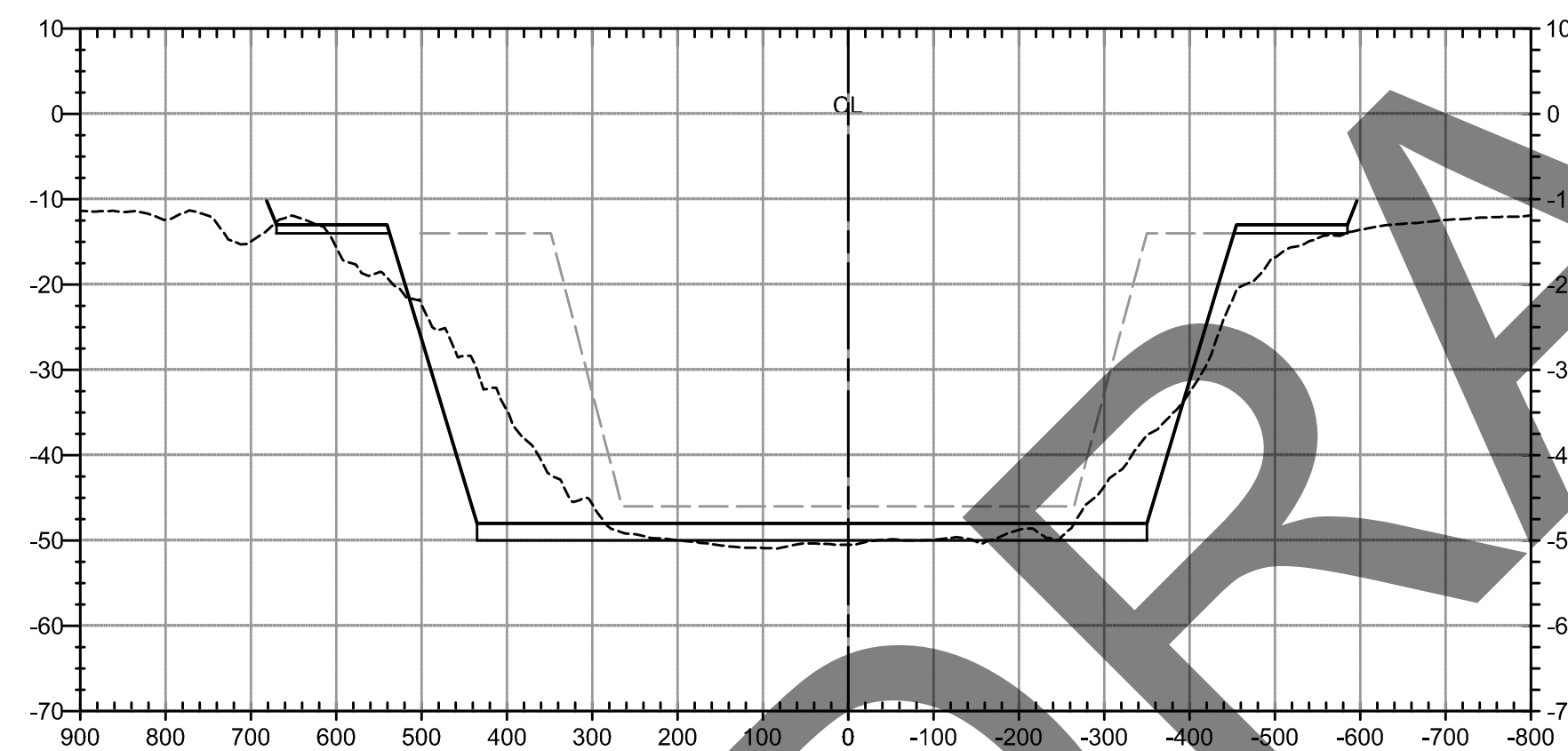
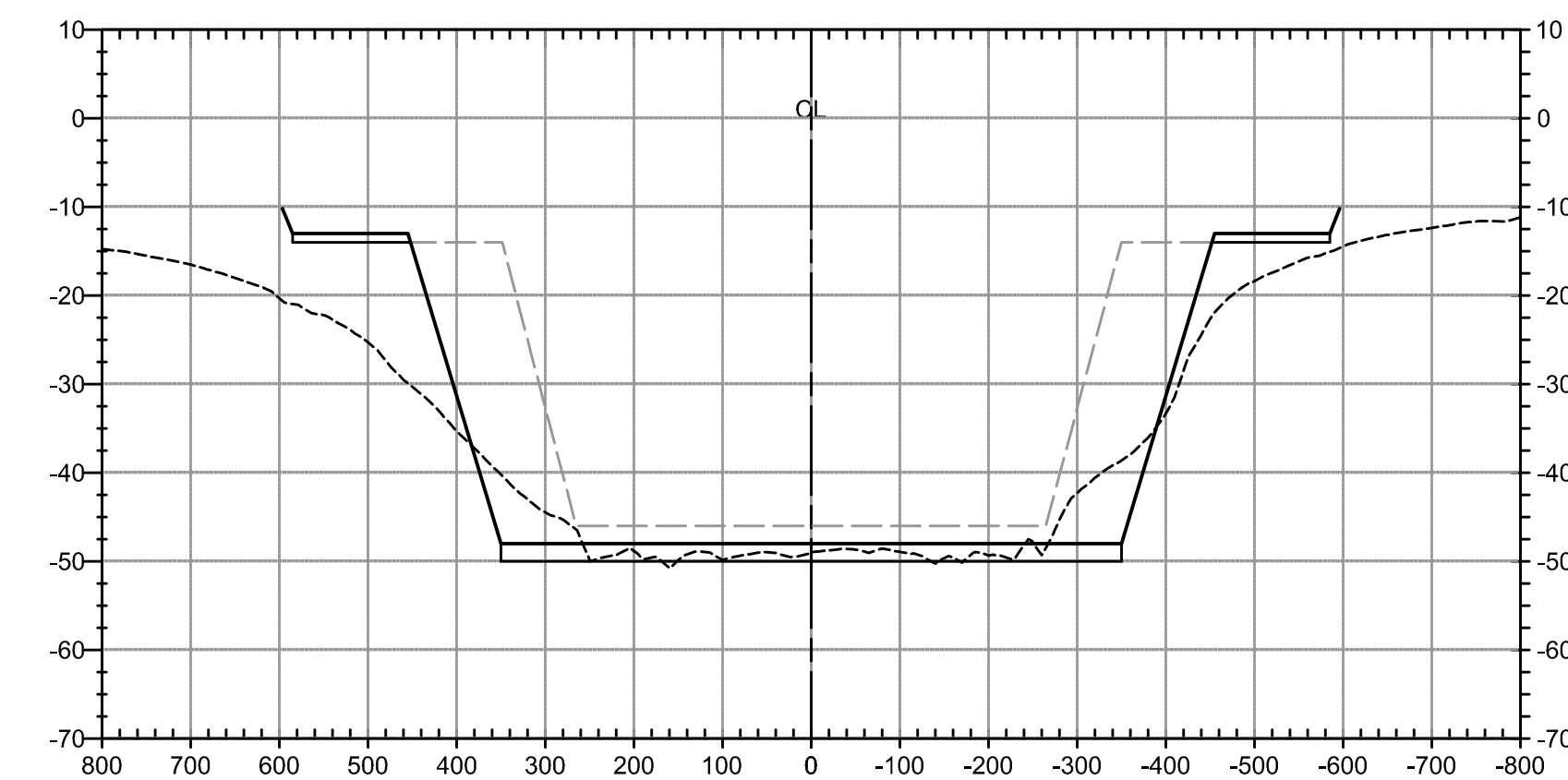
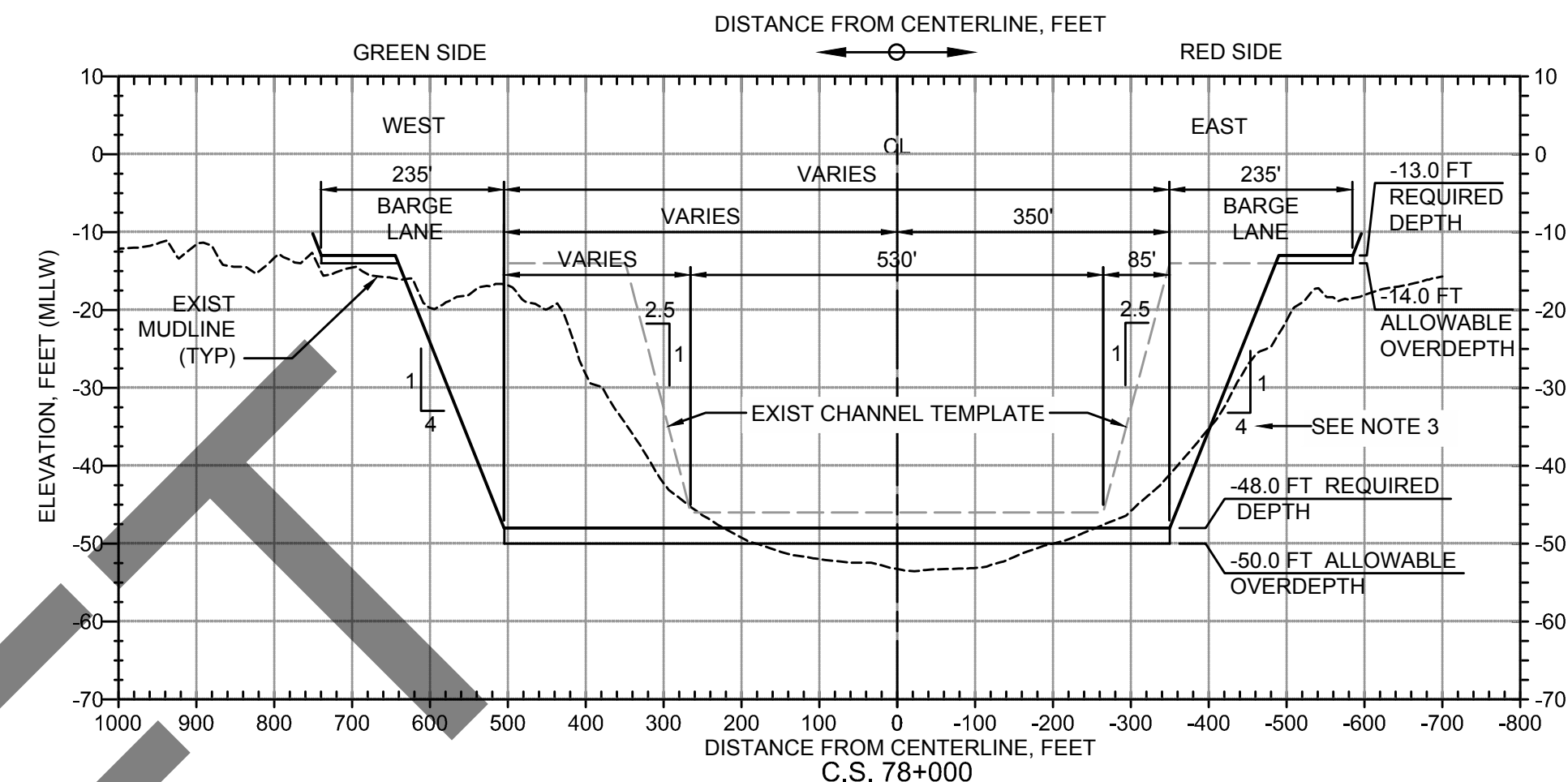
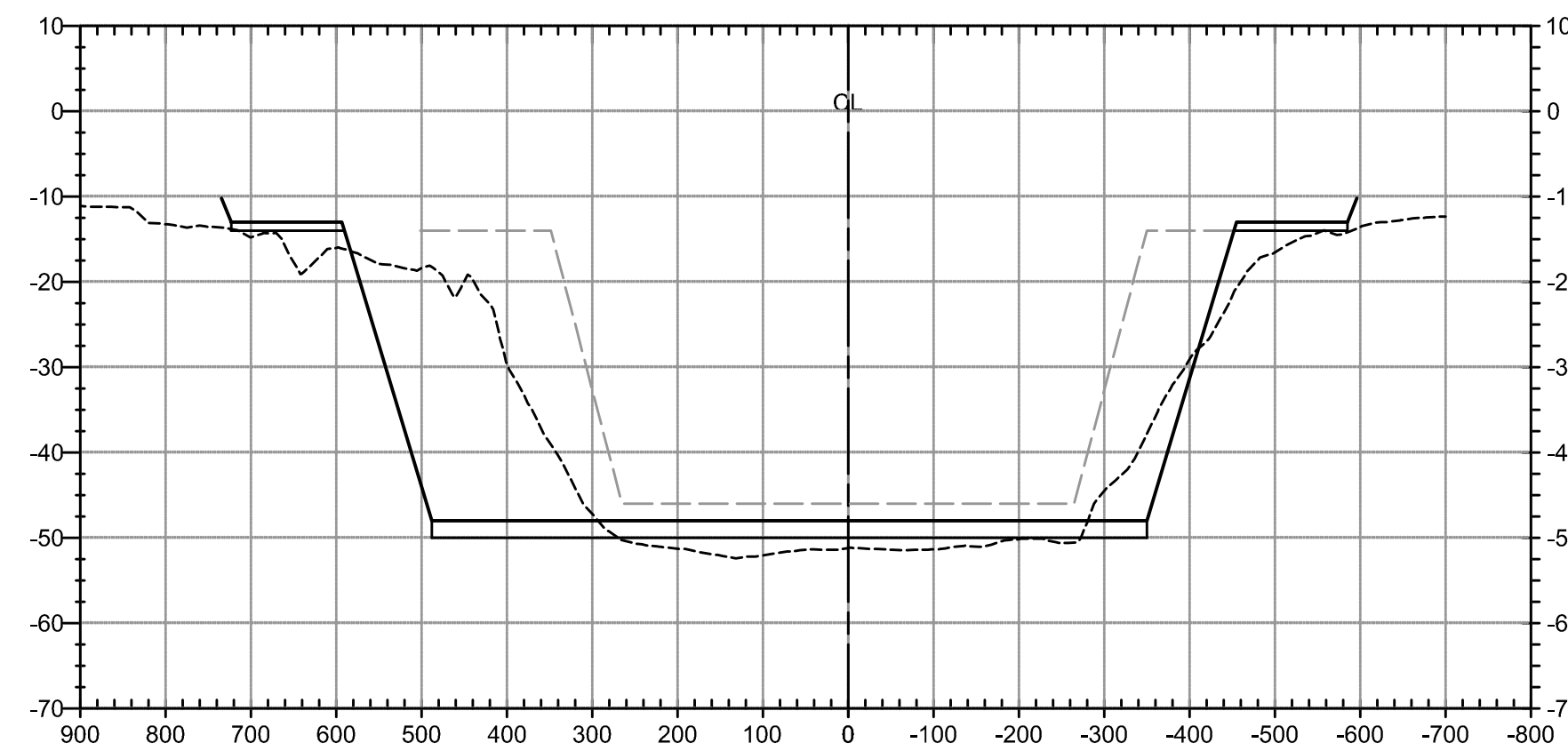
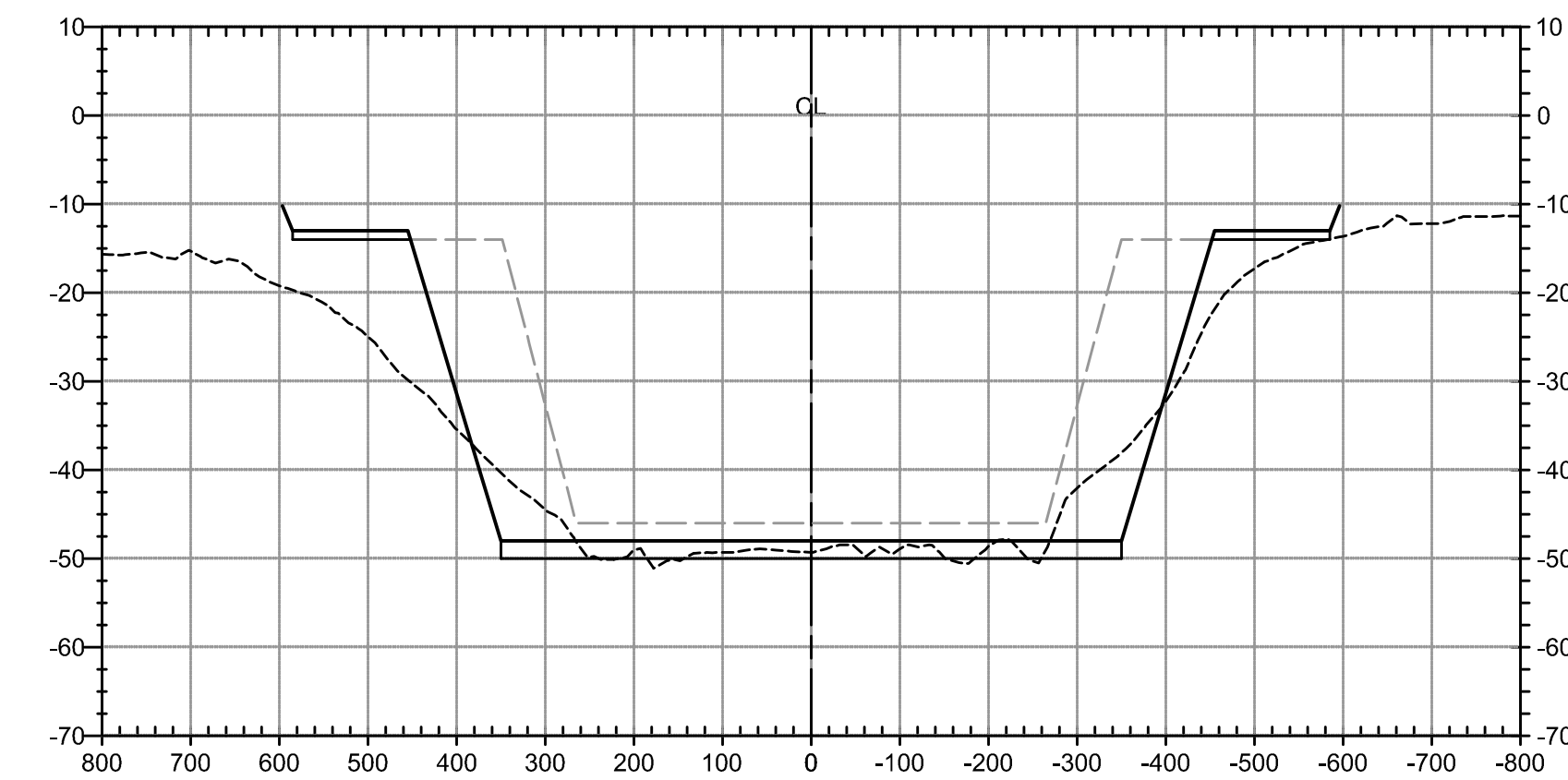
DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	DEC 2020
SCALE:	AS SHOWN

DRAWING NO.

C90-D13-P11-004-CN301

SHEET NO.	REV. NO.
14	0

95% SUBMITTAL



NOTES:

1. ALL ELEVATIONS SHOWN IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW).
2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.
3. CHANNEL CUT SLOPE TRANSITION FROM 4H/1V @ HSC STA 78+000 TO 3H/1V @ HSC STA 78+200. TRANSITION DISTANCE IS 200 FT.
4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.
5. SEE TYPICAL EXISTING CHANNEL TEMPLATE DETAIL SHOWN ON DWG NO. CN301.

GRAPHIC SCALES

HORIZONTAL: 1" = 200'

0 200' 400'

VERTICAL: 1" = 20'

0 20' 40'

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 and letters are rendered in a stylized, metallic-looking font. Surrounding the central design is a circular border containing the text 'PORT OF HOUSTON AUTHORITY' at the top and 'HOUSTON, TEXAS' at the bottom, separated by small decorative elements.

**PORT OF HOUSTON
AUTHORITY**

CONSULTANT:

SEAL:
95% PRELIMINARY
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ENGINEER: Ashley P. Judith
P.E NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E NO: 100209
DATE: 09-30-2021

APPROVED: _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL DREDGE
CROSS SECTIONS - 2
HSC STA 87+000 TO
HSC STA 78+000**

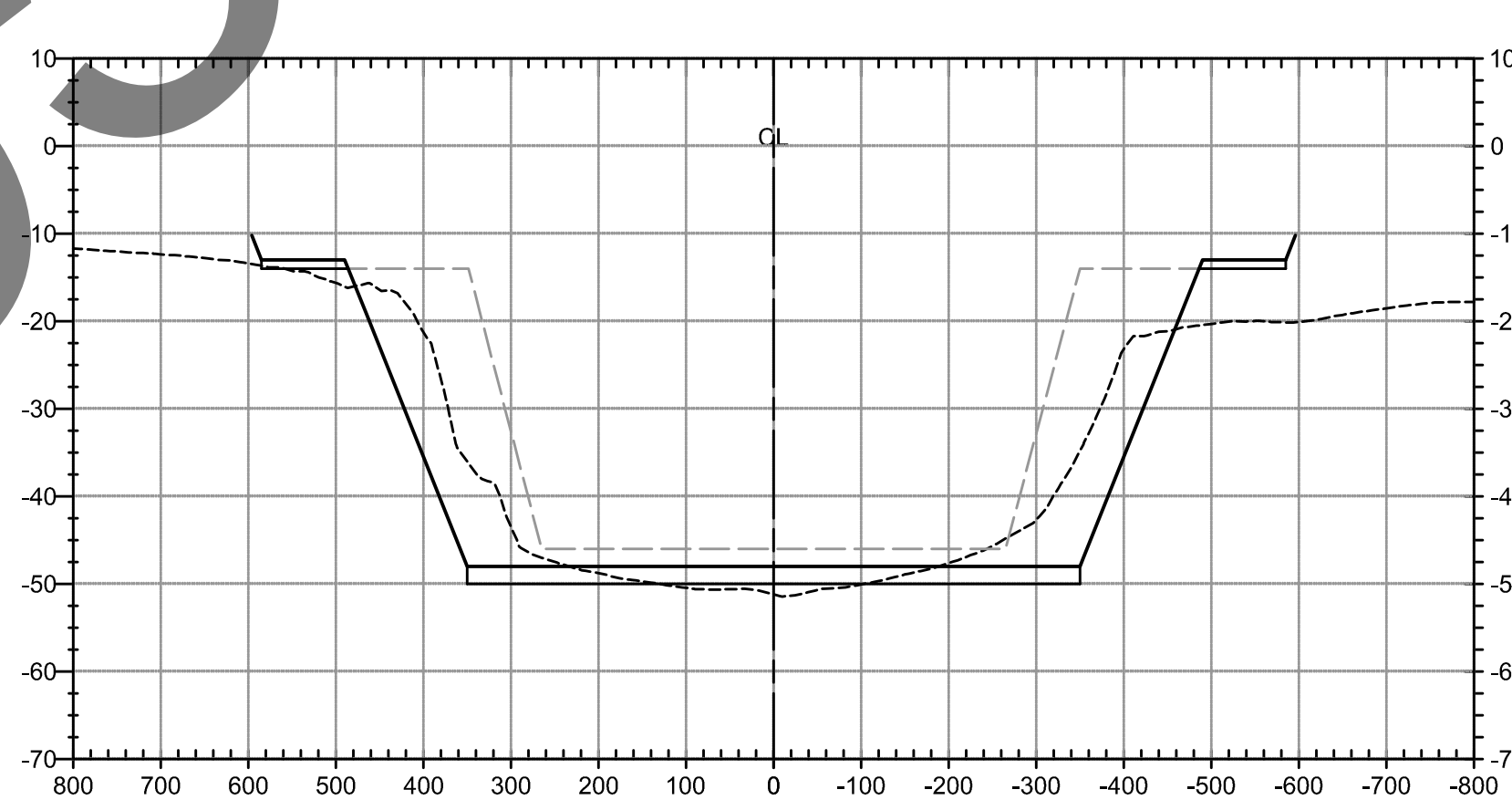
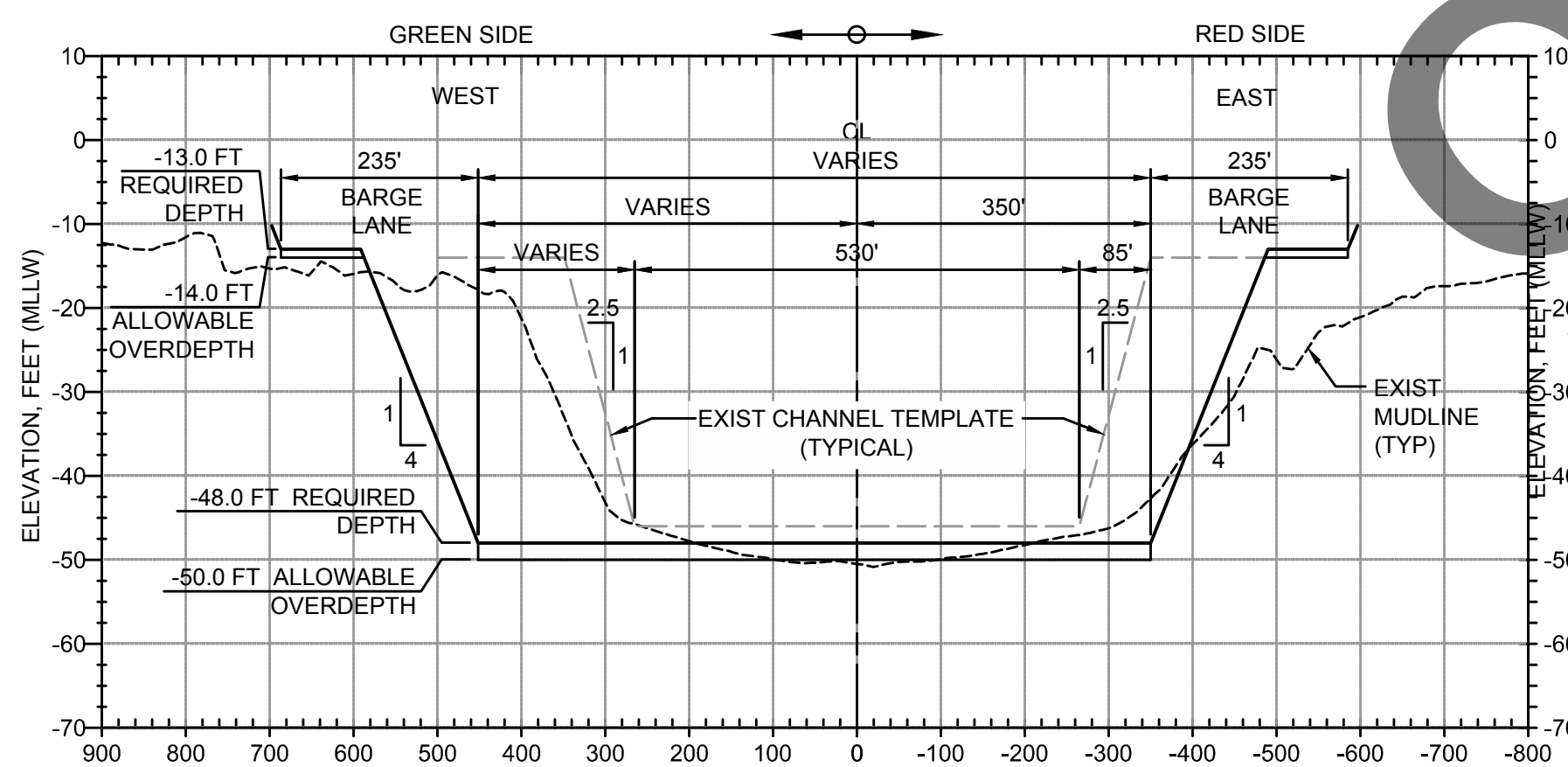
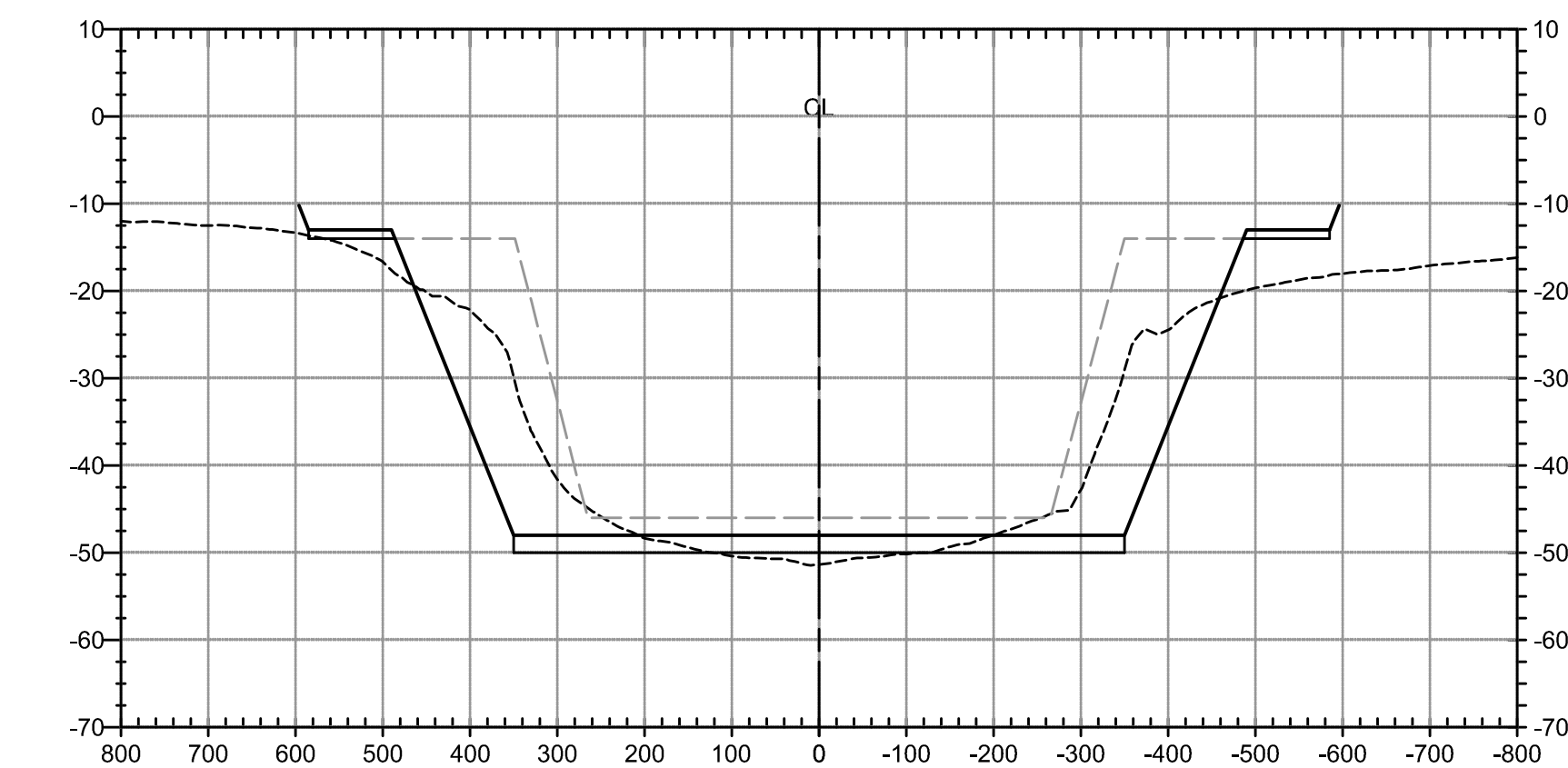
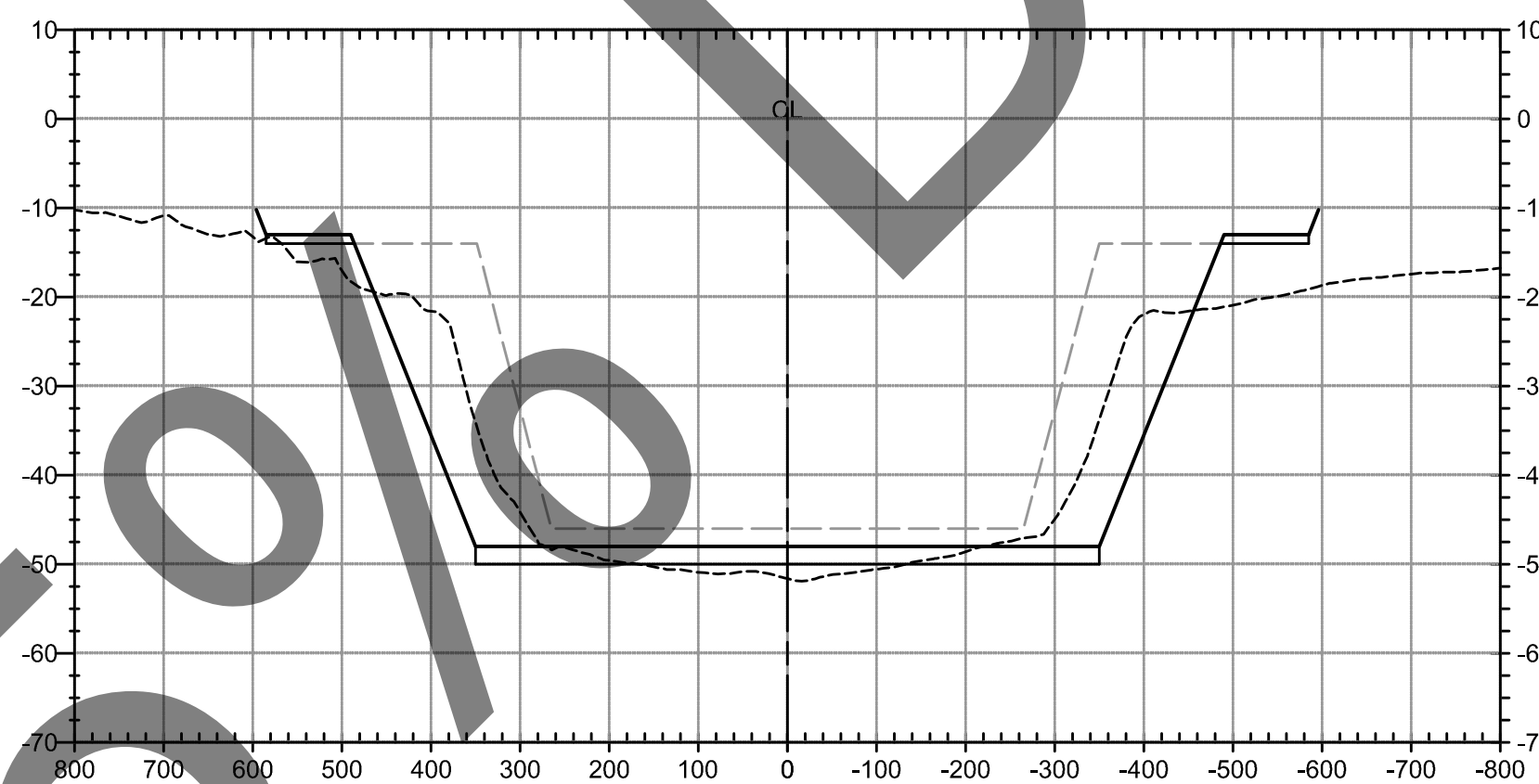
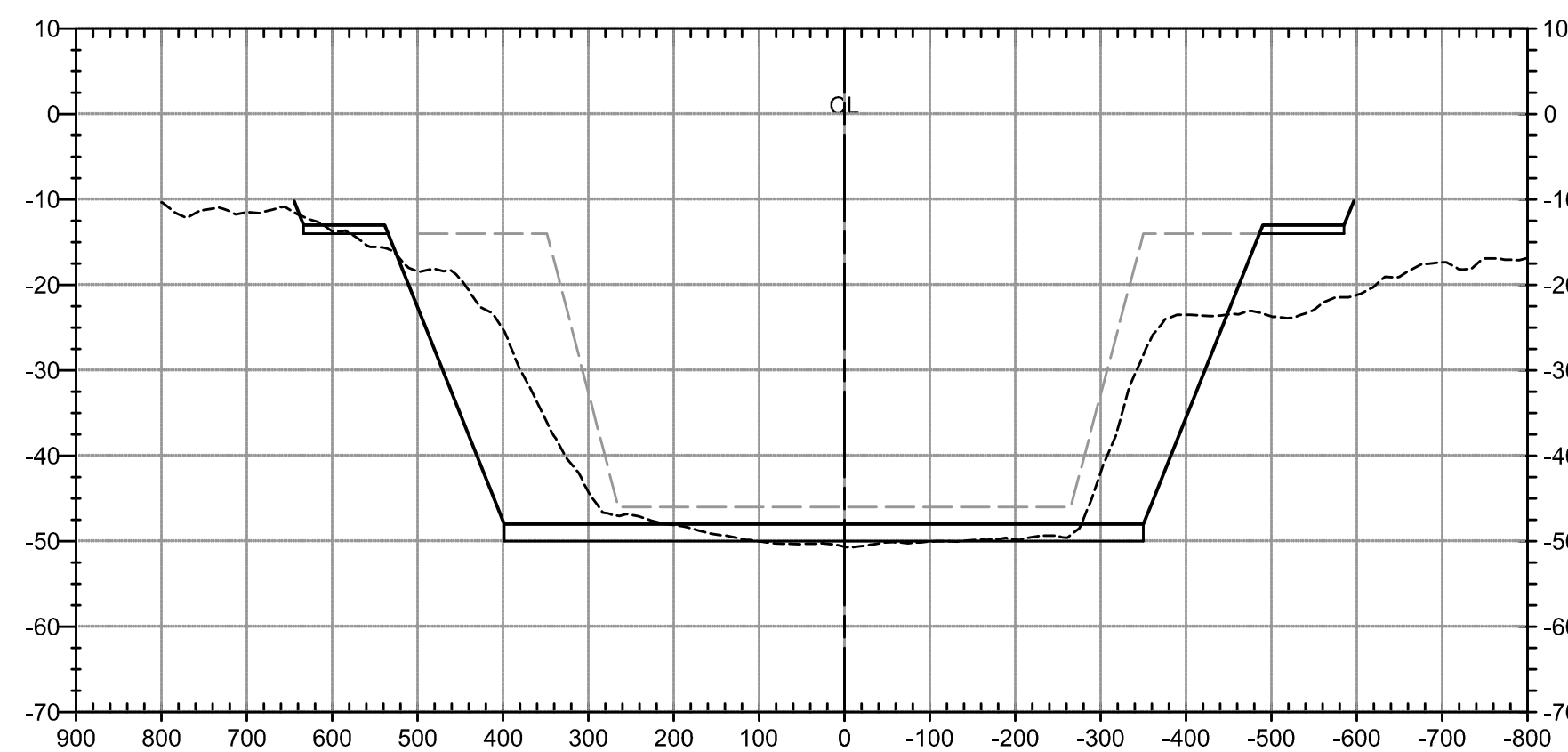
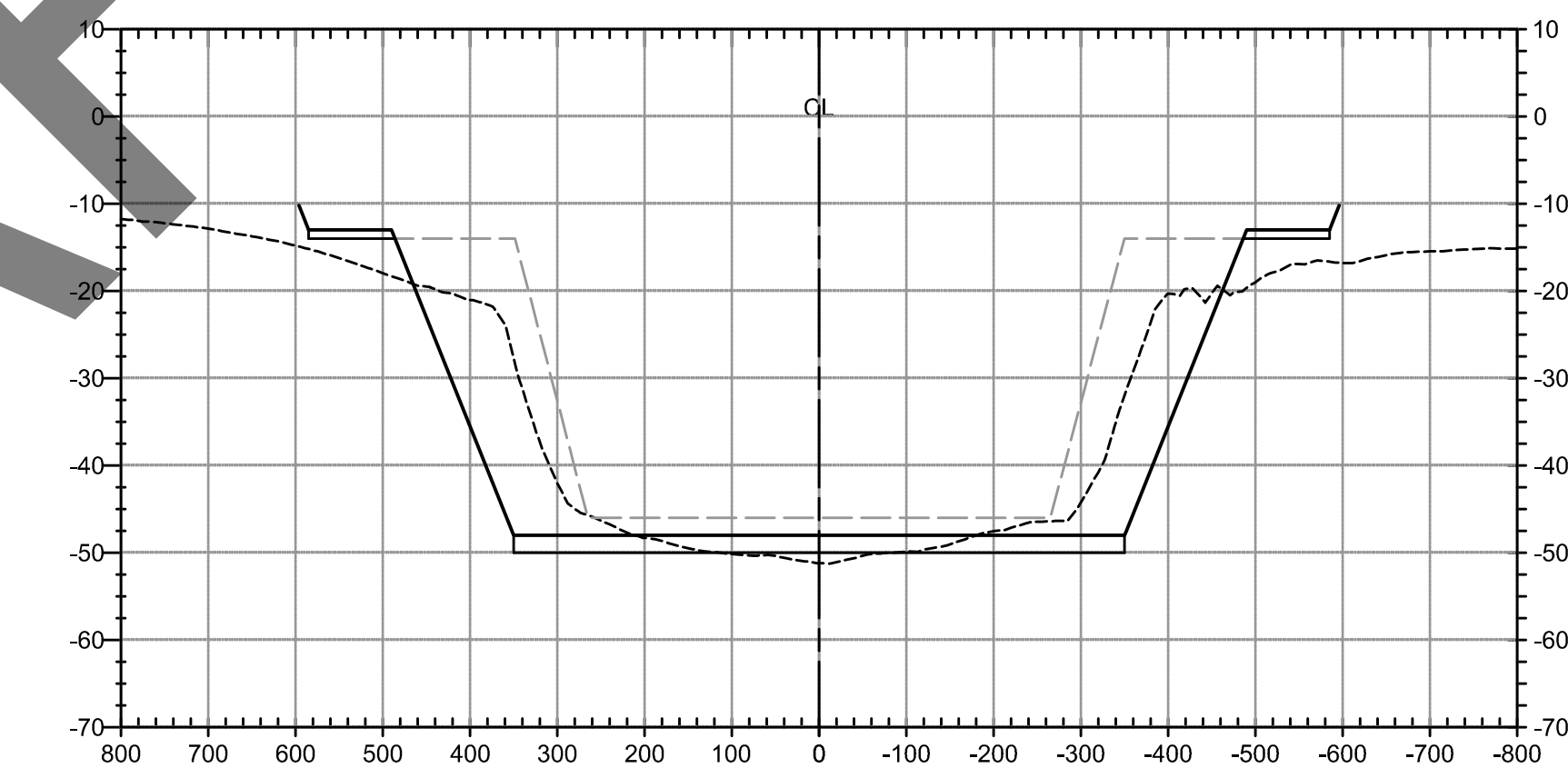
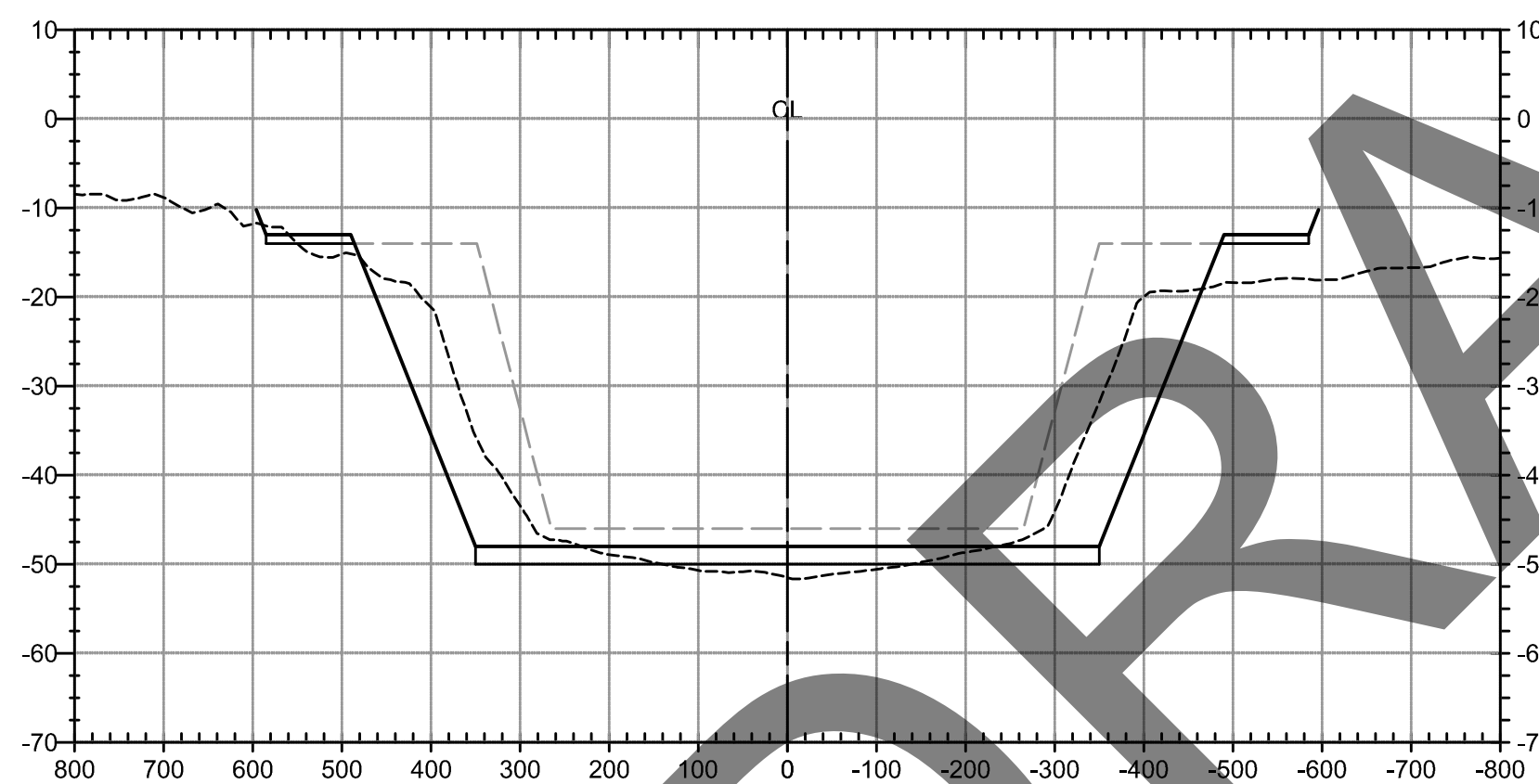
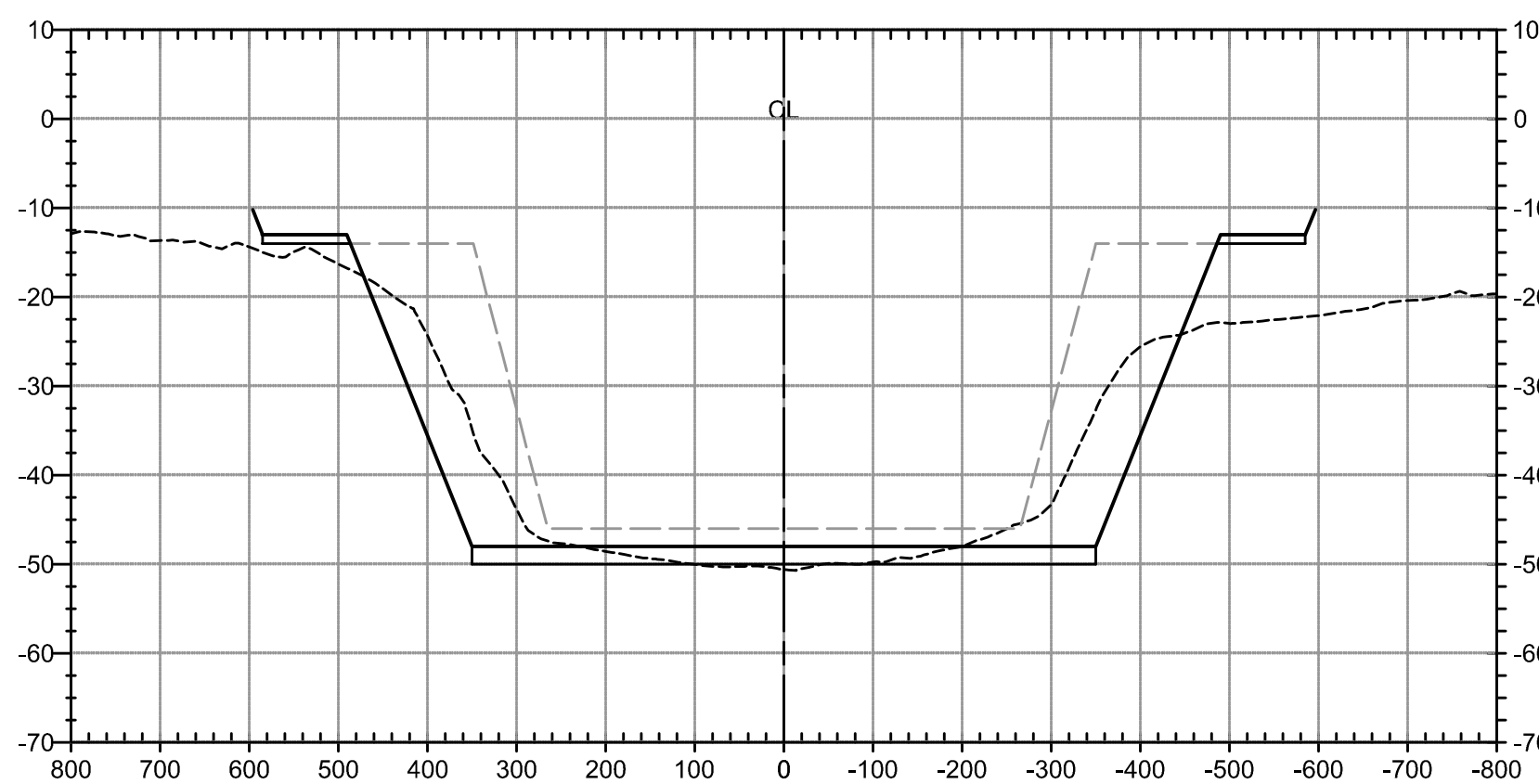
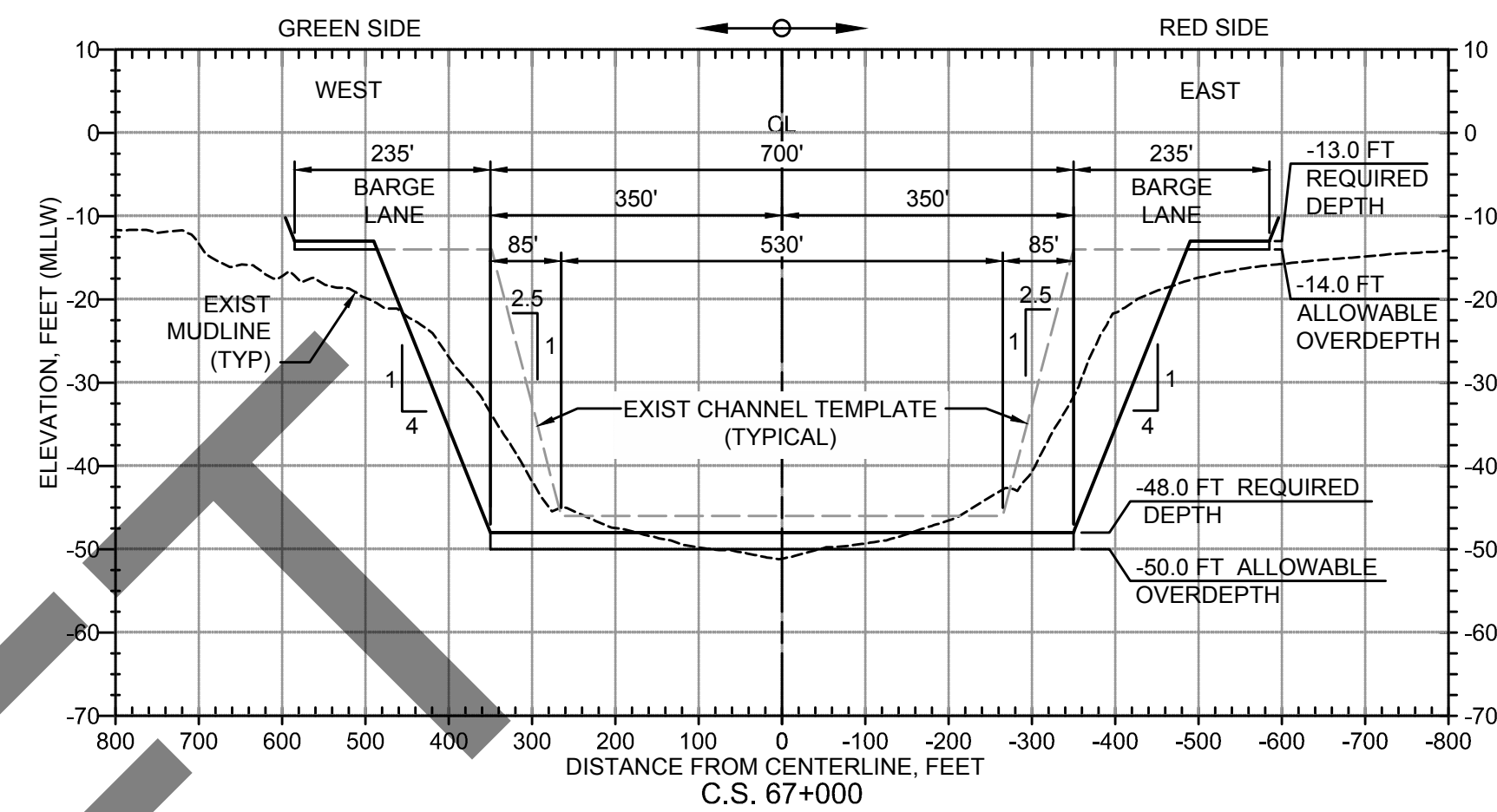
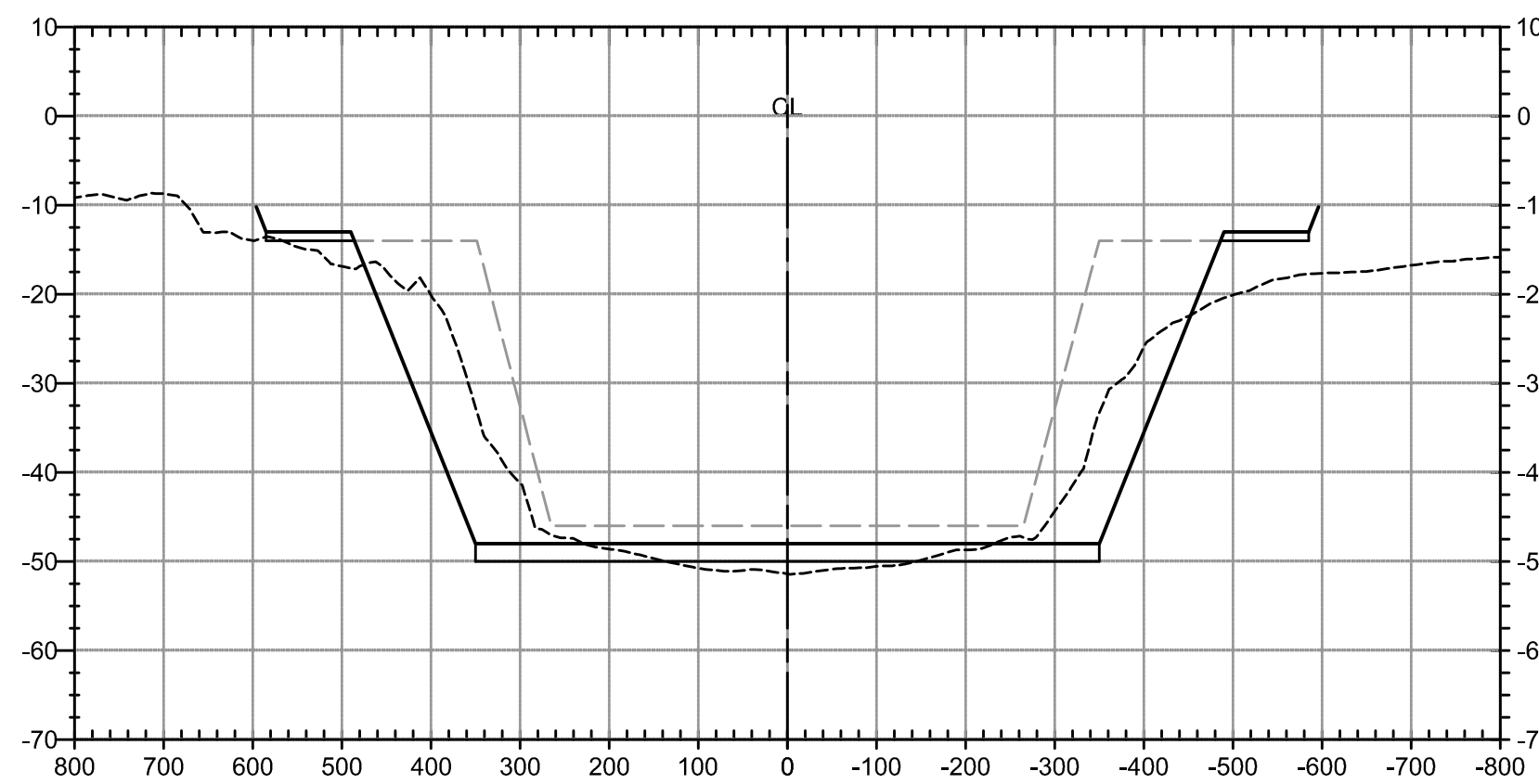
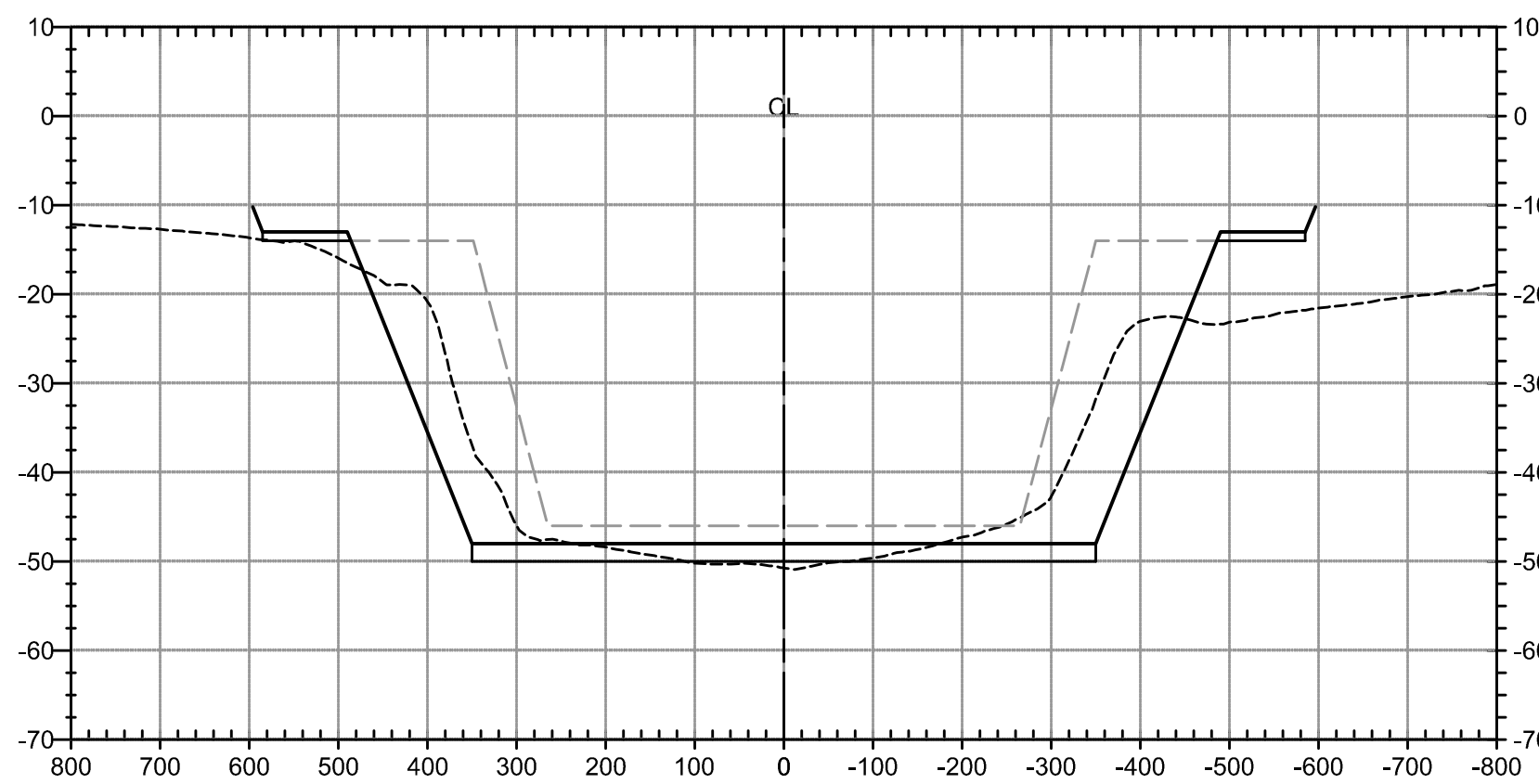
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DESIGNER:	AJ
CADD:	RK
CHECKER:	CH/SH/MM
DATE:	DEC 2020
SCALE:	AS SHOWN

DRAWING NO.
C90-D13-P11-004-CN302

SHEET NO.	REV. NO.
15	0

95% SUBMITTAL



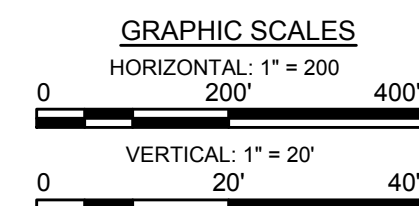
NOTES:

1. ALL ELEVATIONS SHOWN IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW).
2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.
3. ~~ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.~~
4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.
5. SEE TYPICAL EXISTING CHANNEL TEMPLATE DETAIL SHOWN ON DWG NO. CN301.

2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.

4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.

5. SEE TYPICAL EXISTING CHANNEL TEMPLATE DETAIL SHOWN ON DWG NO. CN301.



**PORT OF HOUSTON
AUTHORITY**

CONSULTANT:

SEAL:

95% PRELIMINARY

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ENGINEER: Ashley P. Judith
P.E NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E NO: 100209
DATE: 09-30-2021

APPROVED: _____
DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL DREDGE
CROSS SECTIONS - 3
HSC STA 77+000 TO
HSC STA 67+000**

[illegible]

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

DRAWING NO.

C90-D13-P11-004-CN303

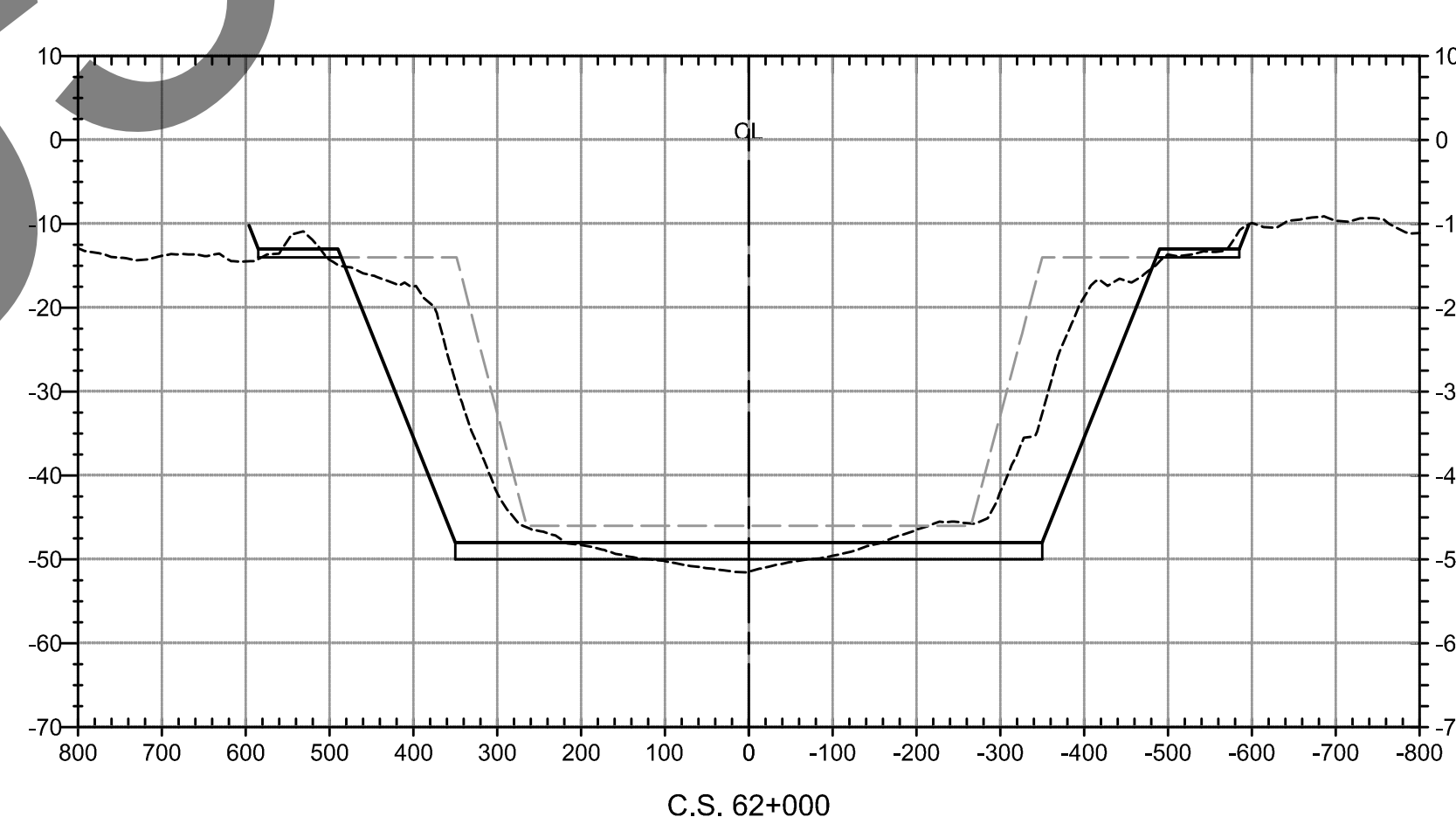
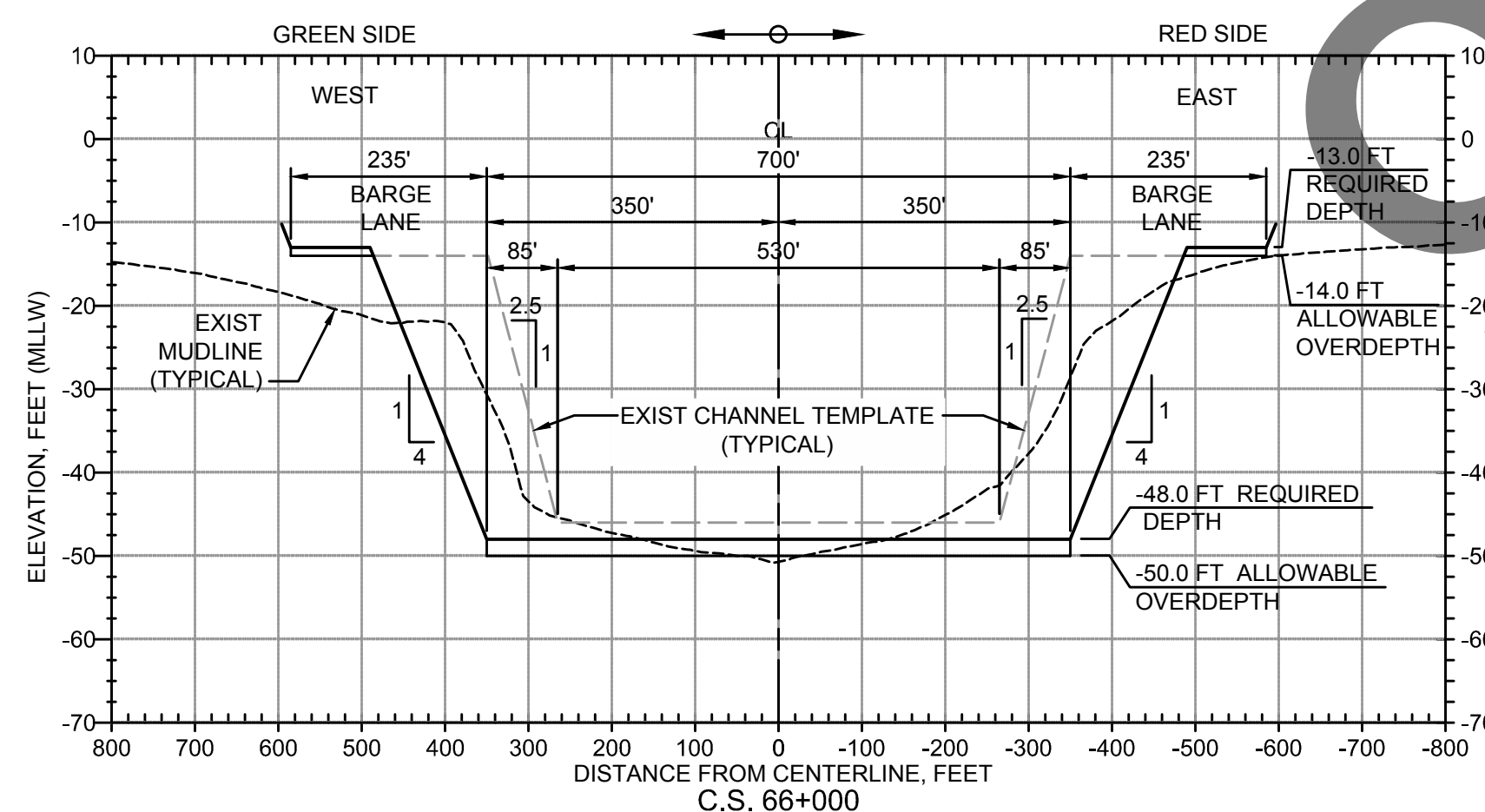
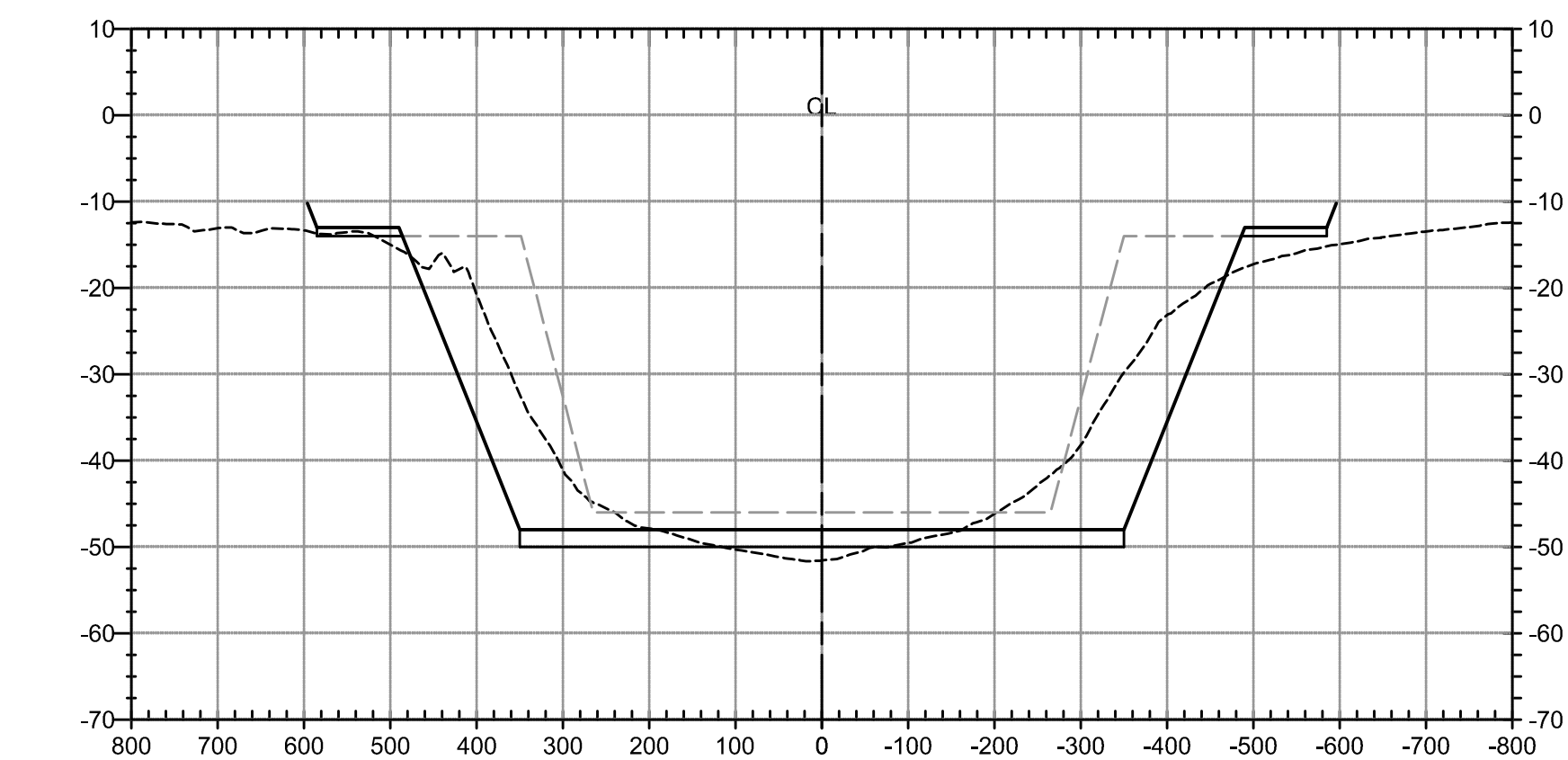
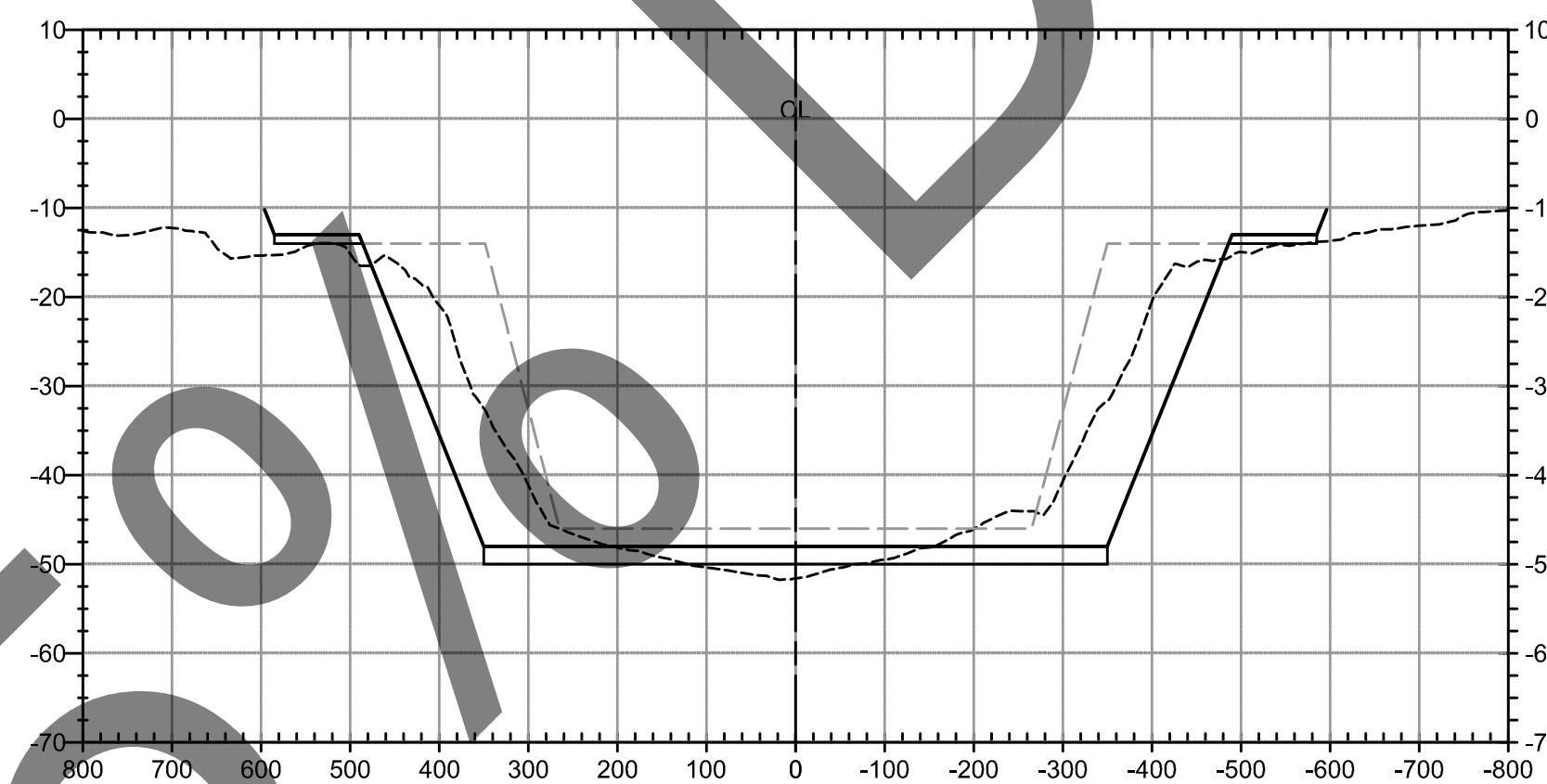
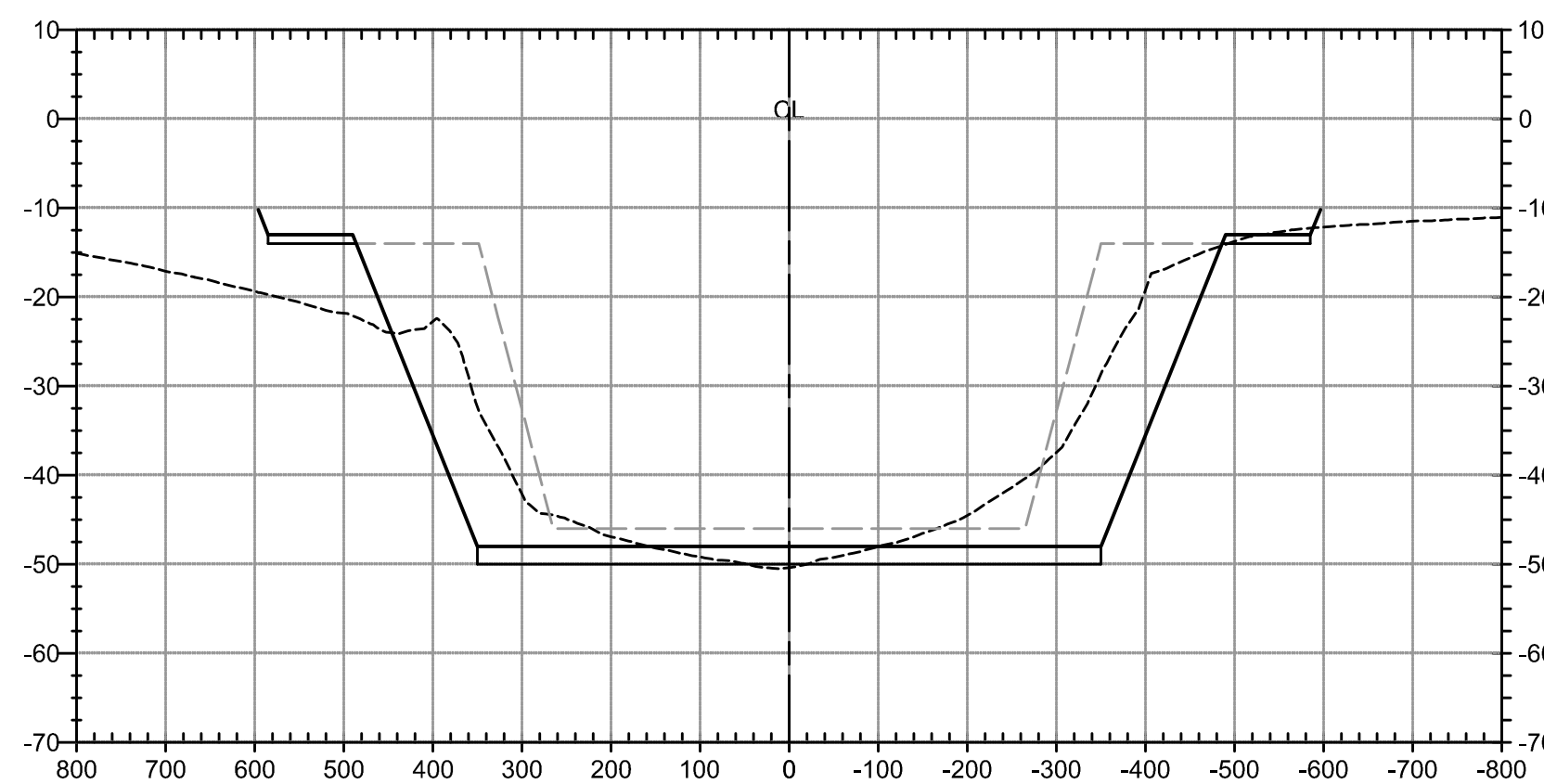
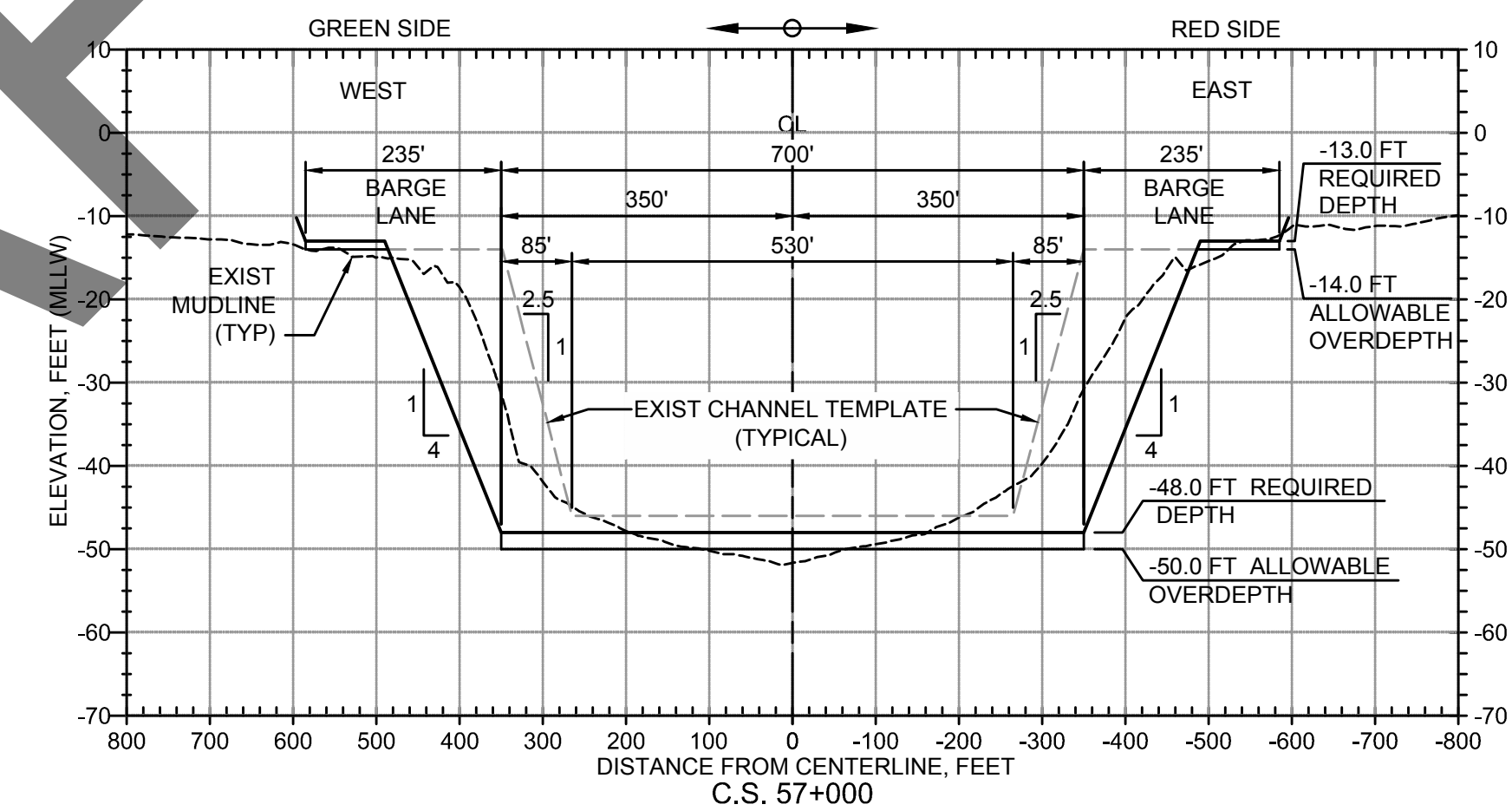
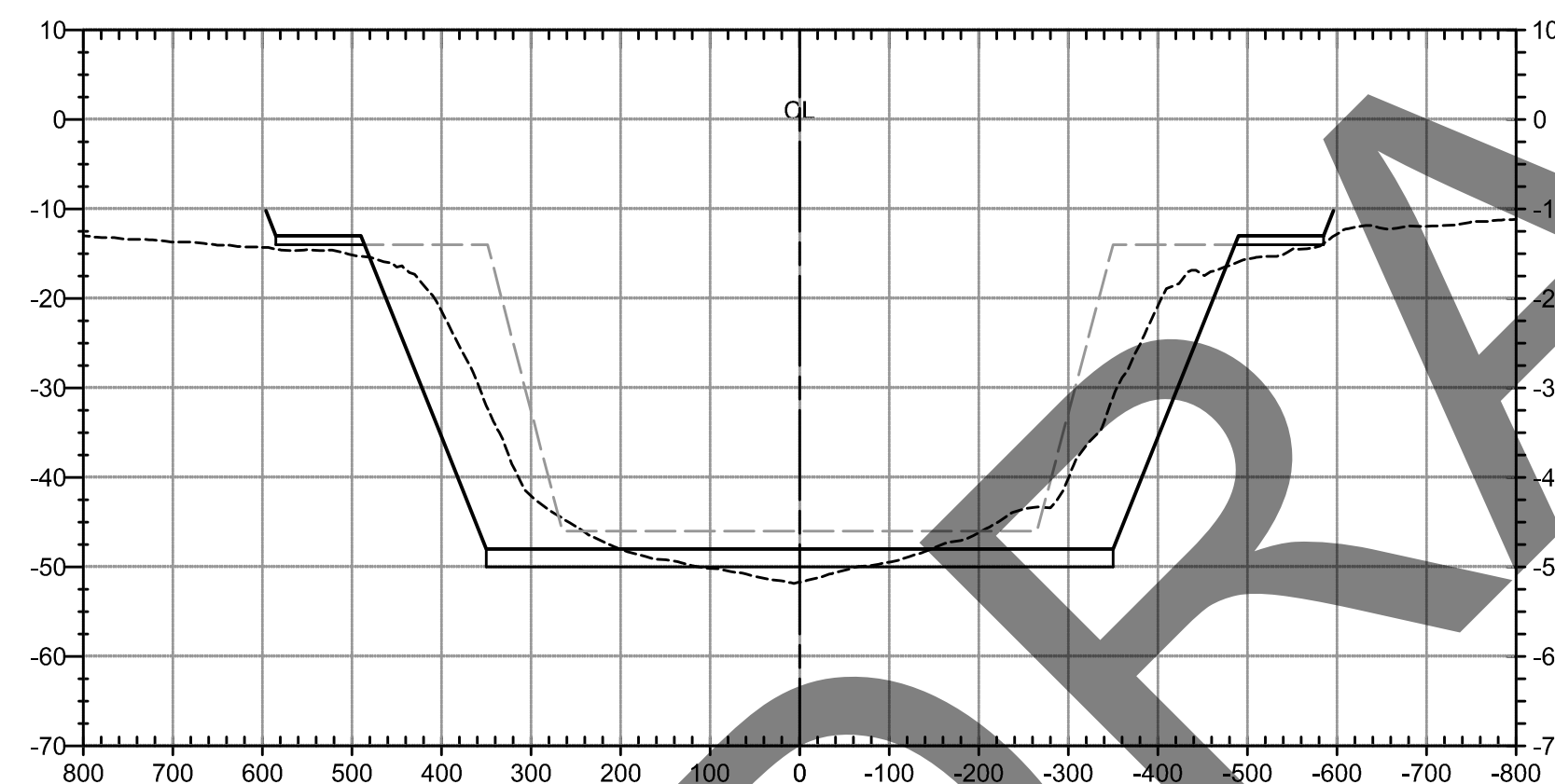
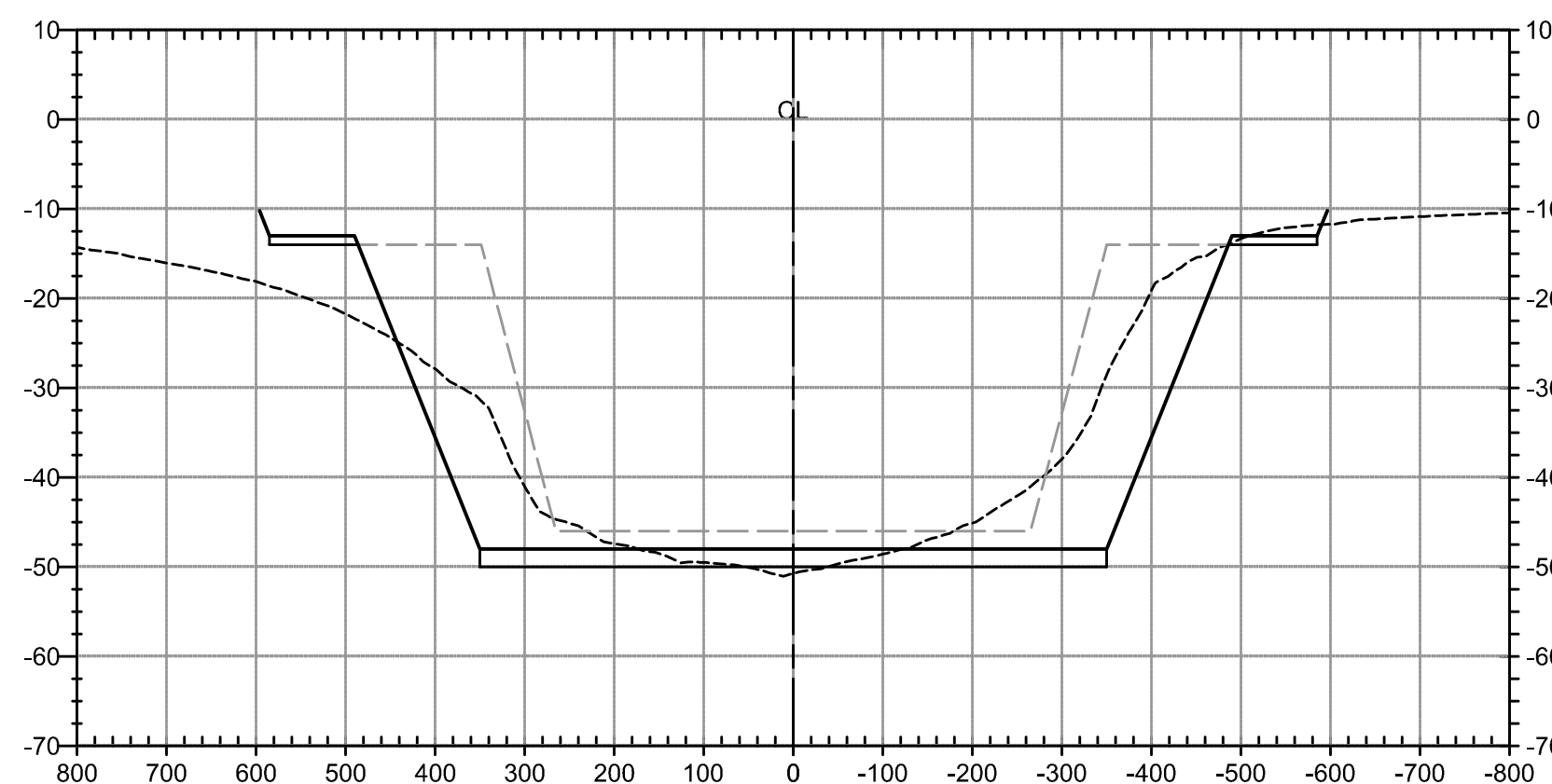
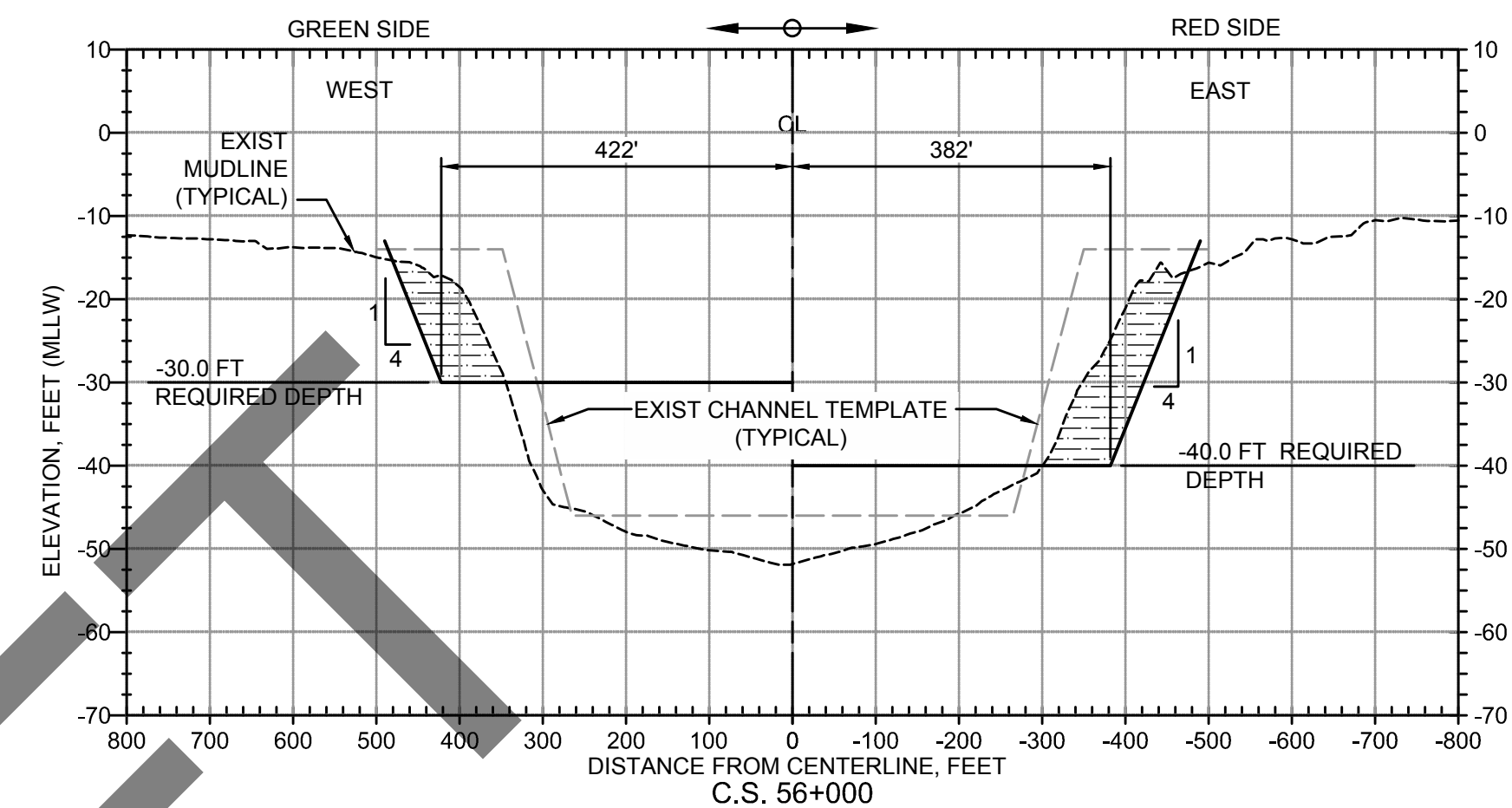
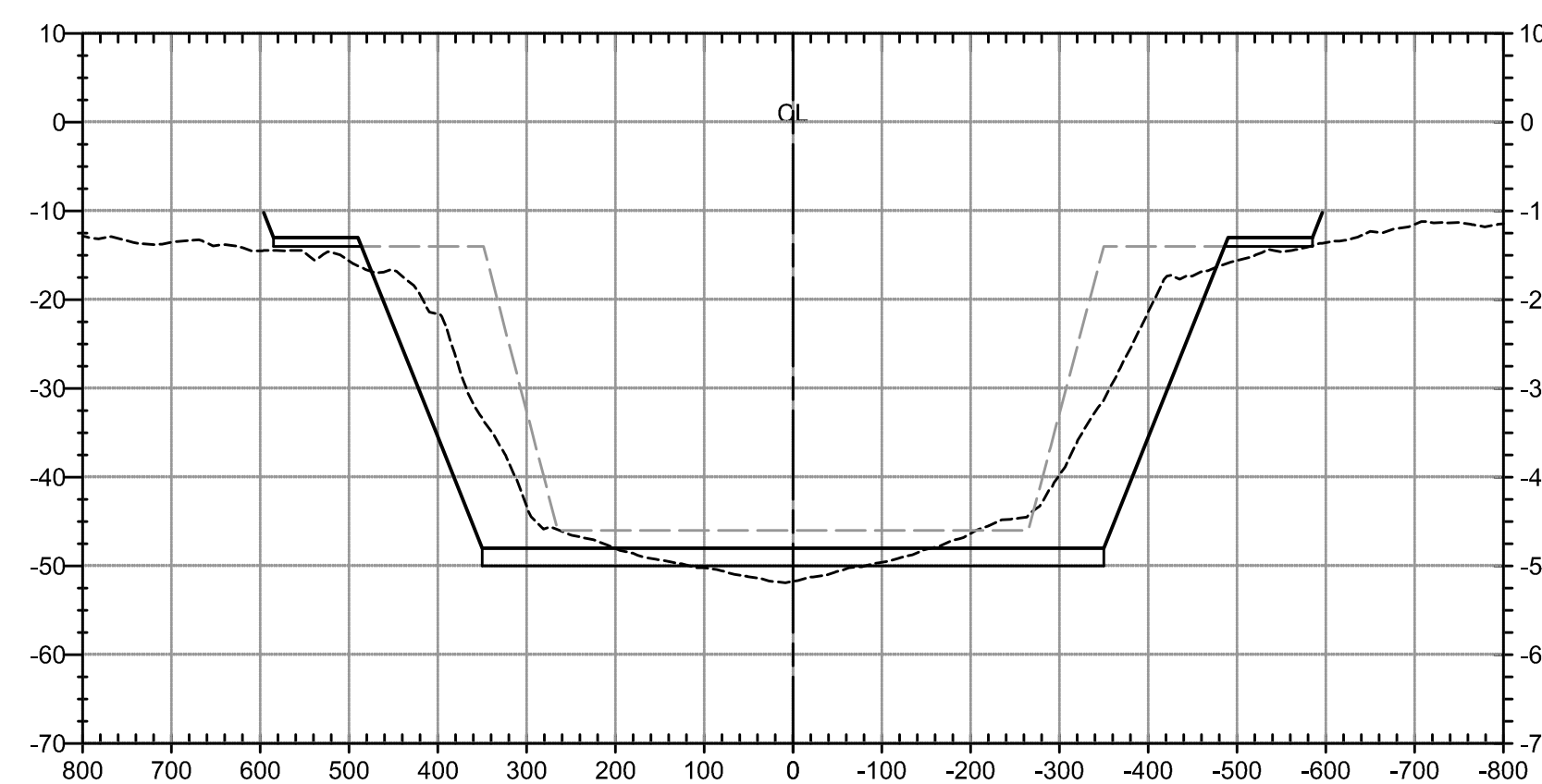
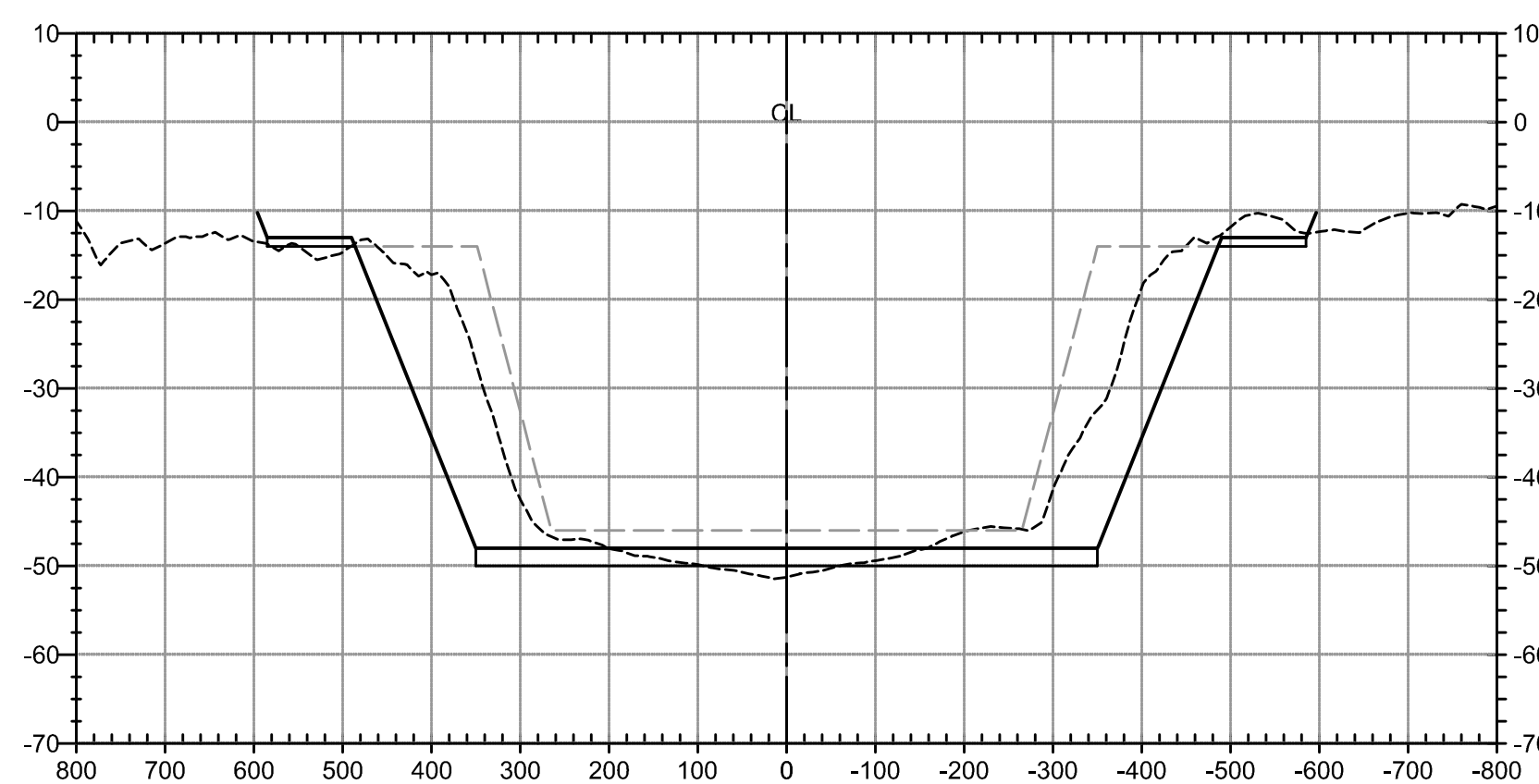
SHEET NO.	REV. NO.
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16	0
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95% SUBMITTAL

95% SUBMITTAL

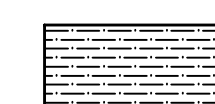
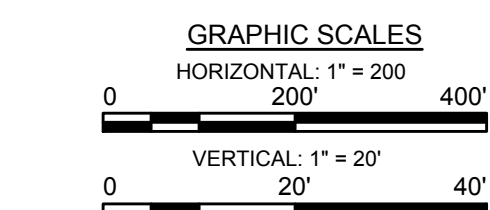
95% SUBMITTAL



- NOTES:

1. ALL ELEVATIONS SHOWN IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW).
2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.
3. CHANNEL CUT SLOPE TRANSITION FROM 3H/1V @ HSC STA 55+800 TO 4V/1H @ HSC STA 56+00. TRANSITION LENGTH IS 200 FT.
4. FOR LIMITS OF STRIP DREDGING, SEE DREDGE PLAN - 4, DWG NO. CN104.
4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.
5. SEE TYPICAL EXISTING CHANNEL TEMPLATE DETAIL SHOWN ON DWG NO. CN301.

LEGEND:

LIMITS OF STRIP DREDGING FROM
HSC STA 57+000 TO HSC STA
45+000 FOR ODMDS PLACEMENTThe 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.

**PORT OF HOUSTON
AUTHORITY**

CONSULTANT:

SEAL:

95% PRELIMINARY
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ENGINEER: Ashley P. Judith
P.E. NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E. NO: 100209
DATE: 09-30-2021

APPROVED:

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:

**HOUSTON SHIP
CHANNEL (HSC)**

**EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)**

SHEET TITLE:

PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL DREDGE
CROSS SECTIONS - 4
HSC STA 66+000 TO
HSC STA 56+000**

[illegible]

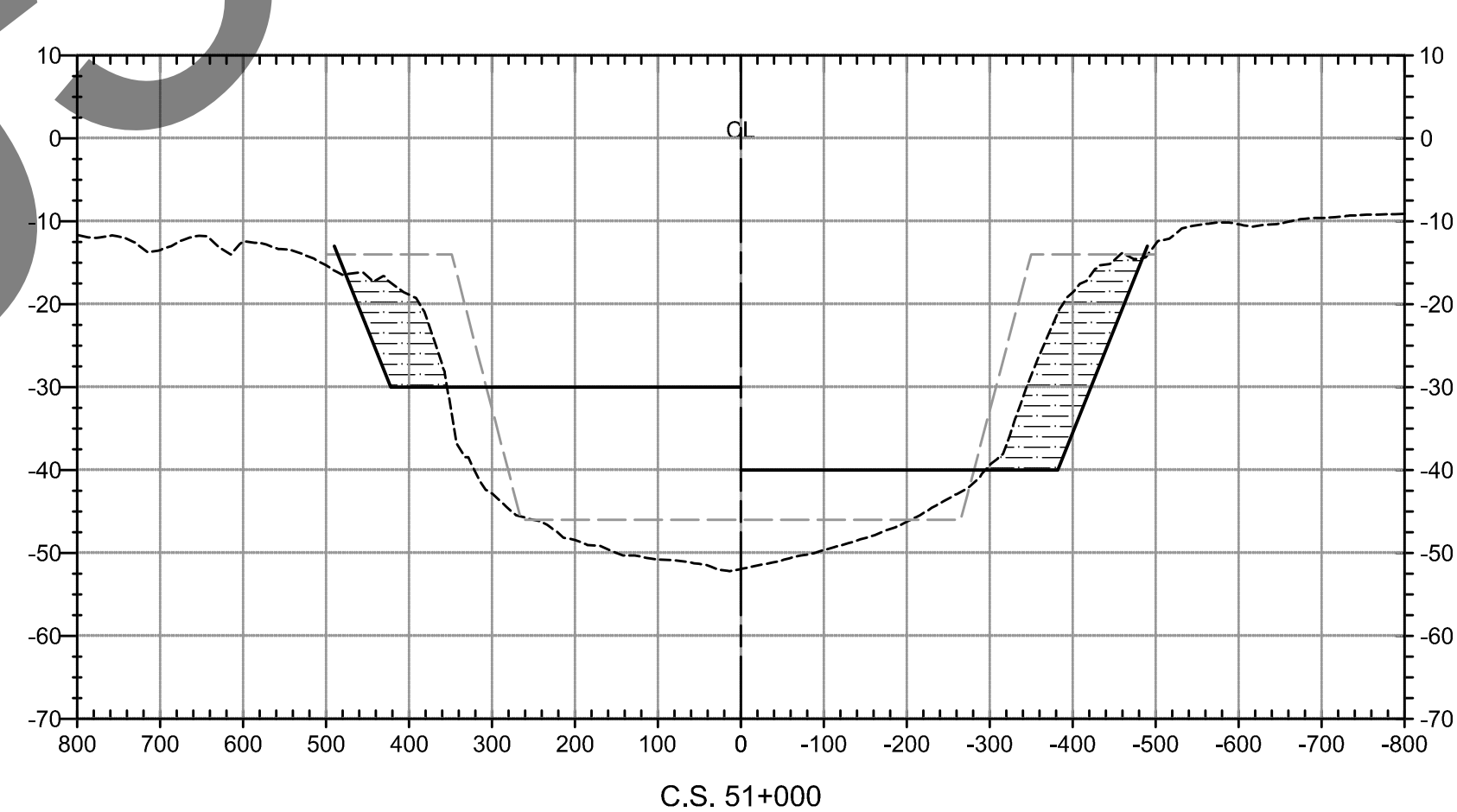
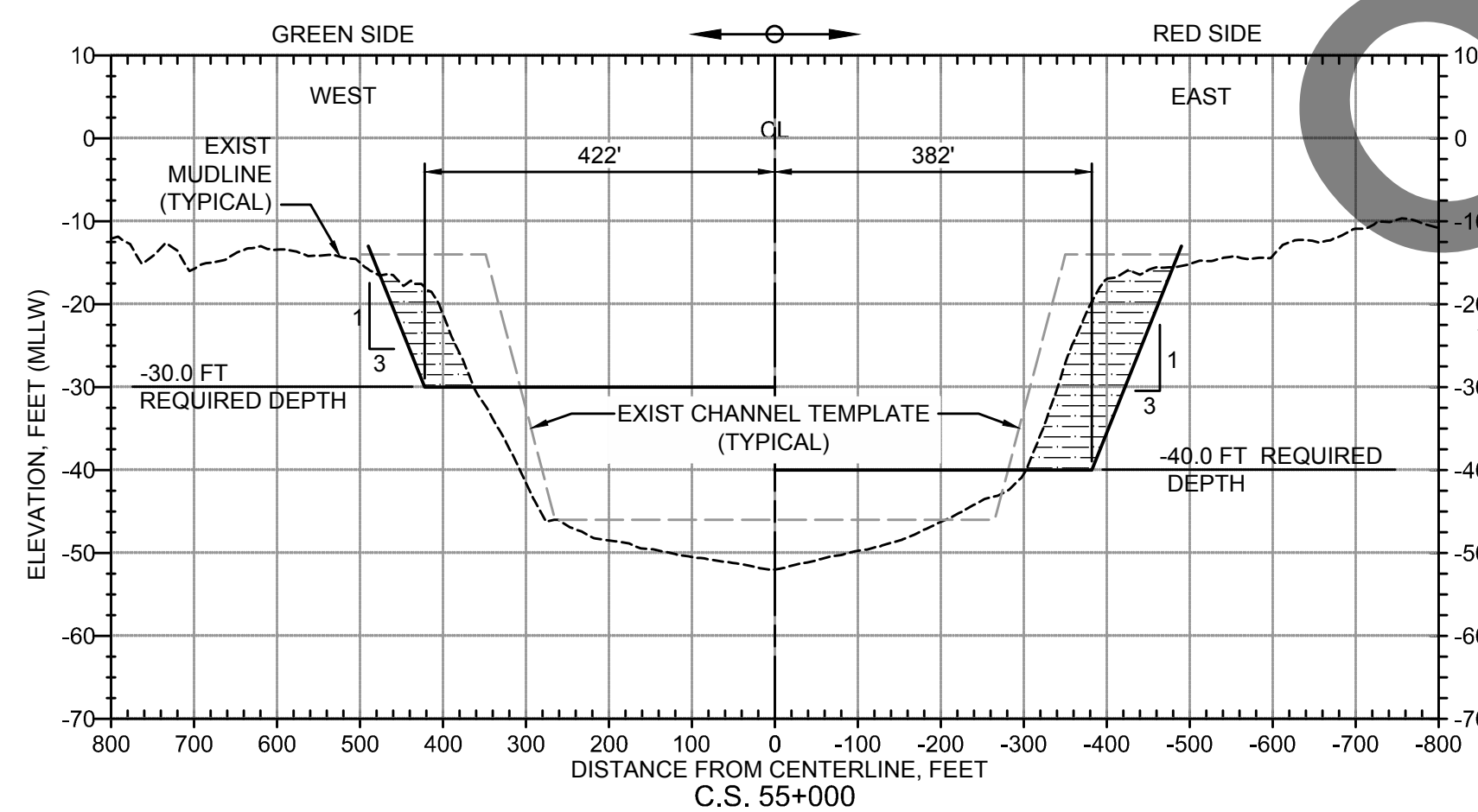
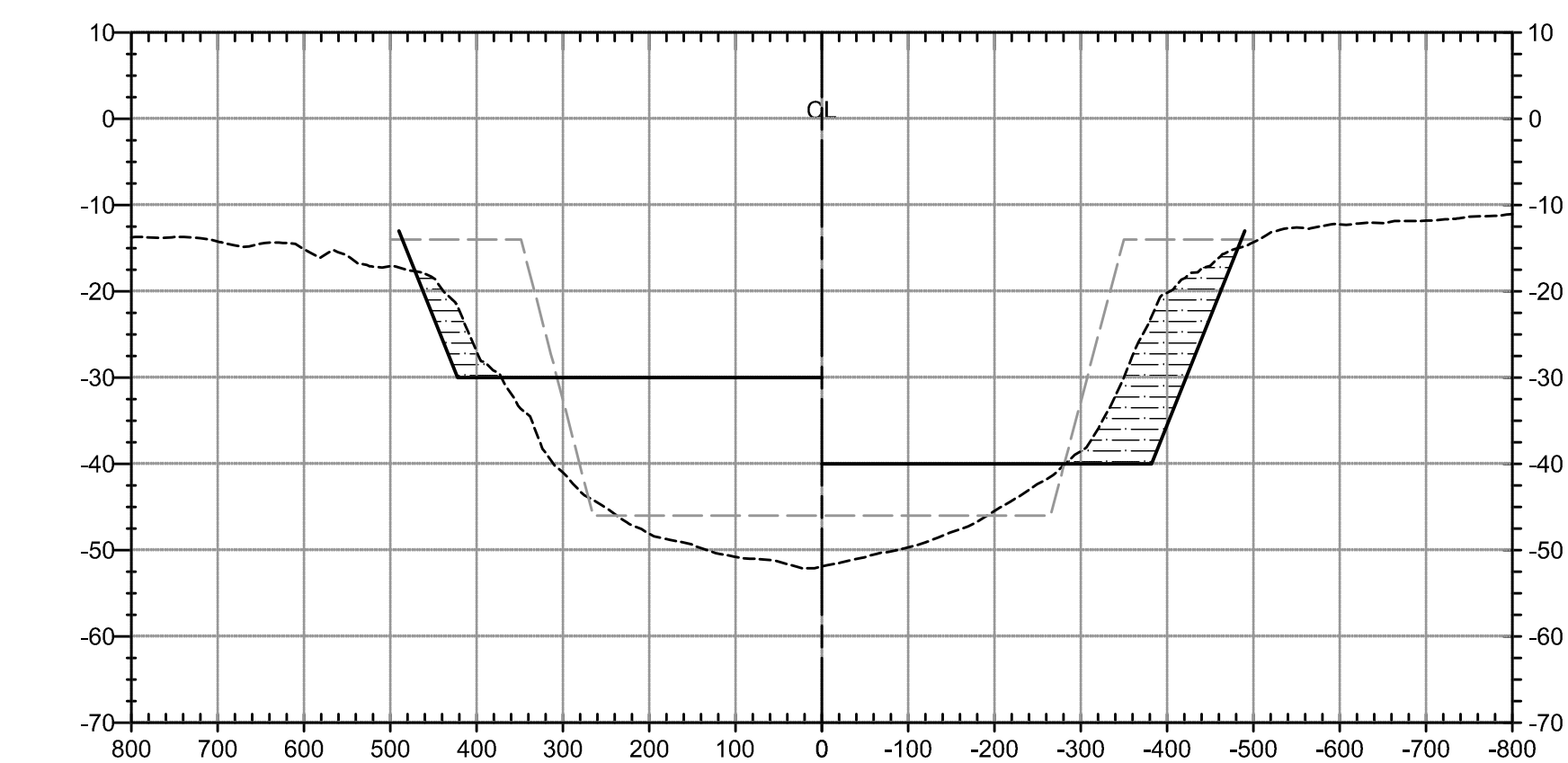
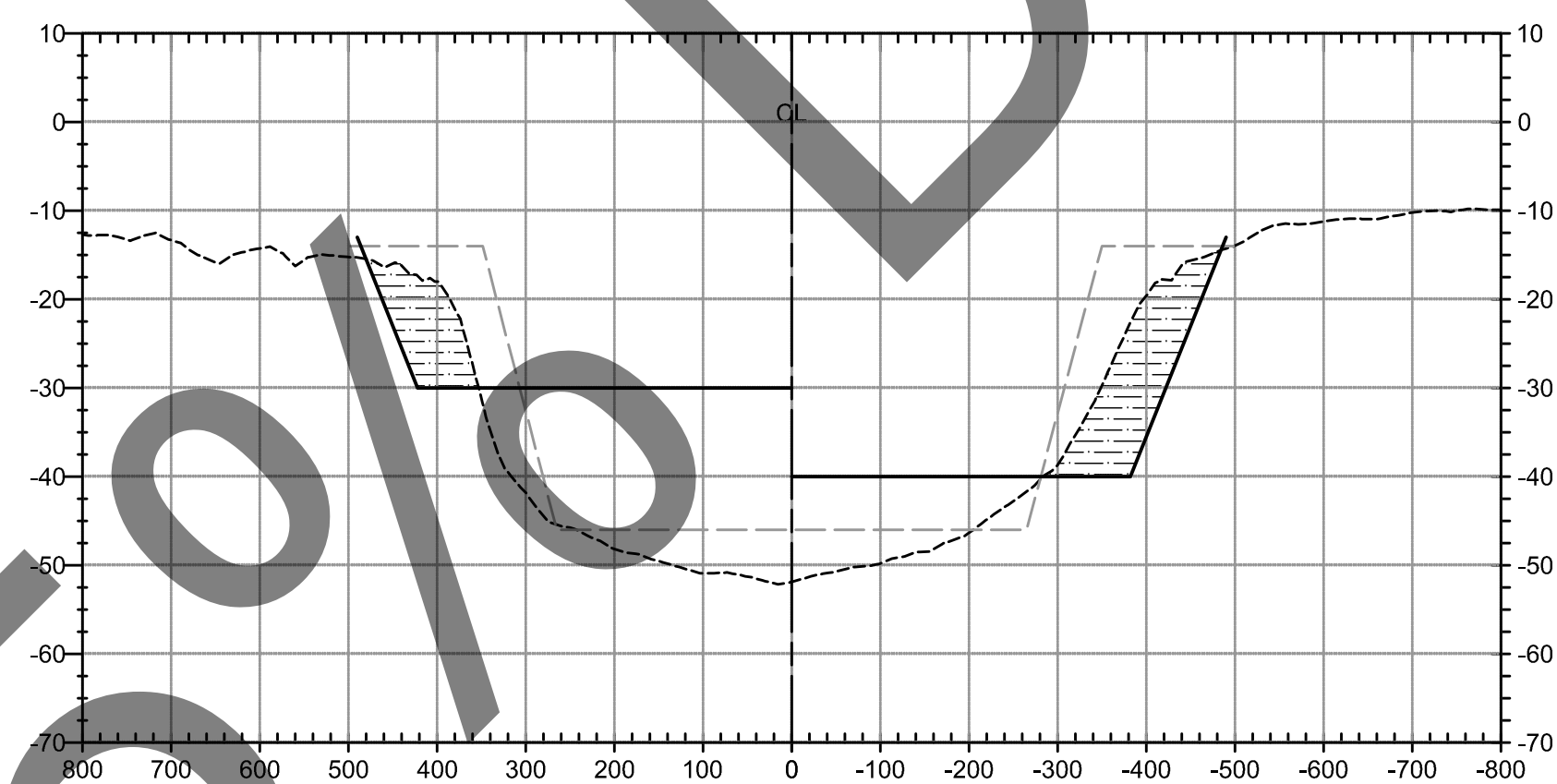
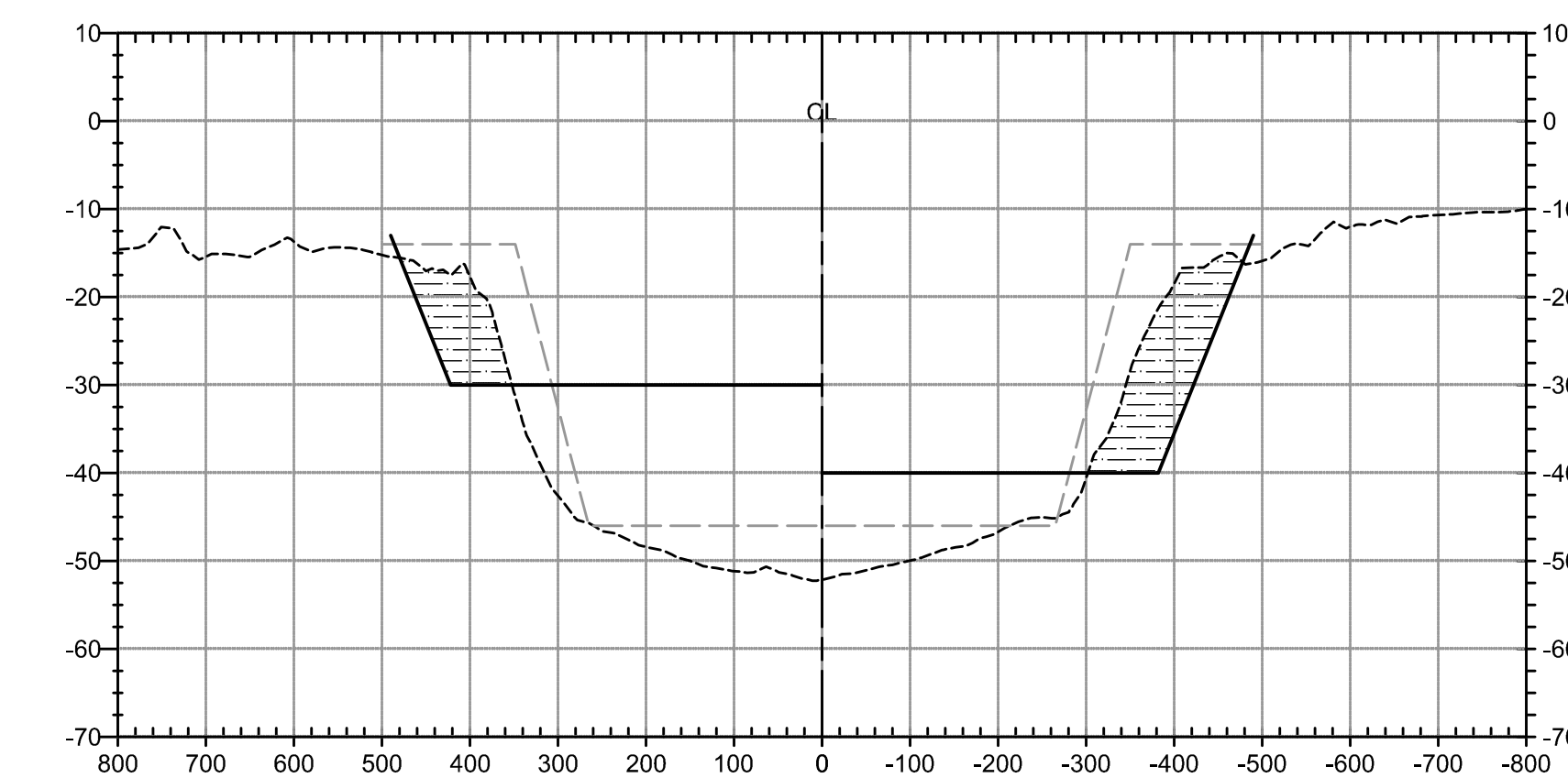
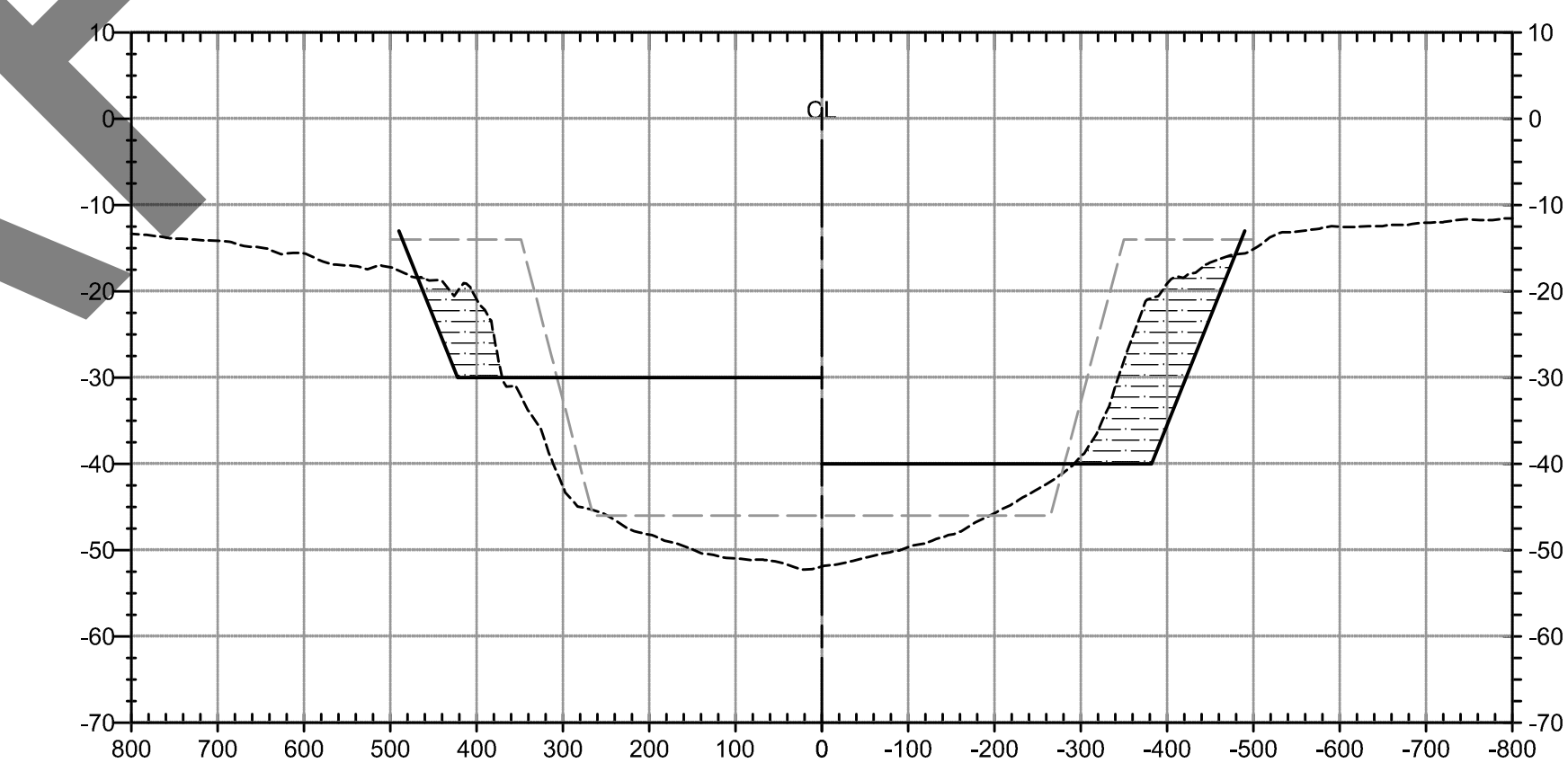
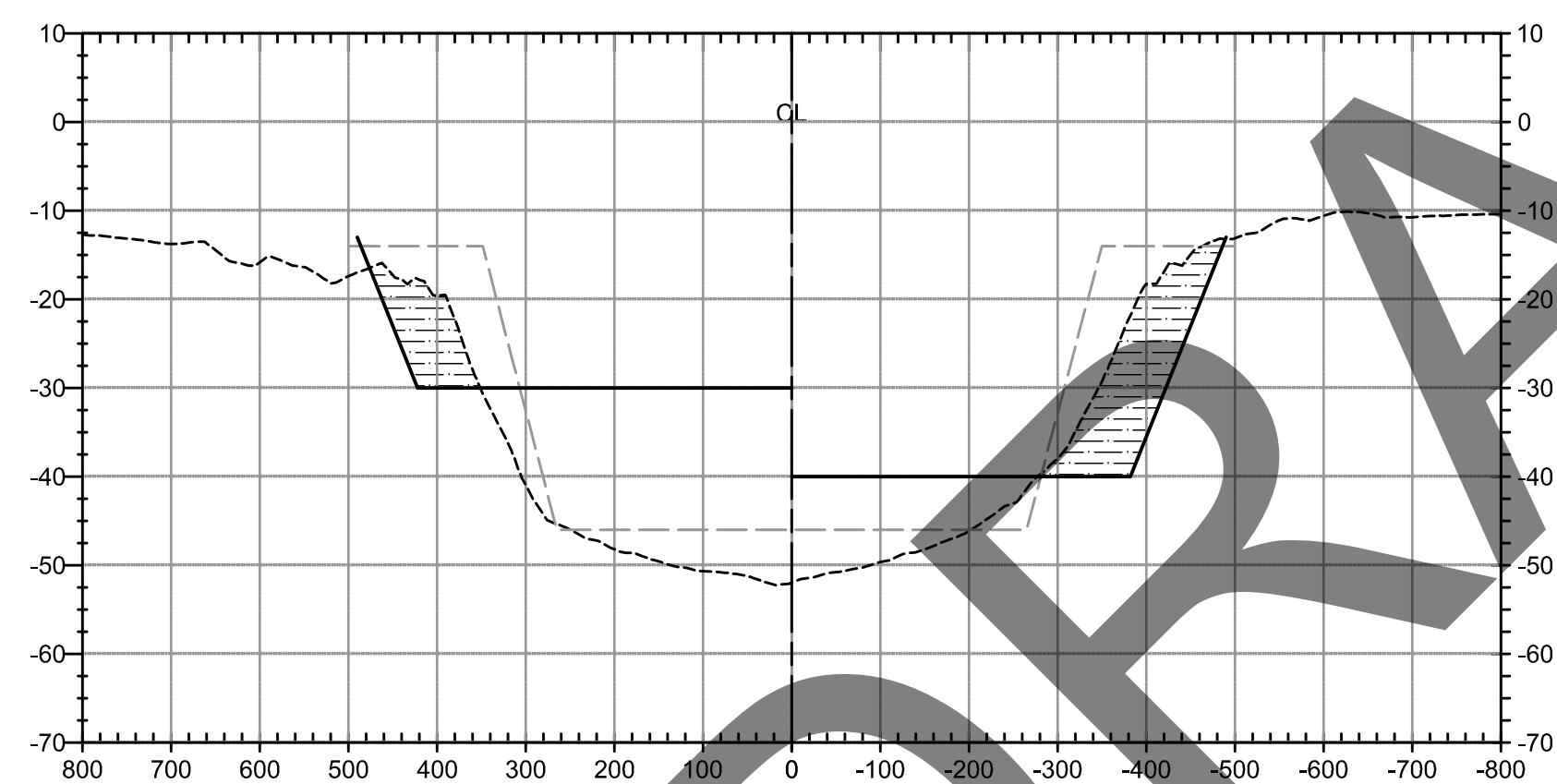
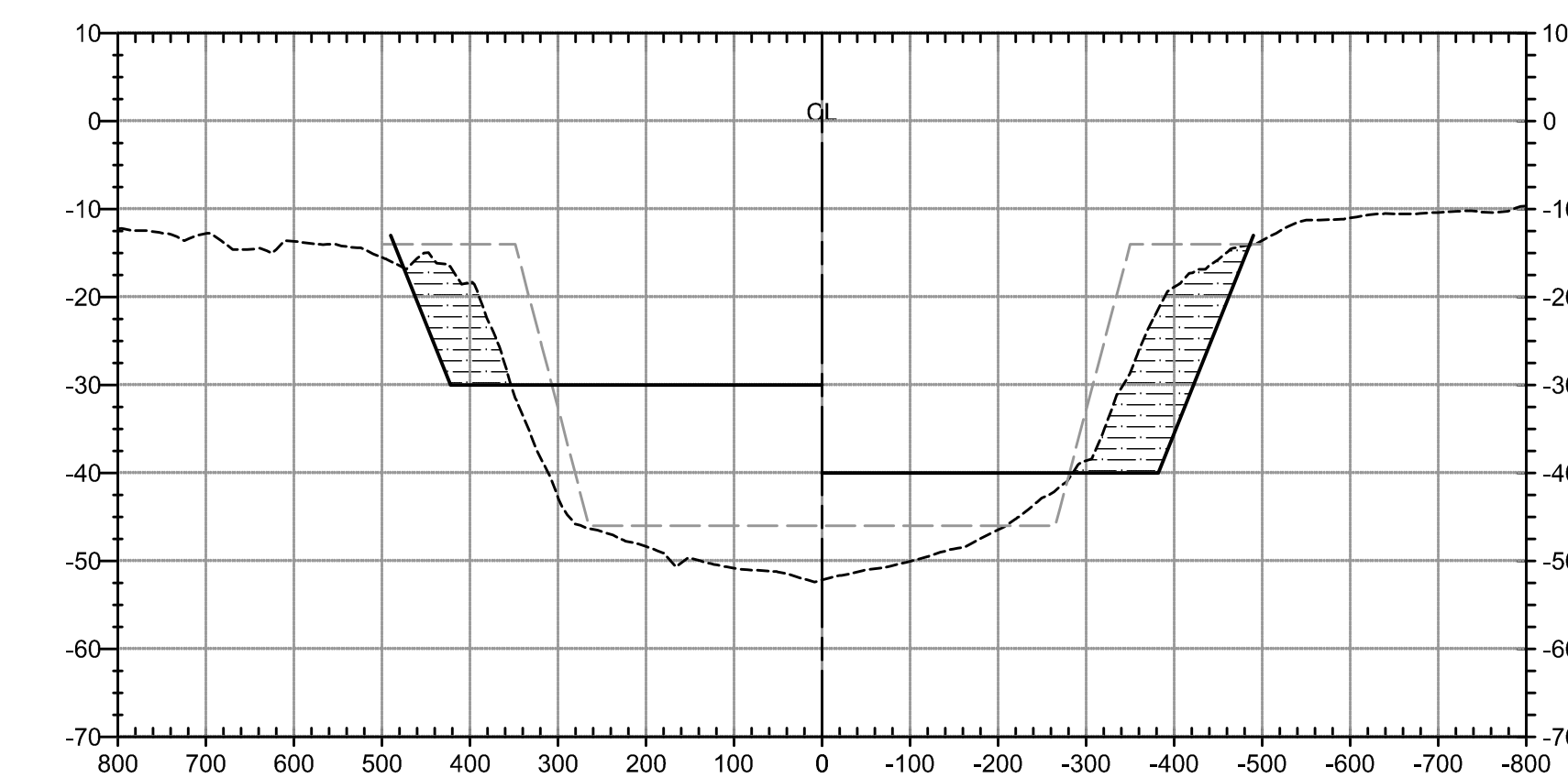
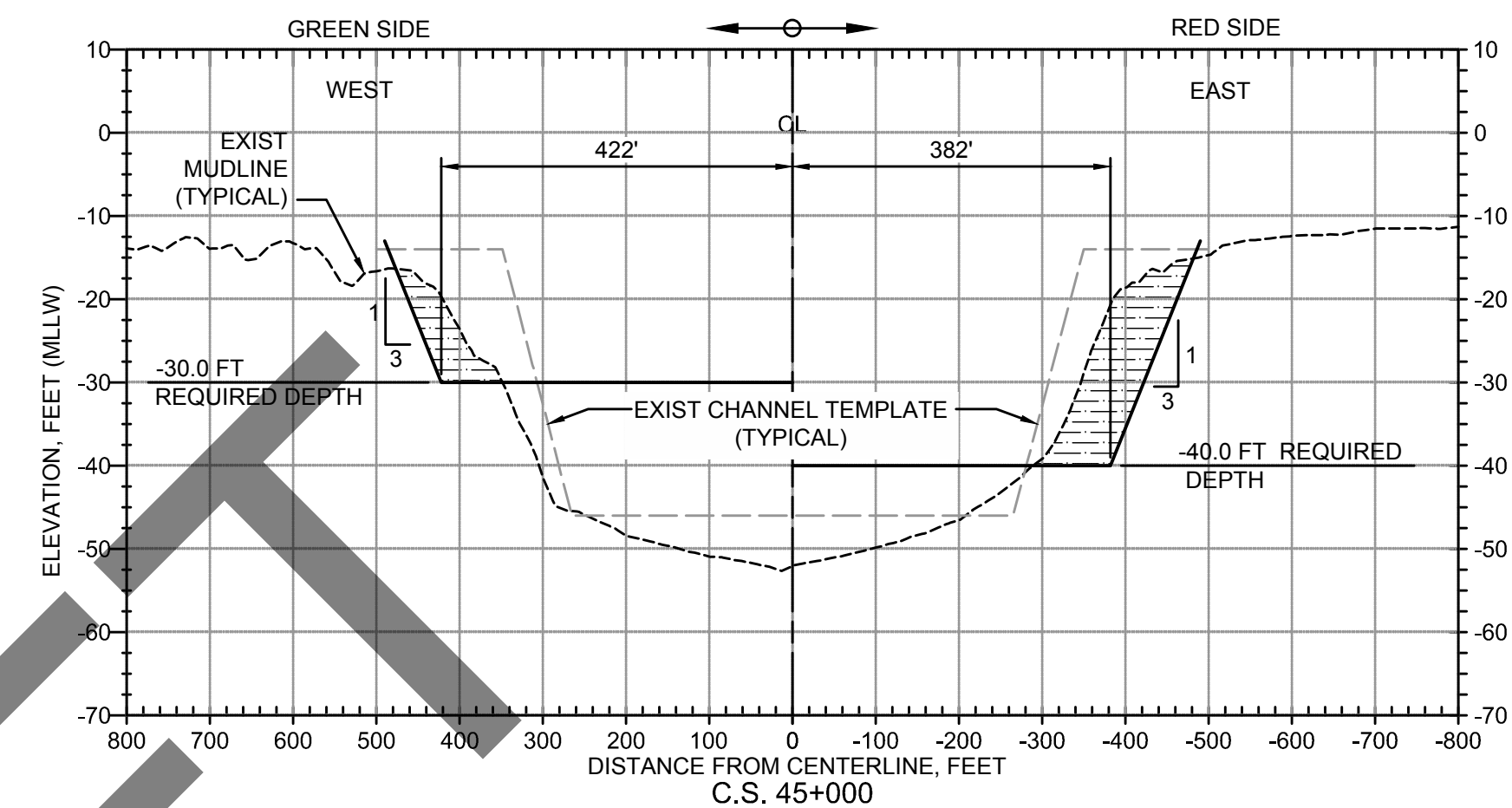
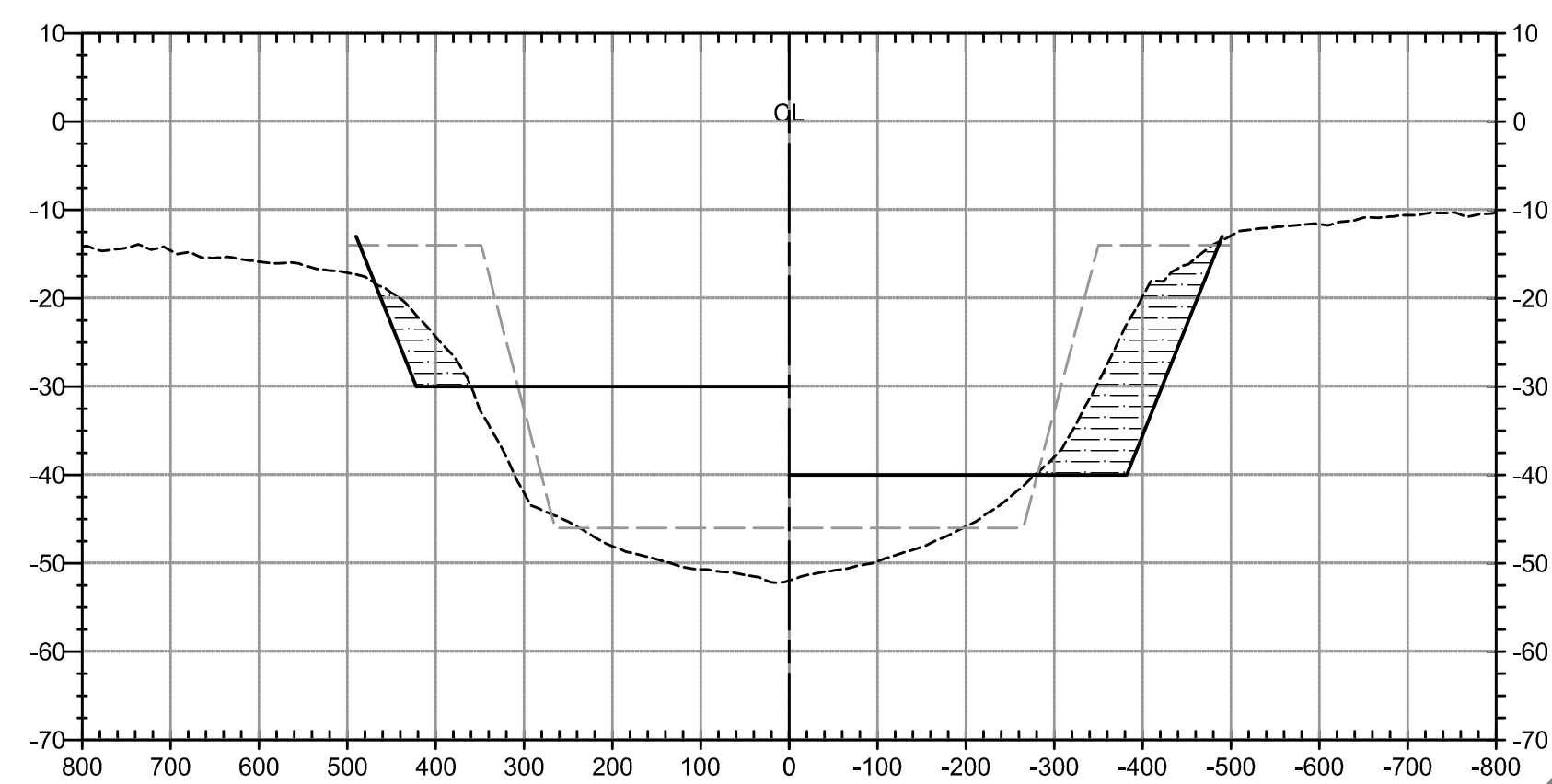
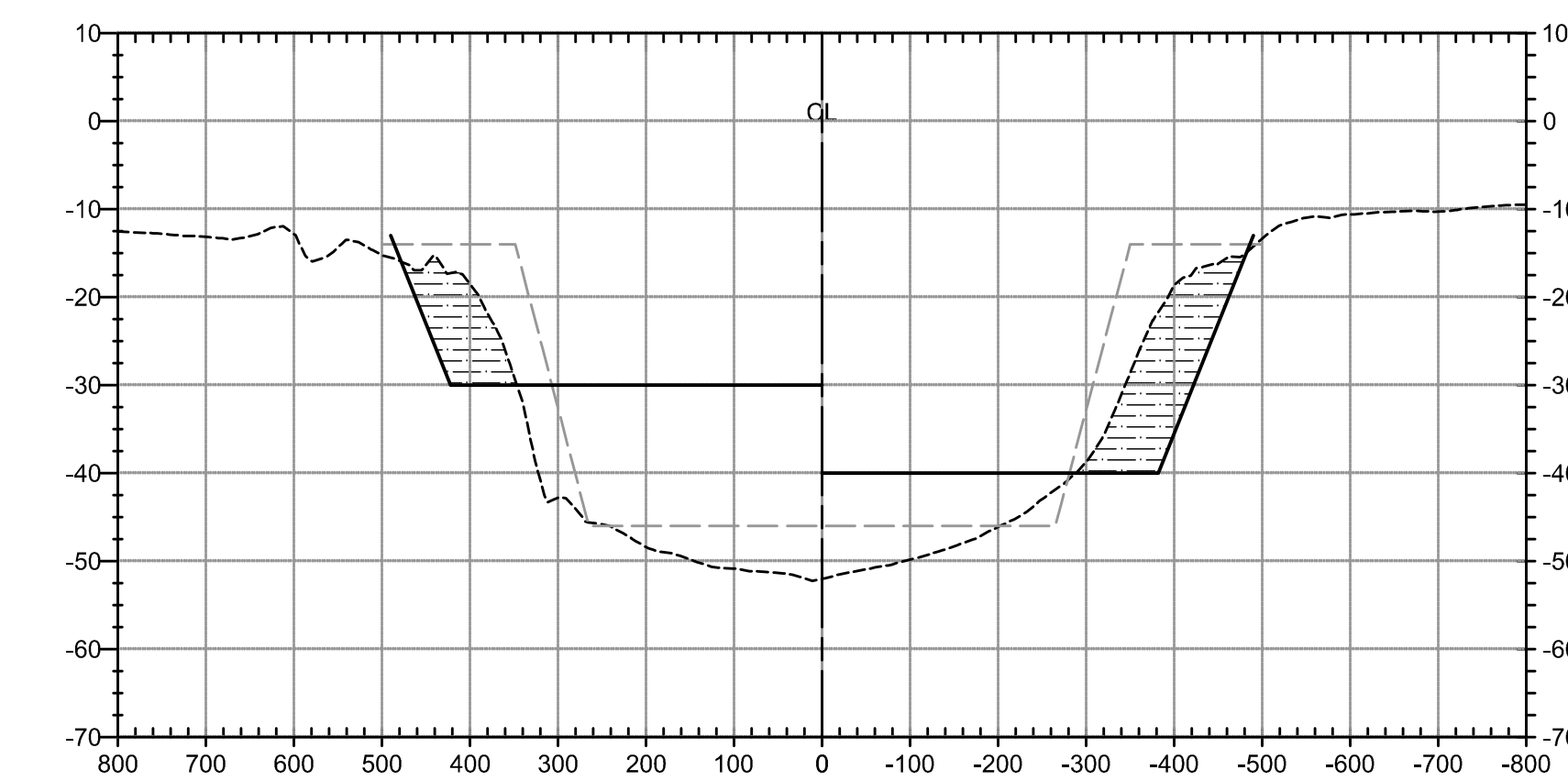
DESIGNER:	AJ
ADD:	RK
CHECKER:	CH/SH/MM
DATE:	DEC 2020
SCALE:	AS SHOWN

DRAWING NO.

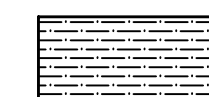
C90-D13-P11-004-CN304

SHEET NO.	REV. NO.
17	0

5% SUBMITTAL



LEGEND:



NOTES:

1. ALL ELEVATIONS SHOWN IN FEET RELATIVE TO MEAN LOWER LOW WATER (MLLW).
2. ALL MATERIAL WITHIN THE REQUIRED DEPTH TEMPLATE MUST BE REMOVED INCLUSIVE OF SLOPE.
3. CHANNEL CUT SLOPE TRANSITION FROM 3H/1V @ HSC STA 55+800 TO 4V/1H @ HSC STA 56+00. TRANSITION LENGTH IS 200 FT.
4. CROSS SECTIONS CUT FACING UP STATION AND DISPLAYED FACING UP CHANNEL PROCEEDING SOUTH TO NORTH IN SEQUENCE.

GRAPHIC SCALES

HORIZONTAL: 1" = 200'

0 200'

VERTICAL: 1" = 20'

0 20'

**PORT OF HOUSTON
AUTHORITY**

CONSULTANT: _____

SEAL:
95% PRELIMINARY
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ENGINEER: Ashley P. Judith
P.E. NO: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E. NO: 100209
DATE: 09-30-2021

APPROVED: _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR – ENGINEERING
DESIGN & SUPPORT

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

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

SHEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

**CHANNEL DREDGE
CROSS SECTIONS - 5
HSC STA 55+000 TO
HSC STA 45+000**

[illegible]

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

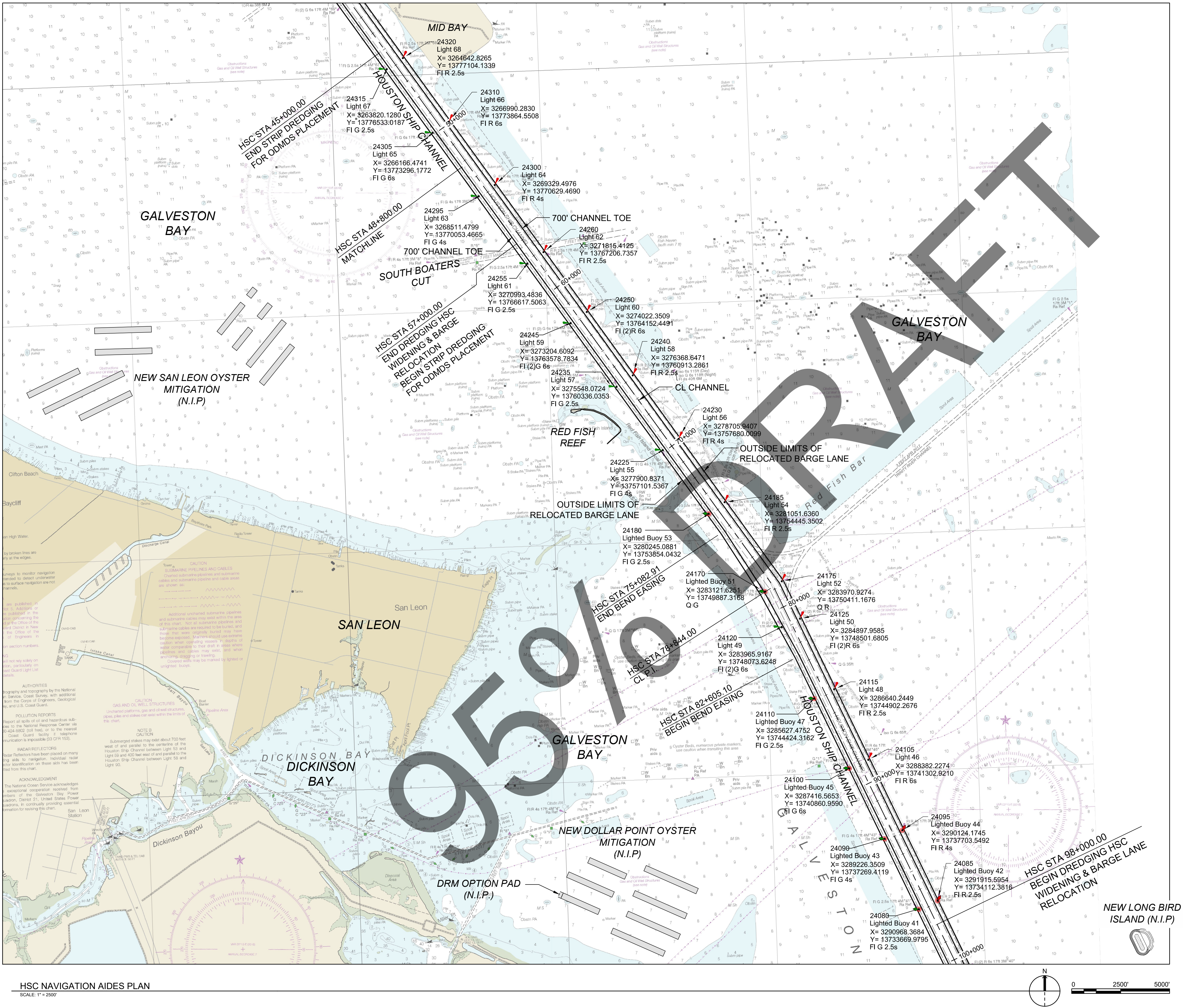
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TIME: 12-09-20 10:27am User: beverlycarriere DWG: D:\60618786 - Project 11 Design\900 CADD\20-Sheets\C90-D13-P11-004-CN106.dwg



HSC NAVIGATION AIDES PLAN
SCALE: 1" = 2500'



PORT OF HOUSTON
AUTHORITY

CONSULTANT:

SEAL:
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PURPOSE OF INTERIM REVIEW AND IS
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FOR ISSUANCE OF A PERMIT.

ENGINEER: Ashley P. Judith
P.E. NO.: 112988
DATE: 09-30-2021

ENGINEER: Chester W. Hedderman
P.E. NO.: 100209
DATE: 09-30-2021

APPROVED: _____ DATE _____

PORT CONTRACT REPRESENTATIVE
MANAGING DIRECTOR - ENGINEERING
DESIGN & SUPPORT

PROJECT TITLE:
HOUSTON SHIP
CHANNEL (HSC)

EXPANSION
CHANNEL
IMPROVEMENT
PROJECT (ECIP)

SHEET TITLE:
PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STA 98+000 TO
HSC STA 45+000

NAVIGATION AIDES
PLAN

REV	DATE	DESCRIPTION
X	XX/XX/XX	XXXX

DESIGNER:	NM
CADD:	BSC
CHECKER:	NM/AJ
DATE:	DEC. 2020
SCALE:	1"=2500'

DRAWING NO.	C90-D13-P11-004-CN106
SHEET NO.	19
REV. NO.	0

NOTE:
ALL ATON LOCATIONS TO BE FIELD
VERIFIED BY THE CONTRACTOR.
LOCATIONS SHOWN ARE APPROXIMATE.

95% SUBMITTAL



CONSULTANT:
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SAHAGAN & BRYANT
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MANAGING DIRECTOR - ENGINEERING
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**HOUSTON SHIP
CHANNEL (HSC)**

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

HEET TITLE:
**PROJECT 11:
REDFISH TO SOUTH
BOATERS CUT
HSC STATION
098+000 TO 045+000**

PLACEMENT AREA PLAN - ODMDS

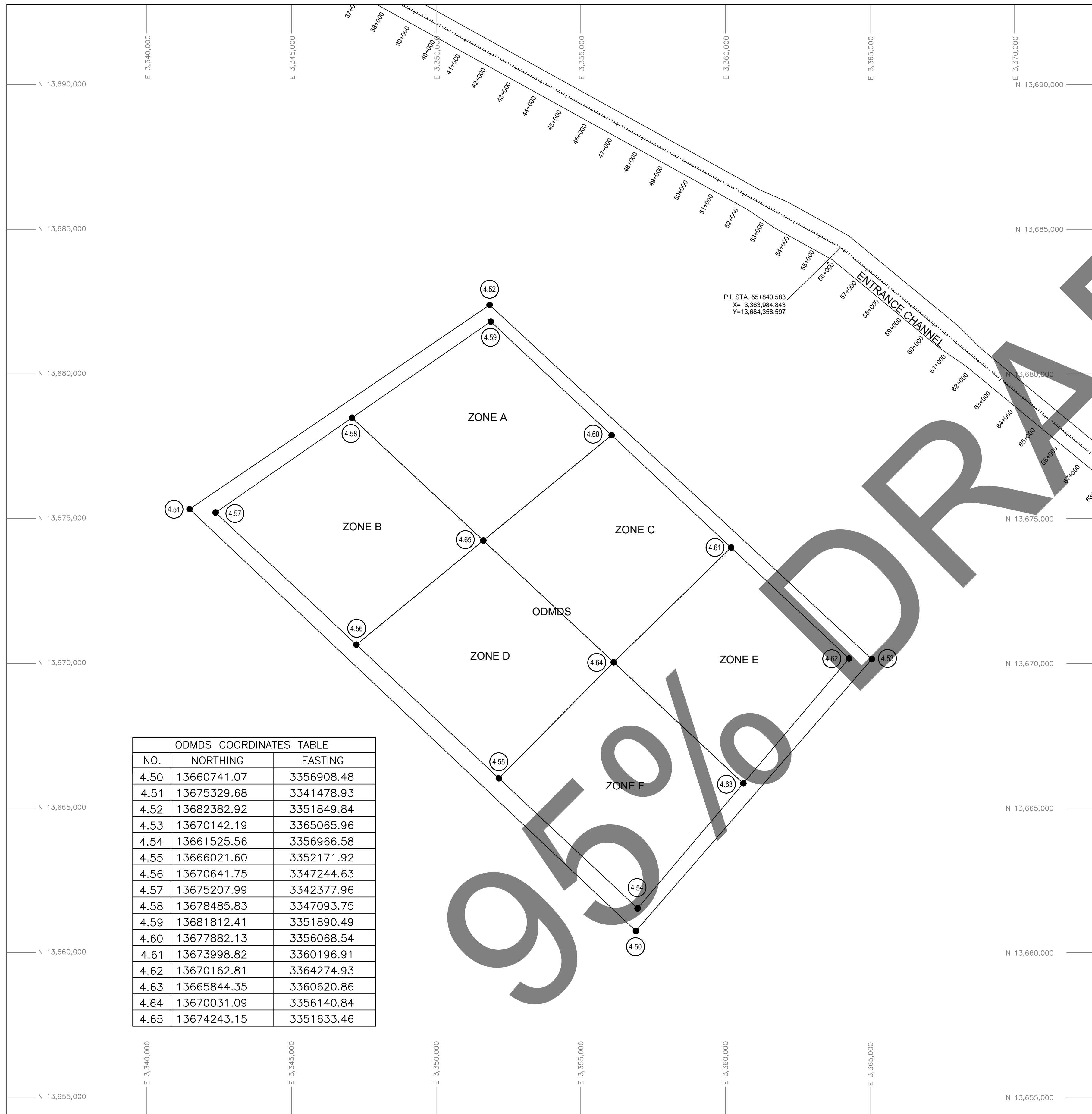
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CHECKER:	NK/SH
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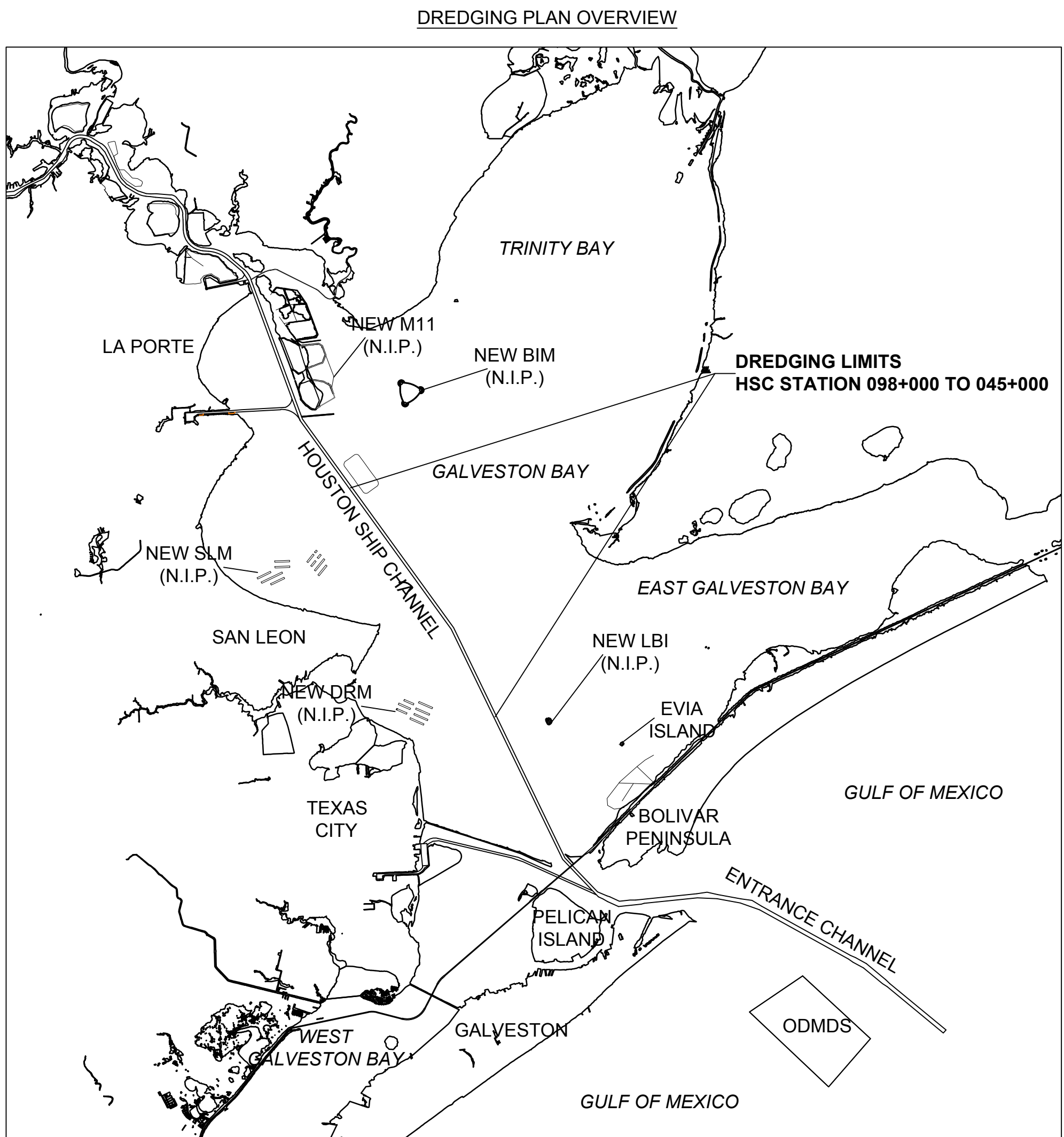
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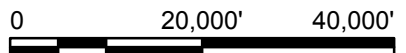
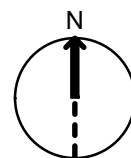
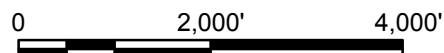
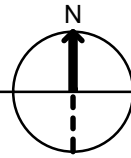


NOTE:

1. GEOGRAPHIC (NAD83) COORDINATES PROVIDED IN THE THE USACE JANUARY 26, 2016 SITE MANAGEMENT & MONITORING PLAN FOR THE GALVESTON, TEXAS OCEAN DREDGED MATERIAL DISPOSAL SITE.
2. ZONE(S) TO BE USED FOR DISPOSAL WILL BE DETERMINED BY THE ENGINEER.



A1 **PLACEMENT AREA PLAN - ODMDS**
SCALE: 1" = 2,000'



TECHNICAL SPECIFICATIONS
FOR
HOUSTON SHIP CHANNEL (HSC)
EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)
PROJECT 11: REDFISH TO SOUTH BOATERS CUT
HSC STA 98+000 TO HSC STA 45+000

Submitted by:

The Joint Venture
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LIST OF APPENDICES TO THE TECHNICAL SPECIFICATIONS

Appendix A: Boring Logs

Appendix B: Galveston Texas Ocean Dredged Material Disposal Site – Site Management & Monitoring Plan

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

Appendix D: NOAA Chart 11327

1 GENERAL INFORMATION

1.1 GENERAL

Administration and performance of the work shall be subject to the General Conditions, Special Conditions, the project drawings and these Technical Specifications. Should it be discovered that information within these Technical Specifications conflicts with the General Conditions and/or Special Conditions, or the drawings, 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 new work dredging of the Houston Ship Channel with disposal of new work dredge materials into the Ocean Dredged Material Disposal Site (ODMDS).

1.2.1 HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT

This portion of the Houston Ship Channel Expansion Channel Improvement Project encompasses dredging of the Houston Ship Channel from approximate Station 98+000 to approximate Station 45+000, referred to as New Work (NW) Dredging HSC to ODMDS. New work dredging will widen the existing 530-foot wide channel equally on each side to a new 700-foot wide channel from Station 98+000 to Station 57+000 as shown on the Plans. Additional new work dredging includes stripping the red side of the channel from Station 57+000 to Station 47+000 to a depth of minus 40 feet mean lower low water (MLLW), stripping the green side from Station 57+000 to Station 45+000 to a depth of minus 30 feet MLLW, and a bend easing at Station 78+844. Barge lanes will be replaced in-kind to their existing dimensions to the outside of the channel widening as shown on the Plans. Depending on shoaling, maintenance dredging may be awarded as an option pay item and shall occur within the existing federal channel template from HSC Station 98+000 to Station 57+000, referred to as "HSC Maintenance Dredging" within these Technical Specifications, and shall be dredged, transported and deposited into the ODMDS as designated on the Plans. Maintenance dredging of the HSC shall be performed prior to new work dredging and will be measured separately for payment.

New work dredging of the HSC shall be performed to the lines and grades shown on the Plans. The existing 530-foot wide template was created with a 4H:1V slope (maintained at 2.5H:1V) beginning at the authorized depth of minus 46 feet MLLW with 2 feet of advance maintenance and 2 feet of allowable overdepth. The new work template shall have a 3H:1V slope from Station 98+000 to Station 78+200, a transition from a 3H:1V slope to a 4H:1V slope from Station 78+200 to Station 78+000, and a 4H:1V slope from Station 78+000 to Station 57+000 beginning at the required depth of minus 48 feet MLLW, with 2 feet of allowable overdepth. New work materials from NW Dredging HSC to ODMDS include the channel widening, bend easing, and relocation of the barge lanes as shown on the Plans. The new work material from NW Dredging HSC to ODMDS shall be dredged, transported and deposited into the ODMDS as designated on the Plans.

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 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.

1.4 TECHNICAL DEFINITIONS

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

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 (where applicable). The Contract price shall include transportation and all other costs incidental for the removal of the plant and equipment from the work areas.

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 these Technical Specifications herein.

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

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. The Contract price will include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for operation.

Mean Lower Low Water: Mean Lower Low Water (MLLW) is the vertical tidal datum used by the United States Army Corps of Engineers (USACE) Southwest Galveston District. USACE provided datum conversions by reach are provided on the Plans. MLLW shall be the project datum for all elevations referenced in these specifications.

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

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; as generally represented on the boring logs provided in Appendix A.

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.

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

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", "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.

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. This includes accretion of materials due to the dredging process and weather-related shoaling.

1.5 EQUIPMENT DEFINITIONS

Hopper Dredge: Hopper dredges are seagoing vessels that excavate material hydraulically and transport it to a placement site in a hopper built into the hull of the vessel.

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

Miscellaneous Equipment: Additional equipment used to facilitate transportation and disposal of dredged material.

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

1.6 SPECIAL SCHEDULING REQUIREMENTS

1.6.1 ORDER OF WORK

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

1. HSC Maintenance (Option 1), if awarded

HSC Maintenance shall be completed prior to commencement of new work dredging.

2. NW Dredging HSC to ODMDs

The sequence of construction shall be determined by the Contractor, unless otherwise restricted by the Contract documents. The dredge locations have been divided into sections as described in Table 6-2: HSC Acceptance Sections. Work for an acceptance section must be completed in its entirety before the Contractor may begin work in the following acceptance section.

The order of work shall also be in accordance with Technical Specifications Section 6.

1.7 PERMITS

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

1.7.1 CONTRACTOR OBTAINED PERMITS

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

1.8 WORK ACCORDANCE

All work shall be accomplished in accordance with the Contract Documents, including these Technical Specifications, the Plans, appendices, and other parts of the Contract Documents. Any changes made by the Contractor to these Technical Specifications or appendices therein, or variances in construction from

the work defined in the Contract Documents, without written authorization by the Engineer, shall become the express responsibility of the Contractor at its own risk and cost.

1.9 LOCAL CONDITIONS AND SITE PHYSICAL DATA

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

1.9.1 SUBSURFACE MATERIAL AND GENERAL SITE CONDITIONS

The material to be removed is composed of new work and shoaled materials. Geotechnical investigations including core borings, to analyze the character of materials to be removed have been conducted 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 these Technical Specifications, Plans, and the site, and after investigation and research, decide for itself the character, quality, and quantity of the material to be dredged and the characteristics, whether surface, subsurface, or otherwise, at the existing disposal areas. The Contractor is expressly encouraged to perform its own investigations and research to determine the character of materials and satisfy itself as to the means and methods required to perform the work herein specified. The Engineer shall be immediately notified of any site conditions that may adversely affect the performance of the work.

1.9.2 DEBRIS

Other materials including, but not necessarily limited to, scrap rope, wire cable, scrap metal, anchors, anchor chains, timbers, snags, stumps, fiberglass, metal, piles, buoys, buoy anchors, or other rubbish or other obstructive materials encountered during dredging activities shall be disposed of in accordance with any and all applicable Federal, State, or local requirements. No separate payment shall be made for removal and disposal of debris. Magnetometer investigations have been conducted by the Port Authority and the results of these investigations are shown in the Plans. Magnetometer data provided in the Plans is for informational purposes only and shall not be considered as the basis of determination for the presence or non-presence of debris or other obstructions. The Contractor shall perform its own investigations and satisfy itself in determining the presence of debris or other obstructions at its sole risk and cost. The costs for debris removal, disposal, downtime, or damages resulting therefrom shall be included in the Contract unit price for dredging.

1.9.3 TIDAL CONDITIONS

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

1.9.4 MARINE CONDITIONS

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

1.9.5 VESSEL WAKE

Commercial, leisure and other watercrafts use 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 or fast-moving vessel traffic can cause high vessel wakes and vessel induced waves and currents. The Contractor shall take measures as it deems appropriate to ensure against damages to the work or itself resulting from vessel wakes and vessel induced waves and currents. Effects from vessel wakes and vessel induced waves and currents shall not be just cause for increased compensation or allowable downtime due to mechanical failure resulting from vessel wakes or vessel induced waves and currents.

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

1.9.6 WEATHER CONDITIONS

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

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

1.10 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 Section 1 Subsection 1.11.2 of these Technical Specifications.

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 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.

1.11 NAVIGATION

1.11.1 OBSTRUCTION OF CHANNEL

The Port Authority will not undertake to keep the channel free from vessels or other obstructions, except to the extent of such regulations, if any, as may be prescribed by the Secretary of the Army, in accordance with the provisions of Section 7 of the River and Harbor Act approved 8 August 1917. The Contractor shall conduct the work using methods that will obstruct navigation as little as possible, and if the Contractor's plant does obstruct the channel and makes the passage of commercial vessels difficult or endangers them, said plant shall be promptly moved on the approach of a vessel as far as may be necessary to afford safe passage. 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.

1.11.2 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 (USCG) will facilitate all ATON removal and replacement. The Contractor shall work and coordinate with the USCG and to enable a smooth operation of all ATON relocation. The Contractor shall contact the Port Authority and 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.

1.11.3 BRIDGE-TO-BRIDGE RADIOTELEPHONE EQUIPMENT

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

1.11.4 LOOKOUTS AND RADIO COMMUNICATIONS

When working in a federal channel, the Contractor shall have a dedicated lookout person posted in the dredge control room at all times to visually monitor the movement of vessels around the dredge plant and to perform radio communications with company floating plant and to deliver passing arrangements with other commercial, fishing, and recreational vessels. The lookout shall be competent in the English language, the U.S. Coast Guard and Federal Communications Commission radio communications procedures and requirements and trained in the Vessel Bridge to Bridge Radiotelephone Act. The lookout shall maintain up to the minute information on the status of each company workboat as well as approaching vessels and will communicate this information as required to prevent collisions and shall comply with all requirements of the Houston-Galveston Vessel Traffic Service (VTS) area as outlined in Section 1 Subsection 1.11.6 of these Technical Specifications. Each company workboat shall check in with the lookout when arriving at the dredge and shall receive radio clearance from the lookout before departing the dredge. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL BE CONSIDERED A VIOLATION OF THE SAFETY PROTOCOL ESTABLISHED HEREIN. PURSUANT TO THE DIRECTION OF THE PORT AUTHORITY, THE CONTRACTOR MAY BE REQUIRED TO CEASE OPERATIONS UNTIL THIS PROVISION IS COMPLIED WITH. ANY SUSPENSION, DELAY OR INTERRUPTION OF WORK ARISING FROM NON-COMPLIANCE OF THIS PROVISION SHALL NOT CONSTITUTE A BREACH OF THIS CONTRACT AND SHALL NOT ENTITLE THE CONTRACTOR TO ANY PRICE ADJUSTMENT UNDER THE CONTRACT CLAUSE ENTITLED TERMINATION AND SUSPENSION OR ANY OTHER MANNER UNDER THIS CONTRACT.

1.11.5 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 August 2014 Navigation Rules and Regulations Handbook, or 33 Code of Federal Regulations 81 Appendix A (International) and 33 Code of Federal Regulations 84 through 89 (inland) as applicable.

1.11.6 HOUSTON-GALVESTON VESSEL TRAFFIC SERVICE AREA

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

1.11.6.1 GENERAL

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

- Location of intended operation

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

1.11.6.2 REPORT CHANGES

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

1.11.6.3 VESSEL TRAFFIC SERVICE LOCATION

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

1.11.6.4 COMMUNICATIONS

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

1.11.6.5 OPERATIONS

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

1.11.7 DREDGE POSITIONING

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

1.11.8 AUTOMATIC IDENTIFICATION SYSTEM (AIS)

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

1.12 VARIATIONS IN ESTIMATED QUANTITIES

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

Maintenance dredging quantities for the HSC have been estimated and are provided in Table 6-4. Estimated shoaling rates are described in Section 6 Subsection 6.3.1 of these Technical Specifications. The Contractor shall make itself familiar with the anticipated work and shoaling rates and shall consider these conditions in its proposal and schedule.

On these pay items and others where the quantity of a pay item in this Contract is an estimated quantity and where the actual quantity of material within the required dredging limits varies more than 15% above or below the stated estimated quantity 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.

1.13 UNAUTHORIZED PLACEMENT OF MATERIAL

1.13.1 MISPLACED MATERIAL

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

1.13.2 DEBRIS DISPOSAL

During the progress of the work, the Contractor shall not discard worn out discharge pipe, wire rope, scrap metal, timbers, or other rubbish or obstructive material into the disposal area or within or along

the banks of any waterbody. This material, together with scrap, rope, wire cable, piles, pipe, or other obstructive material shall be disposed of by the Contractor at locations in accordance with any and all applicable Federal, State, or local requirements.

1.14 HOLD HARMLESS AND INDEMNIFICATION

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

1.15 USE OF PORT AUTHORITY PREMISES AND WORK AREA CONDITIONS

1.15.1 CONTRACTOR FACILITIES

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas approved by the Port Authority. Temporary movement or relocation of Contractor facilities shall be made only on approval by the Port Authority. The Contractor shall fuel and lubricate equipment in a manner that protects against spills and evaporation, and the Contractor shall provide containment for fuel and liquid chemical storage tanks to contain the tank contents in the event of a leak or spill. **Refer to the General Conditions for further guidance.**

1.15.2 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.

1.15.3 SITE MAINTENANCE

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

1.15.4 EXCLUSION OF THE PUBLIC

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

1.16 FIRE PROTECTION

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

1.17 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.**

1.18 ACCESS AND STAGING

The work site is accessible by waterborne transportation only. All staging areas are 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 disposal 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 disposal 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.

1.18.1 CONSTRUCTION OFFICE

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

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

1.19 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).

1.20 ADJACENT PROPERTY AND STRUCTURES

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

1.21 SURFACE AND SUBSURFACE STRUCTURES, PIPELINES AND UTILITIES WITHIN THE WORK AREA

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

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

THE CONTRACTOR SHALL CALL THE TEXAS ONE CALL SYSTEM (811) A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION (DIGGING, DREDGING, JETTING, ETC.) OR ANY DEMOLITION ACTIVITY. PIPELINE SAFETY, AND THE PROTECTION OF PIPELINES OR OTHER UTILITIES, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

The Engineer and Port Authority assumes no responsibility or liability for failure to show any or all pipelines, utilities, structures or other obstructions on the Plans or to show them in their exact location. Failure to show and/or show correctly will 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.

1.22 WEEKLY PROGRESS MEETINGS AND MINUTES

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

1.23 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. Required survey information and plots of the surveys shall be attached to the daily quality control reports.

The Contractor shall inspect for compliance with Contract requirements and record the inspection of operations including, but not limited to the items specified within this Section. A copy of the records of the compliance inspections, tests, and corrective action taken shall be submitted with the daily quality control report (Technical Specifications Section 2 Subsection 2.6.3).

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. 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. The list below is a summary of the required submittals for the Work, refer to each respective section for specific requirements for each submittal:

Submittals After Award:

- Schedule of Values
- Safety Plan
- Accident Prevention Plan
 - *Severe Weather Plan*
- Quality Control Plan
 - *Quality Control Daily Report Form*

Preconstruction Conference Submittals:

- Contacts & Qualifications
- Work Plan and Schedule of Work
 - *Pipeline Crossing Plan*
 - *Survey Plan*
- Obstruction Demolition Plan
- Environmental Protection Plan
- Spill Contingency Plan
- Volatile Organic Compound (VOC) Compliance Plan

Preconstruction Submittals:

- Survey Control Checks
- Notification of Intention to Dredge

Construction Submittals:

- Notification Prior to Commencement of Surveying for Measurement and Payment and Final Acceptance
- Pre-Dredge Hazard Survey

Daily Quality Control Reports

- *Material Transportation and Disposal Fees*
- *Dredge Data*

Survey Submittals

Post Construction Submittals:

Record Drawings

Obstruction Demolition Survey

Final Submittals

Application for Final Payment

2.2 SUBMITTAL PROCEDURES

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

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

2.3 SUBMITTALS AFTER AWARD

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

2.3.1 SAFETY PLAN

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

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

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

2.3.2 ACCIDENT PREVENTION PLAN (APP)

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

- Make available for review, upon request, the Contractor’s current Safety Management System (SMS) documentation
- Submit to the Engineer the current valid Company Certificate of Compliance for its SMS

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- Submit the current dredge(s) Certificate of Compliance based on third party audit
 - Submit for review and acceptance, site specific addenda to the SMS as specified in the solicitation

2.3.2.1 SEVERE WEATHER PLAN

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

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

2.3.3 QUALITY CONTROL PLAN

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

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

2.4 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 for the work:

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

2.4.2 WORK PLAN AND SCHEDULE OF WORK

Fourteen (14) days prior to the preconstruction conference, the Contractor shall provide a detailed work plan for NW Dredging HSC to ODMDS 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 disposal, 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 Contractor shall comply with the provisions described in these Technical Specifications Section 6 pertaining to the order of work, including the anticipated progression of each component within the site.

The Project construction time is as outlined in **Special Condition Section 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 AND UTILITIES CROSSING PLAN

The Contractor shall include for approval a pipeline crossing plan at each pipeline and utility crossing to be submitted to the Engineer and Owner. The plan shall contain the following at minimum:

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- Emergency measures to be taken in the event of an accident
 - Methodology for work that occurs within 500 feet of a utility or pipeline. Work includes, but is not limited to dredging and anchoring/spudding of dredge and auxiliary equipment
 - Estimated start and completion date for work in the vicinity of the utility or pipeline
 - The utility or pipeline type/description, owner and owner contact information

2.4.2.2 SURVEY PLAN

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. The Contractor shall prepare plans for hydrographic construction surveys of the dredging progress detailing the means, methods, and equipment that the Contractor proposes to use for review and approval by the Engineer. The plans shall document an approach that is appropriate for precise hydrographic surveying in soft soils. Refer to Technical Specifications Section 4 for information regarding surveying QA/QC standards.

2.4.3 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 Technical Specification Section 7 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 the work conforming to the requirements of the General Conditions and these Technical Specifications. Approval of the Contractor's plans will not relieve the Contractor of its responsibility for adequate and continuing control of pollutants and other environmental protection measures. The environmental protection plans shall include, but not be limited to, the following:

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

The environmental protection plans shall also address specific measures and information requested to be submitted in Technical Specifications Section 5, including Subsections 5.3 and 5.4. 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 the work, that complies with the requirements of the **General Conditions Section 3.11 Spill Prevention Plan** and these Technical Specifications and meets all applicable local, State, and Federal regulations, including but not limited to, the U.S. Environmental Protection Agency (EPA) Oil Pollution Regulations, 40 CODE OF FEDERAL REGULATIONS 112, EM 385-1-1 and other state regulations as applicable. The plan shall not only account for the release of chemicals or petroleum products hazardous to the environment but shall also monitor the disposal of dredged materials during all operations. At a minimum, the Contractor's spill contingency plan shall include the following:

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- 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 disposal area and (2) companies having silt curtains for containing any misplaced dredge material from the disposal 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 the work. 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.

2.5 PRECONSTRUCTION SUBMITTALS

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

2.5.1 SURVEY CONTROL CHECKS

Project control monumentation has been provided by the Engineer. The Contractor shall perform preconstruction survey control checks on the provided project control monumentation and provide the results to the Engineer. Any discrepancy from the published values shall be immediately brought to the attention of the Engineer, prior to use of the project control monumentation for work.

2.5.2 NOTIFICATION OF INTENTION TO DREDGE

2.5.2.1 USACE AND USCG

The Contractor shall notify the Galveston District Area Engineer, of the U.S. Army Corps Of Engineers, Galveston District Northern Area Office, 12000 Aerospace Avenue, Houston, TX 77034 and the U.S.

Coast Guard, in writing and electronically, at least ten (10) days prior to commencement of dredging operations, the location or locations at which a dredge or dredges will be placed on the site so that a Notice to Mariners can be issued by the U.S. Coast Guard. Documentation of notice shall be submitted to the Engineer prior to the commencement of dredging.

2.5.2.2 PIPELINES AND UTILITIES

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

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

Table 2-1: Pipelines Near the Project Area

Utility of Structure	Approximate Station	Reported Approximate Channel Crossing Elevation MLLW (ft)	Name and Owner Contact Info
24-in Crude Oil P/L	124+246.26	-99.00	Genesis Energy, LP Robert Findley 281-793-6656 robert.findley@genlp.com
(2) Abandoned Natural Gas P/Ls	114+761.52 114+761.52	Unknown Unknown	Houston Oil & Mineral Co.
16-in Natural Gas P/L	112+128.37	-112.90	Williams Companies, Inc. Jerry Knight 985-798-5917 Jerry.Knight@williams.com
18-in Natural Gas P/L	90+406.35	-81.20	Kinder Morgan, Inc. Oscar Zapata 713-420-4654 Oscar_Zapata@kindermorgan.com
24-in Carbon Dioxide P/L	88+810.00	-92.00	Denbury, Inc. Billy Shoen

			281-996-7251 billy.shoen@denbury.com
24-in Natural Gas P/L	80+969.04	-83.00	Energy Transfer Partners (Florida Gas Transmission Co., LLC) Nicholas Gordon 713-989-2816 NICHOLAS.GORDON@energytransfer.com
10-in Abandoned Natural Gas P/L	67+086.95	Unknown	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com
8-in Abandoned Natural Gas P/L	63+581.94	-50.00	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com
10.75-in Abandoned Natural Gas P/L	57+600.00	-55.00	Layton Energy
10-in Abandoned Natural Gas P/L	18+600.56	-49.00	Davis Petroleum Corporation/Yuma Kate Hubackova kateh@yumacompanies.com

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 CONSTRUCTION SUBMITTALS AND NOTICES

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

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

The Port Authority shall conduct all BD, interim AD surveys and final acceptance surveys for measurement and payment and acceptance within the dredge areas.

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

2.6.2 PRE-DREDGE HAZARD SURVEY

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

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

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

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

2.6.3 DAILY QUALITY CONTROL REPORTS

The Contractor shall supply daily quality control reports to document construction progress and ensure compliance with Contract Documents. The daily quality control reports shall start on the first day after date of acknowledgement of Notice to Proceed and end on the last day of demobilization 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 the work 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), 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 and fueling and maintenance logs for the dredge shall be included with the daily quality control report. Additional components of the daily quality control report are described in the following subsections.

The daily quality control report shall be in the approved format (see Technical Specifications Section 2 Subsection 2.3.3.1).

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.

2.6.3.1 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.

2.6.3.2 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.

2.6.3.3 MONITORING OF DISPOSAL OPERATIONS

The Contractor shall adequately inspect disposal operations in the disposal area(s) weekly, or as conditions warrant (e.g., storm events) to reduce the possibility of accidental mounding, breaching or spillage of dredged materials outside of the ODMDS as described in Technical Specifications Section 4 Subsection 4.10.

2.6.3.4 DREDGE DATA

A dredge data spreadsheet shall be set up in Microsoft Excel 2003 or later, with appropriate column headings as required for dredge data monitoring and reporting as outlined in the US Army Corps of Engineers National Dredge Quality Management (DQM) Program. The intent is to provide the same dredge monitoring data as required by the DQM in an Excel format to the Port Authority. The DQM Specifications can be found on the US Army Corps of Engineers website <https://dqm.usace.army.mil/Default.aspx>. The Contractor shall reference the following DQM Specifications as applicable for the Work described within these Technical Specifications:

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

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

2.6.3.5 SUBMITTAL OF REPORTS

Daily quality control reports shall be submitted in both hard copy and electronic form as directed.

2.6.4 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 surveys, ODMS monitoring surveys, quantities placed and retained (as part of the daily quality control report), and survey plots. Surveys shall be conducted in accordance with Technical Specifications Section 4. 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.

2.6.4.1 SURVEY PLOTS

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

- Project name
- Name of party responsible for survey
 - Surveys submitted by the Contractor shall have the Contractor's name displayed.

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- Surveys by the Port Authority shall have the name of the responsible Engineer or Surveyor displayed in addition to the Port Authority.
 - RPLS or PE seal, signature, and business affiliation (where applicable)
 - Date(s) surveys were performed
 - Layout of work including locations and descriptions of survey control
 - Vertical and horizontal datums
 - Sheet names and numbers
 - Drawing scale(s)

All survey plots shall comprise a well-organized, stand-alone set of drawings that do not include any outdated or superseded information that may have been previously submitted. Plots 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.

2.6.4.2 ELECTRONIC SURVEY SUBMITTALS

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

- A submittal log documenting surveys submitted to date with descriptors for survey dates and locations
- Survey plots in AutoCAD format
- Survey plots in PDF format

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- ASCII files containing northing, easting, elevation, and descriptor for each survey point both raw and corrected data points
 - All survey field notes

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 OBSTRUCTION DEMOLITION SURVEY

The Contractor shall submit the results of their obstruction demolition survey (see Technical Specifications Section 4 Subsection 4.11) to the Engineer before final payment for HSC Existing Structure Demolition/Removal can be made. Submittals shall include hard copy plan-view drawings as well as electronic copies of the drawings (in both .DWG and .PDF format), all field notes, and the final data set. Electronic submittals shall be provided on CD or DVD.

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

- Project name
- Contractor's name
- RPLS or PE seal, signature, and business affiliation
- Date(s) surveys were performed
- Layout of work including locations and descriptions of survey control
- Vertical and horizontal datums
- Sheet names and numbers
- Drawing scale(s)
- Possible piles, debris, equipment or other obstructions left by the Contractor

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

2.7.3 FINAL SUBMITTALS

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

- Final "as-built" construction drawings, provided in both PDF and AutoCAD 2017 or earlier formats, showing at minimum the following information:
 - All information shown on the Plans and a record of all completed work, deviations, modifications, or changes from those drawings, however minor, which may have been incorporated into the work.
 - Before and after dredging channel section surveys.
 - Plan plot of dredge area, including gross and net yards dredged distinguished by dates of dredging and reach of channel dredged.
 - Plan plots of disposal locations used, including gross yardage placed at each site
 - Period of disposal placement for each disposal zone utilized.
 - Vertical control utilized including any applicable conversions.
 - Plan plot of required disposal area surveys covering the full extent of material placed within each disposal site used.
 - Utility locations as verified by owners, including station, C/L and/or edge of cut XY-coordinates, and minimum elevations
- One set of all Project submittals and any equipment and material warranties/guarantees as provided by all appropriate suppliers or manufacturers.
- One set of "Record Drawings" showing all revisions to the original Contract Documents. Drawings shall also show routing of underground outside utilities and conduits with actual dimensions from buildings or other known landmarks where applicable.
- Any and all other documents, keys, manuals, etc. required by the Contract Documents.

2.7.4 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 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

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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

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. The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for safe operations and, after the completion of the work, for removal of the plant and equipment from the work sites.

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

3.1.1.2 MEASUREMENT

This shall not be measured for payment.

3.1.1.3 PAYMENT

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

3.2 UNIT PRICE PAYMENT ITEMS

3.2.1 NEW WORK DREDGING – HSC STATIONS 98+000 TO 57+000 TO ODMDs

3.2.1.1 GENERAL

This item shall mean the Contract unit price for new work dredging between HSC Stations 98+000 to 57+000 (channel widening) and relocation of the existing barge lanes outside the channel as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

3.2.1.2 MEASUREMENT

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

3.2.1.3 PAYMENT

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

3.2.2 NEW WORK DREDGING – HSC STATIONS 57+000 TO 47+000 RED SIDE STRIPPING TO ODMDS

3.2.2.1 GENERAL

This item shall mean the Contract unit price for new work dredging (stripping) the red side of the channel from Station 57+000 to Station 47+000 to a depth of minus 40 feet MLLW, as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

3.2.2.2 MEASUREMENT

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

3.2.2.3 PAYMENT

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

3.2.3 NEW WORK DREDGING – HSC STATIONS 57+000 TO 45+000 GREEN SIDE STRIPPING TO ODMDS

3.2.3.1 GENERAL

This item shall mean the Contract unit price for new work dredging (stripping) the green side from Station 57+000 to Station 45+000 to a depth of minus 30 feet MLLW as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

3.2.3.2 MEASUREMENT

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

3.2.3.3 PAYMENT

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

3.2.4 DREDGING STANDBY TIME

3.2.4.1 GENERAL

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

During the standby period, the Contractor shall man the total dredge plant with necessary crew to return to productive dredging upon authorization from the Port Authority, as well as to ascertain the security of the plant and to maintain the operations of those systems of the plant that are essentially required to be operated. During periods of standby, the Contractor shall maintain lookouts and radio communications as required in Technical Specifications Section 1 Subsection 1.11.4. 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.

3.2.4.2 MEASUREMENT

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

3.2.4.3 PAYMENT

Payment for standby time shall be made at the Contract unit price per hour for Dredging Standby Time, which will include the standby hours required per the direction of the Port Authority. No separate payment shall be made for standby or down time incurred while dredging without authorization from the Port Authority. Delay time for ancillary maintenance or repairs beyond the necessary time to alleviate the delay as determined by the Port Authority shall not be included. Nor shall the necessary time to perform the work as described in Section 7 be included, if required.

OPTION 1

3.2.5 MAINTENANCE DREDGING MOBILIZATION AND DEMOBILIZATION – HOPPER DREDGING

3.2.5.1 GENERAL

Mobilization and demobilization shall include the costs in connection with mobilization and demobilization of additional plant or equipment necessary to perform maintenance work under the various bid items. 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.

3.2.5.2 MEASUREMENT

This shall not be measured for payment.

3.2.5.3 PAYMENT

Payment for mobilization and demobilization shall be made in accordance with **Section 9 Payment for Mobilization and Demobilization of the Special Conditions**. Payment shall not be made for mobilization and demobilization of the same plant or equipment as used by the Contractor for new work dredging.

3.2.6 MAINTENANCE DREDGING – HSC STATIONS 98+000 TO 57+000 TO ODMDS

3.2.6.1 GENERAL

This item shall mean the Contract unit price for maintenance dredging between HSC Stations 98+000 to 57+000 to the existing authorized federal channel limits shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of these Technical Specifications.

3.2.6.2 MEASUREMENT

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

3.2.6.3 PAYMENT

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

3.3 OPTION 2

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 Technical Specifications Section 7, HSC Existing Structure Demolition/Removal. The Contract price shall include transportation and other costs incidental to delivery of the plant and other equipment to the general work area in condition ready for operation.

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

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

3.3.1.2 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 work areas and disposal of removed material/debris from the HSC shall be incidental to the cost of the Work. No separate measurement or payment shall be made for removal and disposal of materials and debris from the work areas.

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

3.3.2.2 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 OPTION 3

3.4.1 FINAL SWEEP—HSC STATIONS 98+000 TO 57+000 TO ODMDS

3.4.1.1 GENERAL

This item shall mean the Contract unit price for a final sweep of maintenance material, that has shoaled into the HSC during the time from the start of New Work dredging and before final acceptance of the work, between HSC Stations 98+000 to 57+000 (channel widening) and the improved barge lanes outside the channel as shown on the Plans, and shall include the removal and placement of the material as specified in Section 6 of the Technical Specifications.

3.4.1.2 MEASUREMENT

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

3.4.1.3 PAYMENT

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

END OF SECTION

4 SURVEYING

4.1 SCOPE OF WORK

Surveys shall be performed in accordance with these Technical Specifications. All surveys shall be submitted in the format(s) required in accordance with Technical Specification Section 2 Subsection 2.6.4 and as described herein.

4.1.1 DREDGING SURVEYS

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

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

In addition, the Contractor shall also conduct its own daily construction surveying required during performance of the work. The Contractor shall notify the Engineer a minimum of three (3) days prior to performing surveys for interim 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 / Engineering Manuals:

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

4.3 QUALITY ASSURANCE/QUALITY CONTROL STANDARDS

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

4.3.1 TEXAS LICENSED REGISTERED PROFESSIONAL LAND SURVEYOR OR ENGINEER

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

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

4.3.2 REAL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEMS

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

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

4.4 PROJECT DATUM

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

4.5 SURVEY CONTROL

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

4.6 SURVEY ACCURACY

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

Table 4-1: Survey Accuracies

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

4.7 LAYOUT OF WORK

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

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

The Contractor shall perform its own daily construction surveying as required to complete the work in this Contract to the required lines and grades shown in the Plans. The Contractor shall lay out its work from the gages, coordinates, distances, stationing, ranges, and control shown in the Plans, and shall be responsible for the measurements in connection therewith. The Contractor shall furnish, at its expense, stakes, templates, platforms, equipment, range markers, and labor as may be required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Engineer. The Contractor shall also be responsible for maintaining and preserving the stakes and other marks established by the Engineer, as applicable, until authorized to remove them. If these marks are destroyed by the Contractor or through its negligence before their removal is authorized, they may be replaced by the Engineer at its discretion. The expense of replacement will be deducted from the amounts due or to become due, to the Contractor.

4.8 PRE-DREDGE HAZARD SURVEY

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

The Contractor shall conduct a magnetometer and sidescan survey over the entire area to be dredged and Contractor proposed equipment staging and laydown areas. The pre-dredge hazard surveys shall be at the Contractor's expense. Planned scope of the pre-dredge hazard survey shall be included in the Survey Plan.

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

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

4.9 DREDGING SURVEYS

4.9.1 SURVEY REQUIREMENTS

4.9.1.1 PORT AUTHORITY SURVEYS

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

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

4.9.1.2 CONTRACTOR SURVEYS

As stated in Section 4 Subsection 4.1.1 of these Technical Specifications, the Contractor shall provide its own dredging surveys for itself as required to complete the Work and supply the required submittals as described in Section 2 Subsection 2.6.4 of these Technical Specifications.

Contractor dredging surveys shall be performed in accordance with Technical Specification Sections 4.2 through 4.7. At a minimum, Contractor dredging surveys shall be performed in a methodology commensurate with the requirements specified in Subsection 4.9.1.1 above, unless otherwise approved by the Engineer.

4.9.2 SUMMARY OF DREDGING SURVEYS

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

Table 4-2: Summary of Channel Surveys

Survey	Intended Purpose	Survey Schedule	Type	Completed By
Pre-Dredge Hazard Survey*	To identify known, unknown or suspected utilities or obstructions	Prior to commencement of work	Magnetometer & Sidescan	Contractor
BD Surveys	To verify existing conditions and document pre-dredging grades and quantities	Prior to commencement of dredging	Multibeam	Port Authority

Contractor Dredging Surveys	Channel surveys conducted by the Contractor to measure its own construction progress and compliance	Daily (as safety and weather allows)	Minimum of Single Beam	Contractor
Interim AD Surveys for Progress Payment	Channel surveys performed to monitor dredging and to determine quantities for payment and percentage completion of work performed during pay period	Approximately, but not more frequently than, once per week	Multibeam	Port Authority
AD Surveys for Dredging Section Acceptance	Channel surveys performed to determine that the dredging template within an acceptance section has been dredged to the required lines and grades.	Upon request of Contractor to have an acceptance section accepted, subject to provisions of Technical Specifications Subsection 4.9.6	Multibeam	Port Authority
AD Surveys for Final Acceptance	To document final dredging locations/depths over the project limits (all sections), to verify that no dredging or placement has occurred outside of specified limits, and that the dredging template has been dredged to the minimum required lines and grades	Upon request of Contractor, subject to provisions of Technical Specifications Subsection 4.9.7	Multibeam	Port Authority
<i>* Indicates survey required to be signed and sealed in accordance with Subsection 4.3.1</i>				

4.9.3 BD SURVEYS

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

4.9.4 CONTRACTOR DREDGING SURVEYS

Contractor dredging surveys shall be performed by the Contractor to monitor dredging progress and compliance. Contractor dredging surveys shall be supplied and used by the Contractor to assist in the required daily reports in accordance with Technical Specification Section 2 Subsection 2.6.3. Contractor

dredging surveys shall be performed on a daily basis as dredging occurs and as safety and weather allows.

4.9.5 INTERIM AD SURVEYS FOR PROGRESS PAYMENT

Interim AD surveys shall be performed by the Port Authority to monitor dredging progress and to determine percentage completion and material quantities for progress payment purposes. Progress payments shall be made in accordance with, and at a frequency defined within, the General Conditions. Interim AD surveys for progress payment shall be made within a given pay period as required to capture and quantify the actual quantity of materials removed as measured back to the BD survey.

4.9.6 AD SURVEYS FOR DREDGING SECTION ACCEPTANCE

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

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

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

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

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

4.9.7 AD SURVEY FOR FINAL ACCEPTANCE

Upon completion of dredging, a final AD survey for final acceptance shall be performed over the entire dredge limits to verify that the dredging template has been dredged to the minimum lines and grades

required. The Contractor shall request that the Port Authority perform an AD survey for final acceptance when the dredging is completed. The Contractor shall provide seven days (7 days) advance notice of its intent to request a final acceptance survey.

If any shoals, lumps, or other lack of Contract depth be disclosed by this examination, the Contractor will be required to remove same at its sole cost and expense, but if the bottom is soft and the shoal areas are small and form no material obstruction to navigation, the removal of such shoal may be waived at the discretion of the Port Authority. The Contractor will be notified when soundings are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted. Should the Port Authority be unable to accomplish a required survey because the area is not cleared of Contractor equipment, or should re-survey be necessary because of incomplete work, the cost of the survey party and equipment for each additional survey day required shall be chargeable to the Contractor at the rate of \$5,000 per day, in addition to any liquidated damages that may be imposed in accordance with the General or Special Conditions. Final acceptance of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of the work shall not change the time of payment of the retained percentages of the whole or any part of the work.

4.10 ODMDS MONITORING SURVEYS

Hydrographic surveys under this section shall be performed as described in Paragraph 3.2 of Appendix B and as described herein. Cross sections shall be taken perpendicular to the HSC at 500-foot intervals and extend 500 feet beyond the ODMDS zone limits. Submittals shall be provided as described in Technical Specification Section 2 Subsection 2.6.4.

Contractor ODMDS monitoring surveys shall be performed in accordance with Section 4.2 through Section 4.7 of these Technical Specifications. At a minimum, Contractor ODMDS monitoring surveys shall be performed in a methodology commensurate with the requirements specified in Technical Specifications Section 4.9.1.1 above, unless otherwise approved by the Engineer.

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

Table 4-3: Summary of Placement Area Surveys

Survey	Intended Purpose	Survey Schedule	Completed By
Pre-dredge Survey*	To verify the existing condition prior to commencement of work	No greater than 30 days prior to commencement of work	Contractor
Interim Disposal Surveys	To monitor bathymetry changes and potential mounding to ensure a navigation hazard is not produced	Weekly, as safety and weather allows	Contractor

Post-dredge Survey*	To provide for final acceptance of the work	Within 45 days of completion of disposal operations	Contractor
* Survey deliverables for the pre-dredge survey and post-dredge survey must be signed and sealed by a qualified RPLS or PE in the State of Texas			

4.10.1 PRE-DREDGE SURVEY

Prior to performing any work at the site, the Contractor shall perform a pre-dredge survey of the disposal area. The limits of the survey shall include all disposal zones to be used during the contract, including the 500-foot buffer zone on the outer boundary of the disposal zone(s) and 500 feet outside of the Galveston ODMDS boundary. The Contractor shall notify the Engineer a minimum of (3) three days prior to conducting the pre-dredge survey, so that the Engineer may witness the survey. Promptly upon completion of the survey, the Contractor shall provide all required survey submittals to the Engineer.

4.10.2 INTERIM DISPOSAL SURVEYS

During the course of dredging operations, the Contractor shall perform at minimum, weekly hydrographic disposal surveys to monitor placement in the disposal area (weather permitting). Interim disposal surveys will be used to reduce the possibility of accidental mounding, breaching or spillage of dredged material outside of the ODMDS boundary.

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

4.10.3 POST-DREDGE SURVEY

The Contractor shall conduct the survey for final acceptance of the ODMDS. The limits of the survey shall cover the entire limits of the pre-dredge survey.

The Contractor shall provide (5) five days' advance notice to the Engineer of its intent to perform the Post-Dredge Survey. Material found to be deposited beyond the discharge limits are to be removed by the Contractor at no additional cost to the Government. Promptly upon completion of the survey, the Contractor shall provide all required survey submittals to the Engineer.

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

4.11 OBSTRUCTION DEMOLITION SURVEY

Upon completion of the Work in Section 7 of these Technical Specifications, and at its sole expense, the Contractor shall perform, or shall subcontract to be performed, a sidescan survey which shall be conducted over the demolition area to demonstrate that the obstructions have been completely

removed or cut off below the post-project (AD) sea bed, and that the obstruction demolition area is clear of debris resulting from the Work. The sidescan survey shall be signed and sealed by a RPLS or a PE licensed to practice in Texas. The sidescan survey shall be furnished to the Engineer upon its completion for approval as described in Section 2 Subsection 2.7.2 of these Technical Specifications.

END OF SECTION

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5 ENVIRONMENTAL PROTECTION

5.1 GENERAL REQUIREMENTS

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

5.1.1 CONSTRUCTION AUTHORITY

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

5.1.2 PROTECTION OF LAND RESOURCES

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

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

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

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

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

5.1.4 TEMPORARY EXCAVATIONS AND EMBANKMENTS

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

5.1.5 PLACEMENT OF SOLID WASTES

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

5.1.6 PLACEMENT OF SOLID WASTE BY REMOVAL FROM PORT AUTHORITY PROPERTY

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

5.1.7 PLACEMENT OF DISCARDED MATERIALS

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

5.1.8 SANITATION FACILITIES

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

5.1.9 MAINTENANCE OF POLLUTION CONTROL 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 TURBIDITY AND WATER QUALITY

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

5.3 AIR QUALITY

5.3.1 GENERAL REQUIREMENTS

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

5.3.1.1 PARTICULATES

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

5.3.1.2 HYDROCARBONS AND CARBON MONOXIDE EMISSIONS

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

5.3.1.3 ODORS

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

5.3.2 COMMITMENTS FOR GENERAL CONFORMITY

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

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

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- A description of the types of current equipment (e.g. disposal scow, dredge, 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, etc.) that will work alongside dredges to minimize idling
 - Inspect and maintain seals to hatches, filling ports, etc. used for fuel storage and refueling.
 - Ensure engine turbochargers are properly maintained to prevent fouling, speed drop, and temperature drops
 - Conduct any soot blowing necessary to prevent exhaust stack buildup away from shore if possible.
 - Consider the use of lower engine speeds or “slow steaming” if feasible to reduce fuel consumption
 - Conduct any required clearing, grubbing, cutting of vegetation under moist or wet conditions to minimize particulate and dust generation.
 - The Contractor shall use ultra-low-sulfur diesel (ULSD) fuel in marine vessels where technically and logistically feasible. Marine diesel fuel already must meet the ULSD fuel standard of 15 parts-per-million (ppm) sulfur content and is being phased in within the region. The Contractor shall locate vendors and determine whether ULSD is available and logistically feasible to use for its vessels, whether owned or rented. The Contractor shall identify whether vessels proposed for work under this solicitation can use ULSD fuel. To demonstrate consideration of ULSD use and feasibility, the Contractor shall provide a statement in one page or less describing whether vessels proposed for work under this solicitation can use ULSD fuel, and if so, the potential vendors it has located.
 - The Contractor shall disclose to the Port Authority whether any of the marine vessels being used for work under this contract has been inspected by the U.S. Coast Guard (USCG), and whether that inspection covered the protocols for Annex VI of the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978, known as Marine

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

5.4 FISH AND WILDLIFE RESOURCES

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

5.4.1 MIGRATORY BIRD TREATY ACT (MBTA)

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

5.4.2 ENDANGERED SPECIES ACT (ESA)

The Contractor should be aware of the potential for the presence of federally listed species in the project area, and precautions and notifications to make, in case they are encountered. Five species of sea turtles that frequent the Gulf of Mexico may use inland bays such as Galveston Bay for foraging, with Kemp's Ridley sea turtle, loggerhead sea turtle, and green sea turtle, most likely to use Galveston Bay waters. Piping plover (*Charadrius melodus*), occasionally has been known to utilize mud flats found adjacent to or within HSC placement areas. The Port Authority has agreed to the implementation of the National Marine Fisheries Service's Sea Turtle and Smalltooth Sawfish Construction Conditions. In accordance with these conditions, the Contractor shall cease operation of any moving equipment immediately if Endangered Species Act listed species are seen within a 100 yard radius of the active daily construction/ dredging operation or vessel movement, all appropriate precautions shall be implemented to facilitate its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or manta ray is seen within a 50-foot radius of the equipment. Equipment and activities shall not resume until the protected species has departed the project area of its own volition. Though preferred habitat for the West Indian manatee (*Trichechus manatus*) is not present in the project area, it has wandered into Galveston Bay on rare occasions. In order to facilitate avoidance, the following measures will be implemented: 1) All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The Contractor shall advise all construction personnel that there

are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.; 2) All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.; 3) Siltation or turbidity barriers, if required, shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.; 4) All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.; and should contact with any of these species occur within the project area, the Contractor should contact the U.S. Fish and Wildlife Service's Houston Coastal Ecological Services Field Office immediately at (281)-286-8282, or in the case of a turtle or manatee, please contact the Marine Mammal Stranding Network at (409)-740-2200. As the National Oceanic and Atmospheric Administration (NOAA) has sole responsibility over sea turtles in a marine environment including bays and estuaries, they should be contacted at (727) 824-5312 for such sightings. The Contractor shall also notify the Port Authority of these sightings and notifications made to the aforementioned agencies.

5.4.3 OYSTER REEFS

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

5.5 CULTURAL RESOURCES

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

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

END OF SECTION

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6 HOUSTON SHIP CHANNEL DREDGING AND PLACEMENT

6.1 SCOPE OF WORK

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

The work encompasses dredging the HSC from approximate Station 98+000 to Station 45+000. A hydrographic survey was conducted in February - March 2020 to examine existing conditions. The results of the survey are shown on the Plans. However, it should be noted that the existing federal HSC limits are currently being operated and maintained by the USACE, which includes ongoing maintenance dredging work. The Contractor is advised that the following currently known or anticipated contracts in the vicinity of work described herein consist of the following:

a) Insert Contract(s) at procurement

If awarded as option work, maintenance dredging shall be performed between HSC Stations 98+000 to 57+000 prior to new work dredging within the existing federal HSC limits and disposed of into the ODMDS. Maintenance work will be measured and paid for separately in accordance with Section 3 of these Technical Specifications.

New work materials from NW Dredging HSC to ODMDS include the 170-foot channel widening (85-feet to either side) from Station 98+000 to Station 57+000, stripping of the red side of the channel (within the new work horizontal limits) to a depth of minus 40 feet MLLW from Station 57+000 to 47+000, stripping of the green side of the channel (within the new work horizontal limits) to a depth of minus 30 feet MLLW from Station 57+000 to Station 45+000, a bend easing at Station 78+844, required side slopes and the relocation of the barge lanes as shown on the Plans. However, potential obstructions may exist within the channel widening and barge lanes between approximate Stations 83+000 and 45+000. Obstruction removal is described in Section 7 of these Technical Specifications. Additional debris may be encountered in the excavation areas. Soft shoaled materials encountered within the existing federal channel limits, during the course of new work dredging, shall be considered incidental to the work if maintenance dredging is not awarded as option work. No measurement or payment shall be made for soft shoaled materials or debris removed as part of the work.

New work materials excavated from HSC Station 98+000 to Station 45+000 shall be transported and disposed into the ODMDS as shown on the Plans.

New work dredging of the HSC shall be within the horizontal limits shown on the Plans to a required depth of minus 48 feet MLLW with 2 feet of allowable overdepth from Station 98+000 to Station 75+000. The existing 530-foot wide template was created with a 4H:1V (maintained at 2.5H:1V) slope beginning at the authorized depth of minus 46 feet MLLW plus 2 feet of advance maintenance plus 2 feet of allowable overdepth. New work dredging of the Houston Ship Channel shall be within the horizontal limits shown on the Plans and to the required grades and slopes as shown in Table 6-1.

~~A clean dredging sweep of the improved channel template over the entire dredge limits may be required before final acceptance of the Work by the Port Authority. Please refer to Technical Specifications subsection 6.3.1 for estimated shoaling rates of the project area.~~

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

Description	From Station	To Station	Required Depth (RD)	Advanced Maintenance (AM)	Allowable Overdepth (AO)	Final	
						Side Slope ⁽¹⁾	
						Vertical	Horizontal
Maintenance Dredging HSC to ODMDS ⁽⁴⁾	98+000	57+000	-46.0	2.0	2.0	1	2.5
NW Dredging HSC to ODMDS	98+000	78+200	-48.0	0.0	-2.0	1	3
	78+200	78+000	-48.0	0.0	-2.0	1	3 – 4 ⁽²⁾
	78+000	57+000	-48.0	0.0	-2.0	1	4
NW Dredging HSC to ODMDS Red Side Stripping	57+000	56+000	-40.0	0.0	0.0	1	4
	56+000	55+800	-40.0	0.0	0.0	1	3 – 4 ⁽³⁾
	55+800	47+000	-40.0	0.0	0.0	1	3

NW Dredging HSC to ODMDS Green Side Stripping	57+000	56+000	-30.0	0.0	0.0	1	4
	56+000	55+800	-30.0	0.0	0.0	1	3 – 4 ⁽³⁾
	55+800	45+000	-30.0	0.0	0.0	1	3
Barge Lanes	98+000	57+000	-13.0	0.0	1.0	1	3
<p>(1) Slopes indicated are design values perpendicular to channel toes. (2) Transition from a 3H:1V slope to a 4H:1V slope. (3) Transition from a 4H:1V slope to a 3H:1V slope. (4) If option is awarded.</p>							

6.2 DREDGING

6.2.1 ORDER OF WORK FOR DREDGING

The Contractor shall perform the dredging work in the order specified in Technical Section 1 Subsection 1.6.1. For the purposes of acceptance, the dredging work items in the Bidding Schedule are further divided into Sections as follow:

Table 6-2: HSC Acceptance Sections

Section No.	From Station	To Station	Length of Section (feet)
1	98+000	94+000	4,000
2	94+000	90+000	4,000
3	90+000	86+000	4,000
4	86+000	82+000	4,000
5	82+000	78+000	4,000
6	78+000	74+000	4,000
7	74+000	70+000	4,000
8	70+000	66+000	4,000
9	66+000	62+000	4,000

10	62+000	57+000	5,000
11	57+000 (red)	47+000 (red)	10,000
12	57+000 (green)	45+000 (green)	12,000

The Contractor may begin dredging new work materials at the inbound or outbound limit of work dependent on their own work plan and construction sequence. New work dredging shall be continuous from start to finish once new work dredging begins. The Contractor shall fully complete excavation for each acceptance section before progressing to the next acceptance section, unless otherwise approved by the Engineer.

6.2.2 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. If exercised, maintenance dredging shall be performed prior to new work dredging as part of this Contract and as described in these Technical Specifications. Maintenance material left within the new work template is considered incidental to the new work and shall not be considered separately for payment once new work dredging commences. Please refer to Technical Specifications Section 6 Subsections 6.1 and 6.3.1 for descriptions of anticipated work and shoaling estimates for the project area.

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

HSC New Work					
Section No.	From Station	To Station	Required Depth (RD) (CY)	Allowable Overdepth (AO) (CY)	Total Estimated (CY)
1	98+000	94+000	98,700	47,700	146,400
2	94+000	90+000	112,400	47,700	160,100
3	90+000	86+000	148,500	49,600	198,100
4	86+000	82+000	184,900	50,800	235,700
5	82+000	78+000	711,400	84,400	795,800
6	78+000	74+000	683,400	66,600	750,000
7	74+000	70+000	524,500	50,000	574,500
8	70+000	66+000	556,300	50,400	606,700
9	66+000	60+000	680,200	50,400	730,600
10	62+000	57+000	833,100	63,000	896,100

11	57+000 (red)	47+000 (red)	567,800	0	567,800
12	57+000 (green)	45+000 (green)	267,400	0	267,400
Total:			5,368,600	560,600	5,929,200
<i>Quantities are based on hydrographic surveys, February - March 2020.</i>					

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

HSC Maintenance Work					
Section No.	From Station	To Station	Required Depth (RD) (CY)	Allowable Overdepth (AO) (CY)	Total Estimated (CY)
1	98+000	94+000	0	31,700	31,700
2	94+000	90+000	100	37,300	37,400
3	90+000	86+000	700	48,300	49,000
4	86+000	82+000	1,100	50,500	51,600
5	82+000	78+000	700	11,300	12,000
6	78+000	74+000	13,500	54,800	68,300
7	74+000	70+000	8,900	47,700	56,600
8	70+000	66+000	35,600	69,500	105,100
9	66+000	60+000	76,000	91,000	167,000
10	62+000	57+000	65,700	92,300	158,000
Total:			202,300	534,400	736,700
<i>Quantities are based on hydrographic surveys, February - March 2020.</i>					

6.3 GENERAL PROVISIONS

6.3.1 SHOALING

The Contractor shall consider shoaling in their proposal and schedule. It is estimated that the existing HSC federal channel limits between Stations 98+000 to 57+000 has the potential to shoal approximately 1,469,000 CY/year on average.

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 each dredge vessel, bucket elevation and position, and transport vessel position at all times. The Contractor shall display and record in real-time the location of each dredge, bucket, and transport vessel.

6.3.2.1 RTK GPS STANDARDS

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

6.3.2.2 RTK GPS DATA REQUIREMENTS AND SUBMISSIONS

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

All data shall be collected and stored digitally in ASCII format and shall be readable by MS Windows compatible software. Each day's worth of RTK data shall be a separate and distinct ASCII file, labeled by the date.

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
- For mechanical dredging, dredge bucket location in the X,Y,Z (at the lip of the closed bucket) directions at both the bucket grab closing point and the bucket release or opening point over the transport vessel provided in the project datum in accordance with Technical Specification Section 4 Subsection 4.4. Z coordinates shall be provided for both the raw and tide adjusted values.
- Transport vessel location in the X,Y,Z directions on 10-second intervals provided in the project datum in accordance with Technical Specification Section 4 Subsection 4.4.
- Date, time, and location at initiation and completion of disposal event.

-
- Vessel Draft
 - RTK Tides
 - Load Number

All digital RTK GPS data shall be furnished to the Engineer within 24 hours of collection. During mechanical dredging, a cut chart showing the bucket positions while dredging for each day shall be submitted to the Engineer each week.

6.3.3 DREDGING OPERATIONS

- Dredging shall be to the lines and grades indicated on the Plans.
- Holes dug on the banks for deadmen or anchorage shall be filled and repaired to the previous existing lines and grades.
- 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) and on the transport vessel(s) where applicable.
- Barges used for mechanical dredging, transport, and placement shall be maintained free of leaks, shall be evenly loaded and shall not be filled within 3.0 feet of the coamings to avoid spillage during transport. Doors shall be closed tight during loading and transport and all seals and lips maintained throughout the Contract duration. The Contractor shall notify the Port Authority immediately if excessive leakage occurs while the transport vessel(s) is traveling to the placement area. Excessive leakage is defined as any change in draft exceeding 2.0 feet from the point of departure from the dredging site to the disposal site.

6.3.4 PLACEMENT OF EXCAVATED MATERIAL

Material excavated is to be transported to and deposited in the ODMDS as designated. Inspect the ODMDS to ensure that using the area for placement operations will not place it in violation of the applicable Federal, State, or local statutes concerning fish and wildlife. Particular statutes which the Contractor are to consider, include but are not limited to, the Federal Migratory Bird Treaty Act and the Endangered Species Act of 1973.

6.3.4.1 ODMDS

The dredged material excavated from the channel is to be placed within the approved discharge zone(s) of the ODMDS. The dredged material is to be deposited over or beyond the crests of existing dumping grounds where they exist. The Contractor is to perform its operations using a method that will prevent the material from flowing back into the HSC. The discharge of dredged material is to be made far

enough within the discharge area limits to ensure that no material flows beyond the ODMDS limits shown. Material deposited beyond the discharge limits are to be removed by the Contractor at no additional cost to the Port Authority. The point of discharge is to be relocated as often as necessary to uniformly distribute the dredged material throughout the ODMDS. An accumulation of material that changes the elevation to exceed 1.0 foot along the ODMDS limits or 5.0 feet within the ODMDS is prohibited. All disposal activities within the ODMDS shall also comply with the Site Management and Monitoring Plan included as Appendix B.

6.3.4.2 ODMDS MONITORING SURVEYS

The Contractor shall perform hydrographic surveys of the ODMDS as described in Technical Specifications Section 4 Subsection 4.10 in order to continually monitor the placement of dredged material in the ODMDS.

6.3.5 PLANT

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

6.3.6 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, anchors/frames/stands, ranges, buoys, survey stakes, piles, and other markers or obstructions placed by or for the Contractor. The Contractor will not be permitted to abandon any equipment in the disposal area for dredged materials or other areas adjacent to the worksite.

6.3.7 MEASUREMENT AND PAYMENT

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

6.3.7.1 REQUIRED DEPTH

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

6.3.7.2 ADVANCE MAINTENANCE

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

6.3.7.3 OVERDEPTH

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

There shall be no allowable overdepth dredging that occurs for the stripping of new work materials as described in Table 6.1.

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

6.3.7.4 SIDE AND END SLOPES

The Contractor shall remove sufficient material to provide the limiting side and end slopes specified in this Section. Material actually removed, within the limits shown on the Plans to provide for final side slopes as shown in Table 6-1, but not in excess of the amount originally lying above this limiting side slope will be measured and paid for, whether dredged in original position or by box cutting. Box cutting is defined as dredging the space below the pay slope plane at the bottom of the slope for upslope material capable of falling into the cut. There will be no payment for end slope material that falls into the required cut and is subsequently removed. This Section for compensating side slopes will not apply to areas where dredging is limited due to the proximity of terminal structures or as otherwise indicated in the Plans.

6.3.7.5 EXCESSIVE DREDGING

Payment will not be made for material taken from beyond the limits as shown in the Plans, except as specified in Technical Specifications Section 6 Subsections 6.3.7.3 and 6.3.7.4

New work materials excavated one foot beyond the required depth in areas to be stripped, shall be penalized at the Contract Unit price and withheld from payment, as described in **Section ## of the Special Conditions.**

6.4 ACCEPTANCE

6.4.1 FINAL SWEEP OF IMPROVED CHANNEL

Prior to final completion of the work and handover of the project to the PHA, the Contractor may be required to undertake a final sweep of the dredged areas to ensure compliance with the new work lines and grades as shown on the Plans. Any areas within the HSC new work dredge limits with material lying above the required depth shall be dredged and cleaned up by the Contractor utilizing their own means and methods subject to approval by the Engineer. The Contractor shall dispose of the material into the ODMDS as outlined in Section 6.3.4.1. Material removed within the HSC new work dredge limits during the final sweep shall be measured and paid for separately in accordance with Section 3 Subsection **XXX.**

The work will be accepted as complete upon delivery of a clean channel template as verified by a hydrographic survey in accordance with Section 4 Subsection **XXX.**

END OF SECTION

7 HSC EXISTING STRUCTURE DEMOLITION/REMOVAL (OPTION 2)

7.1 SCOPE OF WORK

Submerged obstructions may exist within the new work dredge limits and barge lane relocation limits. Removal of the existing structures, if encountered, may be required in order to excavate the HSC to the lines and grades shown on the Plans. Obstructions including, but not necessarily limited to; timber piles, stakes, sheet piling, scrap metal or other obstructive materials encountered during demolition/removal activities shall be disposed of in accordance with any and all applicable Federal, State, or local requirements.

The work in this Section consists of providing all labor, material, and equipment for removing and disposing of potential existing submerged structures within or near the new work limits of the HSC as described in Section 6, which may prevent the excavation and dredging of new work materials to the lines and grades shown on the Plans and in accordance with these Technical Specifications.

The Contractor shall make its own investigations to determine the exact type, size, and quantity of submerged obstructions to be removed, if any. The Contractor shall remove the obstructions or cut them off in accordance with these Technical Specifications. Unless otherwise indicated by the Engineer, where piles are cut off, they shall be cut off at a minimum depth of one (1.0) foot below the allowable template as shown on the Plans. The Contractor shall determine its own means and methods by which to complete the Work. Removed or demolished materials shall become the property of the Contractor and shall be removed from the Site. Removed or demolished materials shall not be allowed to encroach on to adjoining property, including public or private places, unless approved by the Engineer.

Surface trash and debris encountered in the new work dredge limits as described in Section 1 Subsection 1.9.2 shall not constitute as basis for execution of the Work outlined in this Section. The Work in this Section shall only be exercised for structures of a type or form necessitating mobilization of additional plant or equipment for removal, to allow for complete excavation of the channel template as shown on the Plans.

7.2 REFERENCES

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

ASTM International (ASTM):

- ASTM E 1609 (2001) Development and Implementation of a Pollution Prevention Plan

Publications:

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- Vincent, Mark, and Glahn, Lisa, and Raphaelson, Rebecca. "The History of Dredging at The Port of Houston: Ditching High and Low to Build a Port" Proceedings of the Western Dredging Association and Texas A&M University Center for Dredging Studies' "Dredging Summit and Expo 2015"
 - Ward, George. "Dredge and Fill Activities in Galveston Bay" The Galveston Bay National Estuary Program "Publication GBNEP-28 April, 1993"

7.3 BACKGROUND

Dredge delays were encountered during the HSC Expansion Channel Improvement Project 10 due to believed wood bulkheads in the vicinity of Bulkhead Reef. The results of further historical investigations performed on behalf of the PHA are provided below.

7.3.1 HISTORICAL DATA

Both publications in Subsection 7.2 provide a history of the development of the Houston Ship Channel from the early 20th century to the current-day HSC. The Contractor is encouraged to review the provided references and to perform their own research as to any potential existing submerged obstructions within the limits of the HSC new work. The excerpts provided below were deemed of note during the historical investigation performed on behalf of the PHA.

- The bulkhead retaining walls first formed for Morgan's Cut were extended for up to twelve miles down the bay reach, in the form of king pile walls with brush infill for sediment management. When that wall proved inadequate, a second sheet pile wall was constructed offset 30.48 m (100 ft) from the first line of silt defense. While the pile walls were eventually abandoned, remnants of the wall are still charted as obstructions to boaters in Galveston Bay (Vincent & Glahn & Raphaelson, p. 479).
- Another barrier to flow in the system was the dike extending 18 km out across the bay from Morgan's Point. First completed as a timber-and-brush dike in 1902, the dike survived for a decade, with high maintenance, until the hurricane of 1911, and allowed stabilization of spoil islands just to the east of the Houston Ship Channel (Atkinson Island). The dike is clearly visible in Fig. 2-3. While the dike is now gone (a few sections of the old dike still survive near Bulkhead Reef), the disposal areas along the channel above Redfish Reef now serve its original function of blocking lateral flow across the channel (Ward, p. 171).

7.3.2 POTENTIAL AREAS OF CONCERN

7.3.2.1 NOAA NAUTICAL CHART 11327 (current)

1. Note B suggests that submerged stakes may exist 400 feet east of and parallel to the Houston Ship Channel between Light 58 and Light 90.
2. A submerged bulkhead is shown near Bulkhead Reef on the east side of the HSC. Bulkhead Reef is a spoil area located on the east side of the HSC, between Midbay placement area and North Boater's Cut, as shown on NOAA Nautical Chart 11327.

7.3.2.2 COAST CHART NO. 204 GALVESTON BAY, TEXAS (dated 1901)

1. "Lines of Piles" are displayed on the chart on the west side of the horizontal limits of the historic 1901 HSC between Morgan's Point and the current day Bayport Flare.
2. A second "Lines of Piles" is displayed on the chart on both the west and east sides of the horizontal limits of the historic 1901 HSC offshore of Eagle Point.

7.4 INTENT

Supplemental to dredging of material to the required lines and grades shown on the Plans, the intent of the Work covered under this Section is to remove or cut off the existing structures in accordance with these Technical Specifications and apply sound environmental principles in the disposal of the generated debris. As part of the implementation of this policy the Contractor shall use all reasonable means to divert demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

7.5 OBSTRUCTION DEMOLITION/REMOVAL

The Contractor shall remove or cut off below the allowable template, all of the potential existing submerged obstructions as referenced in Appendix C and Appendix D, or as encountered during the progress of Work. The material generated from this Work shall be classified as demolished material or debris, shall become property of the Contractor, and shall be removed from the Site in accordance with this Section. No separate payment shall be made for standby time incurred as a result of "HSC Existing Structure Demolition/Removal".

7.5.1 MEETINGS

After award of the Contract and prior to commencement of Work, the Contractor shall schedule and conduct a meeting with the Engineer to discuss the proposed Obstruction Demolition Plan, and to develop a mutual understanding relative to the details of the Work. At a minimum, the Obstruction Demolition Plan and waste management goals and issues shall be discussed at the Preconstruction Conference or other meetings as scheduled during performance of the Work under this Contract.

7.5.2 RECORDS

Submit documentation for solid waste disposal and diversion, and submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material. The records shall be made available to the Engineer during construction, and a copy of the records shall be delivered to the Engineer upon completion of obstruction removal/cutoff and disposal.

7.5.3 COLLECTION

Provide the necessary containers, bins and storage areas to facilitate effective waste management. Provide materials for barriers and enclosures around material storage areas. Locate out of the way of construction traffic. Provide adequate space for pick-up and delivery and convenience to subcontractors. Handle hazardous waste and hazardous materials in accordance with applicable regulations.

7.5.4 DISPOSAL

All waste and debris materials generated shall become property of the Contractor. Control accumulation of waste materials and trash. Recycle or dispose of waste and debris materials off-site and in compliance with federal, state, and local laws and regulations.

7.6 ACCEPTANCE

Acceptance of the Work covered under this Section shall be determined by two components:

1. Upon completion of the Work, the Port Authority shall perform a multibeam survey over the demolition area as determined by the Engineer to inspect the Work and determine if:
 - a. The channel has been dredged to the required lines and grades shown on the Plans, in accordance with these Technical Specifications and;
 - b. All obstructions have been removed or cut off to a minimum of 1-foot below the allowable template, and that the demolition area is clear of debris resulting from the Work. The multibeam survey shall be provided to the Contractor upon its request.
2. Completion of the obstruction demolition survey as described in Section 4 Subsection 4.11 and acceptance of the corresponding obstruction demolition survey submittals as described in Section 2 Subsection 2.7.2.

If one or both of the acceptance components as defined above are not met, corrective action will be required as determined by the Engineer, and at the sole cost and expense of the Contractor. If both acceptance components are met, the work will be finally accepted.

END OF SECTION

Appendix A – Boring Logs

The boring logs provided herein are taken from multiple sources and may not reflect the full extent of data collected or reporting provided at that time. Full data reports in possession of the Engineer can be provided electronically upon request by the Contractor.

95% DRAFT



Project 11

Houston Ship Channel Expansion Channel Improvement Project

Boring Logs



PORT HOUSTONSM
THE INTERNATIONAL PORT OF TEXAS

December 9, 2020

95% PRELIMINARY

THIS DOCUMENT IS RELEASED FOR
THE PURPOSE OF INTERIM REVIEW
AND IS NOT INTENDED TO BE USED
FOR CONSTRUCTION, BIDDING, OR
PERMITTING PURPOSES.

ENGINEER: ASHLEY P. JUDITH
LICENSE NO: TX# 112988
DATE: DECEMBER 09, 2020

ENGINEER: CHESTER HEDDERMAN
LICENSE NO: TX# 100209
DATE: DECEMBER 09, 2020

TurnerCollie&Braden, Inc.

JOINT VENTURE - PORT DEVELOPMENT AND ENVIRONMENTAL SERVICES

Gahagan & Bryant Associates, Inc.

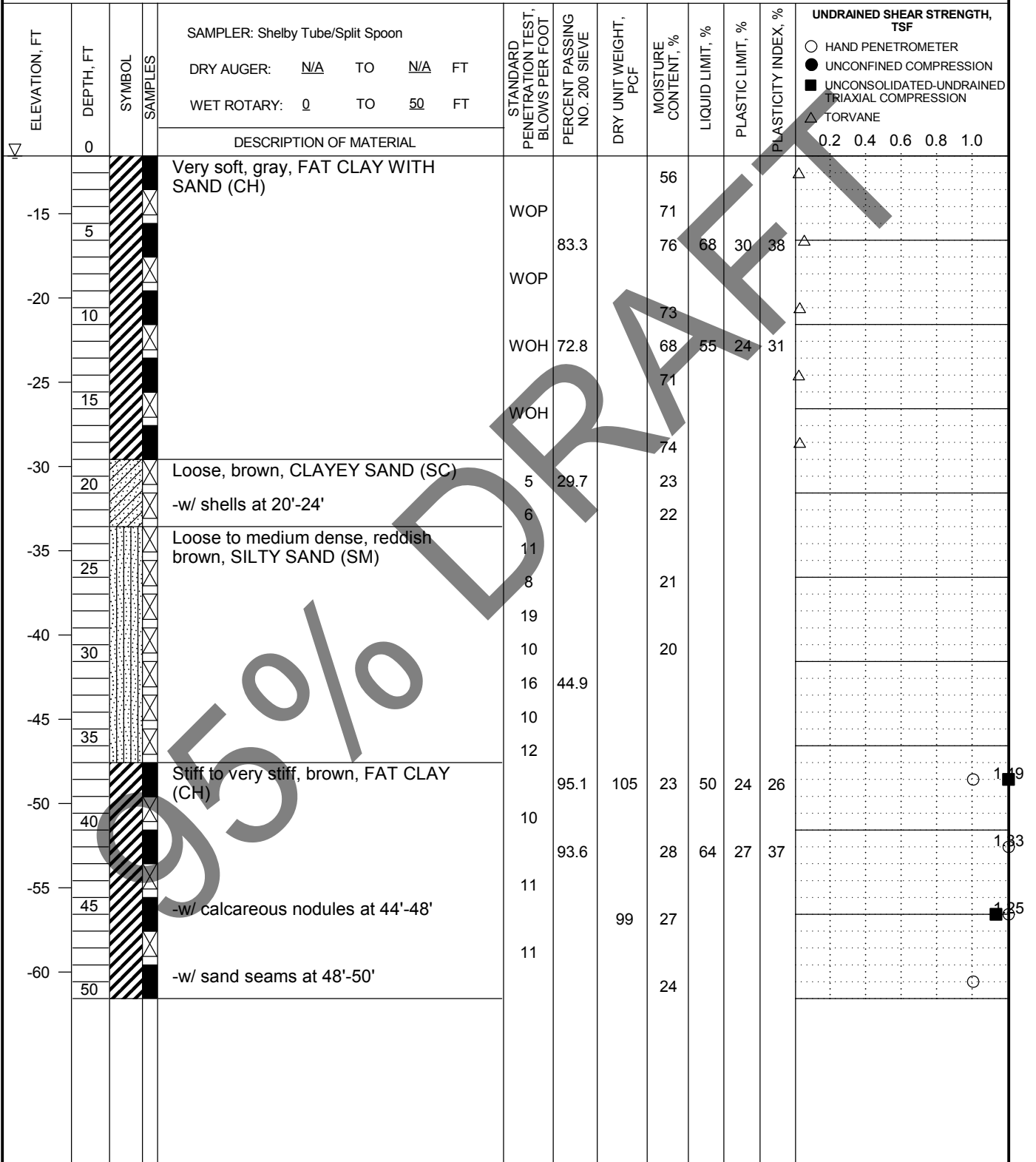
LOG OF BORING ECP-112

PROJECT: Houston Ship Channel Expansion - Segment 1A
 LOCATION: N: 13730806.7; E: 3292147.36
 DEPTH OF WATER: 12.9 FT
 OFFSET: N/A
 SURFACE ELEVATION: -11.58 FT

PROJECT NO.: HG1910092.1.1

COMPLETION DEPTH: 50 FT

DATE: 11/24/2019



COH HG1910092.1.1 - HSC SEGMENT 1A.GPJ 4/27/20

Remarks: Mudline was encountered at 12.9' below the water level during drilling operations.

LOG OF BORING ECP-113

PROJECT: Houston Ship Channel Expansion - Segment 1A
 LOCATION: N: 13734400.14; E: 3290404.3
 DEPTH OF WATER: 13.4 FT
 OFFSET: N/A
 SURFACE ELEVATION: -11.3 FT

PROJECT NO.: HG1910092.1.1

COMPLETION DEPTH: 50 FT

DATE: 11/25/2019

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	SAMPLER: Shelby Tube/Split Spoon	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, TSF
				DRY AUGER: <u>N/A</u> TO <u>N/A</u> FT								WET ROTARY: <u>0</u> TO <u>50</u> FT
	0			DESCRIPTION OF MATERIAL								0.2 0.4 0.6 0.8 1.0
				Very loose, gray, CLAYEY SAND (SC)	WOP	25.0		41				
					WOP							
-15	5			Very soft to firm, gray, FAT CLAY WITH SAND (CH)				65	59	26	33	△
					WOP							
-20								58				△
	10			-w/ sand at 10'-12'								
					WOP	77.2		67	64	27	37	
												△
-25												
	15			Very soft, gray, FAT CLAY (CH)	WOP			75				
						95.3		79	78	32	46	△
-30					WOP							
	20							67				△
					WOP							
-35												
	25				WOP	88.9		70	70	27	43	△
					WOP							
-40												△
	30				WOP							
							55	71				△ ■
-45					WOP							
	35							83				△
-50					WOP							
	40			Very soft, gray, SANDY FAT CLAY (CH)		55.0		57	60	29	31	△
				-w/ shells at 40'-42'	WOH							
-55												
	45			Very soft to soft, gray, FAT CLAY (CH) -w/ wood pieces at 48'-50'		99.1		84	99	34	65	△
					WOH							
-60							37	129				○ ■
	50											

Remarks: Mudline was encountered at 13.4' below the water level during drilling operations.

COH HG1910092.1.1 - HSC SEGMENT 1A.GPJ 4/27/20

LOG OF BORING ECP-114

PROJECT: Houston Ship Channel Expansion - Segment 1A
 LOCATION: N: 13737697.68; E: 3290318.66
 DEPTH OF WATER: 13 FT
 OFFSET: N/A
 SURFACE ELEVATION: -11.55 FT

PROJECT NO.: HG1910092.1.1

COMPLETION DEPTH: 50 FT

DATE: 11/25/2019

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	SAMPLER: Shelby Tube/Split Spoon DRY AUGER: <u>N/A</u> TO <u>N/A</u> FT WET ROTARY: <u>0</u> TO <u>50</u> FT	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, TSF ○ HAND PENETROMETER ● UNCONFINED COMPRESSION ■ UNCONSOLIDATED-UNDRAINED TRIAxIAL COMPRESSION △ TORVANE
	0			DESCRIPTION OF MATERIAL								0.2 0.4 0.6 0.8 1.0
				Very soft, gray, FAT CLAY WITH SAND (CH)	WOP			69				
-15	5				WOP	77.3		73	66	35	31	
-20	10				WOP			79	82	32	50	
					WOP			85				
-25	15			Very soft to soft, gray, FAT CLAY (CH)	WOP	90.7		90	106	30	76	△
-30	20				WOP			79				△
					WOP			82				
-35	25				WOP	94.8		76	92	30	62	△
					WOP			81				△
-40	30				WOP		60	74				△■
					WOP			95				△
-45	35				WOP	98.3		88	114	35	79	
-50	40				WOP		50	90				△■
					WOP			92				△
-55	45				WOP		50	90				△■
-60	50				WOP			94				△

COH HG1910092.1.1 - HSC SEGMENT 1A.GPJ 4/27/20

Remarks: Mudline was encountered at 13' below the water level during drilling operations.

LOG OF BORING ECP-115A

PROJECT: Houston Ship Channel Expansion - Segment 1A
 LOCATION: N: 13741833.31; E: 3288337.34
 DEPTH OF WATER: 16.2 FT
 OFFSET: N/A
 SURFACE ELEVATION: -14.51 FT

PROJECT NO.: HG1910092.1.1

COMPLETION DEPTH: 46 FT

DATE: 11/26/2019

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	SAMPLER: Shelby Tube/Split Spoon DRY AUGER: <u>N/A</u> TO <u>N/A</u> FT WET ROTARY: <u>0</u> TO <u>46</u> FT	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, TSF ○ HAND PENETROMETER ● UNCONFINED COMPRESSION ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION △ TORVANE
	0			DESCRIPTION OF MATERIAL								
-15				Very soft, gray, FAT CLAY WITH SAND (CH) -w/ shells at 0-8'		82.0		73	60	27	33	△
	5				WOP			81				
-20					WOP			80				△
	10			Very soft, gray, FAT CLAY (CH)		94.2		76	77	29	48	△
-25					WOP			87	82	33	49	△
	15				WOP			92				△
-30					WOP							
	20				WOP							
-35					WOP	96.9		88	90	30	60	△
	25				WOP			88				△
-40					WOP			80				△
	30				WOP							
-45					WOP	95.2		84	91	31	60	△
	35				WOP							
-50					WOP	98.6		89	102	41	61	△
	40				WOP			84				△
-55					WOP							
	45				WOP			83				△
-60												

Remarks: Mudline was encountered at 16.2' below the water level during drilling operations.

COH HG1910092.1.1 - HSC SEGMENT 1A.GPJ 4/27/20

LOG OF BORING ECP-116

PROJECT: Houston Ship Channel Expansion - Segment 1A
 LOCATION: N: 13740268.67; E: 3287559.72
 DEPTH OF WATER: 16.6 FT
 OFFSET: N/A
 SURFACE ELEVATION: -14.03 FT

PROJECT NO.: HG1910092.1.1

COMPLETION DEPTH: 46 FT

DATE: 11/26/2019

ELEVATION, FT	DEPTH, FT	SYMBOL	SAMPLES	SAMPLER: Shelby Tube/Split Spoon DRY AUGER: <u>N/A</u> TO <u>N/A</u> FT WET ROTARY: <u>0</u> TO <u>46</u> FT	STANDARD PENETRATION TEST, BLOWS PER FOOT	PERCENT PASSING NO. 200 SIEVE	DRY UNIT WEIGHT, PCF	MOISTURE CONTENT, %	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, TSF ○ HAND PENETROMETER ● UNCONFINED COMPRESSION ■ UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION △ TORVANE
	0			DESCRIPTION OF MATERIAL								0.2 0.4 0.6 0.8 1.0
-15				Very soft, gray, FAT CLAY (CH)				76				△
	5				WOP	88.9		78	67	29	38	△
-20					WOP							
	10						46	86	83	32	51	■
-25					WOP							
	15						48	89				■
-30					WOP	86.4		78	81	29	52	△
	20				WOP			84				
-35						96.2		87	98	38	60	△
	25				WOP							
-40								78	92	40	52	△
	30				WOP			84				△
-45				-w/ silt seams at 30'-42'	WOP			87				△
	35				WOP							
-50				-w/ sand seams and shells at 36'-38'		98.8	49	87	78	33	45	■
	40				WOH							
-55								87				△
	45				WOP							
-60								88				△

COH HG1910092.1.1 - HSC SEGMENT 1A.GPJ 4/27/20

Remarks: Mudline was encountered at 16.6' below the water level during drilling operations.