SOLICITATION NO.: XXXXXXX-XX-X-XXXX
CONTRACT NO.: WXXXXX-XX-X-XXXX
ISSUE DATE:

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LOCATION MAP

BARBOURS CUT TERMINAL
PROJECT LOCATION

CEDAR BAYOU
PROJECT LOCATION

M12 BENEFICIAL USE SITE
PROJECT LOCATION
This document is released for the purpose of interim review under the authority of M. Cameron Perry, P.E., 94056 8/14/20. It is not to be used for construction, bidding, or permit purposes.
1. REFER TO GENERAL NOTES ON SHEET G-003.
1. REFER TO GENERAL NOTES ON SHEET G-003.

BARBOURS CUT CHANNEL - EXISTING PIPELINE

SCALE = 1" = 500'

65% DRAFT
BARBOURS CUT CHANNEL - SITE PLAN

SCALE = 1" = 500'

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PORT OF HOUSTON AUTHORITY

HDR Engineering, INC
TBPELS Firm
Registration No. F-754

DESIGN PREPARED BY:

1. REFER TO GENERAL NOTES ON SHEET G-002.
BARBOURS CUT CHANNEL - TYPICAL SECTION 1

BARBOURS CUT CHANNEL - TYPICAL SECTION 2

BARBOURS CUT CHANNEL - TYPICAL SECTION 3

GENERAL SHEET NOTES

1. REFER TO GENERAL NOTES ON SHEET G-002.

2. SLOPE "VARIES" INDICATES CROSS-SECTION SLOPE OF 1V:3H IS NOT PERPENDICULAR TO CHANNEL CENTERLINE. ALL SIDE SLOPES ARE 1V:3H FROM TOE OF DREDGE CUT.

3. CONTRACTOR SHALL NOT USE HYDRAULIC DREDGE EQUIPMENT WITHIN 5 FEET OF EXISTING WALL STRUCTURE.

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65% REVIEW
TABLE 1

<table>
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<tr>
<th>ARMOR STONE - GRADED STONE &quot;B&quot;</th>
<th>THICKNESS = 3.0'</th>
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HDR Engineering, INC
TBP Firm
Registration No. F-754

PROPOSED CUTOFF WALL
EXISTING SHORELINE PROTECTION
(TO BE REMOVED AND STOCKPILED FOR USE IN NEW SHORELINE PROTECTION)

EXISTING EDGE

PROPOSED EDGE SCARP

EXCAVATE TO ALLOW CONSTRUCTION AND BACKFILL UPON ACCEPTANCE OF SHORELINE PROTECTION REPLACEMENT GEOTEXTILE ARMOR STONE "B"

THICKNESS = 3.0' (BY WEIGHT)

WEIGHT (POUNDS)

<55
200-520
500-760
1000-1500

BARBOURS CUT CHANNEL - TYPICAL SHORELINE PROTECTION SECTION

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1. REFER TO GENERAL NOTES ON SHEET G-002.

2. CONTRACTOR SHALL FULLY EXCAVATE BORROW AREA LOCATED ON WEST SIDE OF MECHANICALLY PLACED BERM PRIOR TO EXCAVATION FOR BORROW AREA ON THE EAST SIDE OF BERM.

GENERAL SHEET NOTES

PORT OF HOUSTON AUTHORITY

65% REVIEW

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

HDR Engineering, INC
TBPELS Firm
Registration No. F-754

DESIGN PREPARED BY:

65% DRAFT

PROJECT 11
PACKAGE #7

SEGMENT 3
BARBOURS CUT CHANNEL, M12 BENEFICIAL USE SITE AND CEDAR BAYOU

POINT M12 BENEFICIAL USE SITE GEOMETRY

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<th>NORTHING</th>
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</table>

PLAN - M12 BENEFICIAL USE SITE - SITE PLAN

SCALE = 1" = 500'
INITIAL PLACEMENT OF HYDRAULICALLY PUMPED BERM RECOVERABLE MATERIAL

ANGLE OF REPOSE

FINAL SHAPING AND GRADING OF BERM RECOVERABLE MATERIAL

HYDRAULIC FILL

WATERSIDE ARMOR STONE "A"

TOP OF TOE ELEVATION VARIED (SEE TABLE 2)

EXISTING BAY BOTTOM ELEVATION VARIES

BERM (BASELINE "A")

THICKNESS = 2.4'

% LESS (BY WEIGHT)

WEIGHT (POUNDS)

15' 15'

55' 55'

CL

ELEVATION +4.0 MLLW

ELEVATION +6.0 MLLW

GEOTEXTILE FABRIC

TYPICAL SECTION - M12 BASLINE "A" - BENEFICIAL USE

SCALE = NTS C-203

TYPICAL SECTION - M12 BASLINE "B" - BENEFICIAL USE

SCALE = NTS C-203

ARMOR STONE - GRADED STONE "A"

THICKNESS = 2.4'

ARMOR STONE "A"

GRADED STONE "A" - BASELINE "A" - STA 9+28.78 TO STA 81+38.73

ARMOR STONE "A"

GRADED STONE "A" - BASELINE "B" - STA 0+00.00 TO STA 5+00.00

SECTION 3 BARBOURS CUT CHANNEL
M12 BENEFICIAL USE SITE AND CEDAR BAYOU

M12 BENEFICIAL USE SITE - TYPICAL SECTIONS

TOP OF ELEVATION (FT/MLLW) STATION TOP OF ELEVATION (FT/MLLW) STATION

-3.0 -3.5' 9+26 TO 24+70

-4.0 27+70 TO 49+70

49+70 TO 81+38

50' FLOTATION CHANNEL

5' (MAX)

25' (MIN.)

HSC EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)
PROJECT 11 PACKAGE #7

TABLE 1

ARMOR STONE - GRADED STONE "A"

THICKNESS = 2.4'

ELEVATION +6.0 MLLW

ELEVATION +6.0 MLLW

TABLE 2
1. REFER TO GENERAL NOTES ON SHEET G-002.

GENERAL SHEET NOTES

PORT OF HOUSTON AUTHORITY

65% REVIEW

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

PROJECT 11 PACKAGE #7

SEGMENT 3 BARBOURS CUT CHANNEL M12 BENEFICIAL USE SITE AND CEDAR BAYOU M12 BENEFICIAL USE SITE - TYPICAL SECTIONS AND DETAILS

PROJECT 11

DESIGN PREPARED BY:

HDR Engineering, INC TBPELS Firm

Registration No. F-754

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1. REFER TO GENERAL NOTES ON SHEET G-002.
2. CEDAR BAYOU SWEEP MAINTENANCE AREA SHALL BE SURVEYED PRIOR TO CONSTRUCTION OF M12 BASELINE A BERM TO DOCUMENT EXISTING CONDITIONS.
3. MONTHLY SURVEYS OF CEDAR BAYOU SWEEP MAINTENANCE AREA SHOULD BE PERFORMED DURING DURATION OF M12 BASELINE A CONSTRUCTION. ENGINEER AND PORT AUTHORITY WILL REVIEW AND DOCUMENT AREAS REQUIRING MAINTENANCE DREDGING.
4. MAINTENANCE DREDGING SHALL BE BY MECHANICAL MEANS AND PLACED IN ODMDS. REFER TO SECTION 35 20 23, "DREDGING."
1. INFORMATION ON LOCATION AND TYPE OF DEBRIS AT LASH DOCK AND ALONG NORTH DREDGE TEMPLATE IS BEING FURTHER EVALUATED BY GEOPHYSICAL SURVEYS. ADDITIONAL INFORMATION WILL BE PROVIDED IN NEXT DESIGN SUBMITTAL.

DEBRIS, OBSTRUCTIONS - LASH DOCK

SCALE = 1" = 100'

1. REFER TO THE GENERAL NOTES ON SHEET D-00.
DEBRIS, OBSTRUCTIONS - BARBOURS CUT CHANNEL

SCALE: 1" = 100'

65% REVIEW

PORT OF HOUSTON AUTHORITY

HOUSTON SHIP CHANNEL (HSC) EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP) PROJECT 11 PACKAGE #7

SEGMENT 3 BARBOURS CUT CHANNEL, M12 BENEFICIAL USE SITE AND CEDAR BAYOU DEBRIS, OBSTRUCTIONS - NORTH FLARE BARBOURS CUT CHANNEL
GENERAL SHEET NOTES

1. REFER TO THE GENERAL NOTES ON SHEET G-002.

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PORT OF HOUSTON AUTHORITY

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HOUSTON SHIP CHANNEL (HSC)

EXPANSION CHANNEL IMPROVEMENT PROJECT (ECIP)

PROJECT 11

PACKAGE #7

SEGMENT 3

BARBOURS CUT CHANNEL

M12 BENEFICIAL USE SITE AND CEDAR BAYOU DEBRIS, OBSTRUCTIONS - NORTH FLARE BARBOURS CUT CHANNEL

DEBRIS, OBSTRUCTIONS - BARBOURS CUT CHANNEL

SCALE = 1" = 100'

65% DRAFT
1. REFER TO THE GENERAL NOTES ON SHEET G-002.

GENERAL SHEET NOTES

SEGMENT 3
BARBOURS CUT
CHANNEL,
M12 BENEFICIAL
USE SITE AND
CEDAR BAYOU

BORING LOCATIONS
BARBOURS CUT
CHANNEL

PORT OF HOUSTON
AUTHORITY

HDR Engineering, INC

TBPELS Firm

Registration No. F-754

DESIGN PREPARED BY:

PROJECT 11
PACKAGE #7

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94056 8/14/20. It is not to be
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bidding, or permit purposes.

5% REVIEW

65% REVIEW

65% DRAFT
PORT OF HOUSTON
AUTHORITY

65% REVIEW

HDR Engineering, INC
TBPELS Firm
Registration No. F-754

DESIGN PREPARED BY:

M12 BENEFICIAL USE SITE - WIER DETAILS 1 OF 2

SCALE = S-001

SECTION - WIER-BOX AND WALKWAY

SEGMENT 3
BARBOURS CUT CHANNEL, M12 BENEFICIAL USE SITE AND CEDAR BAYOU

SCALE = S-001

PLAN - WIER-BOX AND WALKWAY

65% DRAFT
1. Foundation design is based on the geotechnical data provided and certified by Fugro USA Land, Inc., Report No. 04.10190049-R2, dated 2/18/2020, by Sara Navidi, P.E.

2. W8x40 columns/piles were selected to provide adequate strength for the weir-box. The contractor may elect to provide heavier and stronger sections if required for driving installation of columns/piles. Columns shall not be spliced, U.N.O.

3. Columns/piles shall be installed by driving using a power hammer (diesel, air or hydraulic). Contractor shall provide alternative pile sections and/or reinforce pile sections to prevent damage during driving.

4. Contractor shall maintain and submit pile driving records for review by engineer. Records shall include the blows per foot for each foot of penetration, average ram stroke for each foot, hammer power/fuel setting, and all pile driving equipment data.

5. The structure has been designed to resist lateral force from a differential fill height not to exceed 4ft. Therefore in any event, the height difference of soil on either side of the box should not be greater than 4ft.

6. Provide 1/2" full depth stiffener equal spaces typical at (3) locations shown for (4) corner columns.

7. Refer to specifications section 35 20 30.00 45 add - drop-outlet structure for material specifications and other requirements.
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<td>Section 01 00 50.00 Add Scope of Work</td>
<td>2</td>
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<tr>
<td>Section 01 16 60 Add Environmental Protection Measures</td>
<td>3</td>
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<tr>
<td>Section 01 25 00 Add Measurement and Basis of Payment</td>
<td>7</td>
</tr>
<tr>
<td>Section 01 35 29.00 Mod Health, Safety and Emergency Response Procedures</td>
<td>2</td>
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<td>Section 01 35 53.00 Add Security Procedures</td>
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<td><strong>DIVISION 05 – Metals</strong></td>
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<td>Section 05 12 00.00 Mod Structural Steel Framing</td>
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<td><strong>DIVISION 31 – EARTHWORK</strong></td>
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<td>Section 31 05 19.13 Add Geotextiles for Earthwork</td>
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<tr>
<td>Section 31 23 16.30 Add Drop-Outlet Structure Excavation, Filling, and Backfilling</td>
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<td><strong>DIVISION 32 – EXTERIOR IMPROVEMENTS</strong></td>
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<tr>
<td>Section 32 92 19 Add Seeding</td>
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<td><strong>SECTION 33 – UTILITIES</strong></td>
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<td>Section 33 40 01.10 Add Effluent Pipe</td>
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<tr>
<td><strong>DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION</strong></td>
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<tr>
<td>Section 35 20 00 Add Construction Surveying</td>
<td>6</td>
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<tr>
<td>Section 35 20 23 Add Dredging</td>
<td>16</td>
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<tr>
<td>Section 35 20 23.33 Add National Dredging Quality Management Program</td>
<td>12</td>
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<tr>
<td>Section 35 20 30.00 Add Drop-Outlet Structure</td>
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<tr>
<td>Section 35 31 19 Add Revetment</td>
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<tr>
<td>Section 35 41 00 Add Berm Construction</td>
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**65 % PRELIMINARY**

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

ENGINEER: M. Cameron Perry
REGISTRATION NO.: 94056
DATE: August 14, 2020
The Technical Specifications for the above-referenced Project are the Port of Houston Authority Standard Technical Specifications listed herein, inclusive of those that have been amended, supplemented, or otherwise modified herein, and inclusive of added sections as listed herein.

The Port of Houston Authority Standard Technical Specifications listed herein may be obtained from Port of Houston Authority Project & Construction Management Department.

Any Port of Houston Authority Standard Technical Specifications listed herein but not amended, supplemented, or otherwise modified herein shall apply as set forth in the Port of Houston Authority Standard Technical Specifications.

Amendments and other modifications to specific Sections of the Port of Houston Authority Standard Technical Specifications take precedence over such Specification Section language of the Port of Houston Authority Standard Technical Specifications.

Any newly added Technical Specification Sections are in addition to the Port of Houston Authority Standard Technical Specifications.

Subject to the foregoing, the Port of Houston Authority Technical Specifications for the above-referenced Project are as follows.
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
PROJECT 11 – SEGMENT 3

The following Sections of the Port of Houston Authority Standard Technical Specifications (December 2011) form a part of the Technical Specifications for the Project.

DIVISION 01 – GENERAL REQUIREMENTS
   Section 01 22 10.00 Std Measurement of Quantities

DIVISION 03 - CONCRETE
   Section 03 21 00.00 Std Reinforcing Steel
   Section 03 31 00.00 Std Structural Concrete

DIVISION 09 - FINISHES
   Section 09 96 56.01 Std Epoxy Coating – Coal Tar

DIVISION 31 - EARTHWORK
   Section 31 23 33.00 Std Trenching and Backfilling
   Section 31 41 33.00 Std Trench Safety System
   Section 31 62 16.16 Std Steel H Piles

The attached modifications to the following Sections of the Port of Houston Authority Standard Technical Specifications (December 2011) form a part of the Technical Specifications for the Project.

DIVISION 01 - GENERAL REQUIREMENTS
   Section 01 35 29.00 Mod Health, Safety and Emergency Response Procedures

DIVISION 05 - METALS
   Section 05 12 00.00 Mod Structural Steel Framing

The attached Technical Specification Sections are added to and form a part of the Technical Specifications for the Project.

DIVISION 01 – GENERAL REQUIREMENTS
   Section 01 00 50.00 Add Scope of Work
   Section 01 16 60 Add Environmental Protection Measures
   Section 01 25 00 Add Measurement and Basis of Payment
   Section 01 35 53.00 Add Security Procedures

DIVISION 31 – EARTHWORK
   Section 31 05 19.13 Add Geotextiles for Earthwork
   Section 31 23 16.30 Add Drop-Outlet Structure Excavation, Filling, and Backfilling

DIVISION 32 – EXTERIOR IMPROVEMENTS
   Section 32 92 19 Add Seeding
SECTION 33 – UTILITIES
Section 33 40 01.10 Add Effluent Pipe

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION
Section 35 20 00 Add Construction Surveying
Section 35 20 23.13 Add Dredging
Section 35 20 23.33 Add National Dredging Quality Management Program
              Pipeline Dredge
Section 35 20 30.00 Add Drop-Outlet Structure
Section 35 31 19 Add Revetment
Section 35 41 00 Add Berm Construction
PART 1 GENERAL

1.1 SECTION INCLUDES

DREDGING:

The work consists of new work channel widening dredging within Project 11 – Segment 3 located within the Barbours Cut Channel near the Houston Ship Channel in La Porte, Texas. Approximate coordinates are as follows: 13,817,906N 3,241,761E (ref. Texas State Plane Coordinate System, South Central Zone, NAD 83, in U.S. Survey Feet). Project includes maintenance dredging within Cedar Bayou Channel located near the Houston Ship Channel and Barbours Cut Channel intersection (reference the following coordinates: 13,818,019N 3,244,050E).

The work includes new work dredging with a pipeline dredge to remove approximately 3,201,600 CY of material within 5,720 ft of Barbours Cut Channel. The channel will be dredged to a required depth of -46.5 ft MLLW. Dredged material from Barbours Cut shall be placed as a hydraulic berm at the M12 Beneficial Use of Dredged Material placement area. The work will also include a channel sweep maintenance dredging with a mechanical dredge of Cedar Bayou Channel of shoaling that occurs due to construction of M12 berms. The channel will be dredged to a required depth of -12.0 ft MLLW. Material will be placed in a scow and transported to the ODMDS for disposal.

The scope of work includes all dredge and pipeline mobilization with multiple setups and relocation; a pre-dredge hazard survey; debris removal from the channel prior to dredging; hydraulic dredging; dredging pipeline management; dredged material discharge management; dredged material placement area management; bathymetric surveys before, during, and after dredging; demobilization and site cleanup; and related ancillary work.

The location of the dredging and placement of material shall occur as indicated on the Drawings and Specifications.

M12 BENEFICIAL USE SITE:

The work consists of construction of berms, shoreline protection, and a drop-outlet structure at the M12 Beneficial Use of Dredged Material placement area located adjacent to the Houston Ship Channel near Atkinson Island (reference the following coordinates: 13,817,555N 3,250,440E).

The work includes using new work material dredge from Barbours Cut Channel as material for a 7,200 ft hydraulically placed berm along Baseline A. Material will be placed to an initial template and then mechanically shaped to a final template. A 3,500 ft mechanically placed berm will be constructed from borrow areas located adjacent to the berm along Baseline B. Shoreline protection will be placed along all of Baseline A and 500 ft of Baseline B. A drop-outlet structure will be constructed and placed at Station 73+00 on Baseline A. Work will also include closing a breach within the existing berm along the southern portion of the M12 site, and also creating a new breach in the existing berm at the southern end of the western borrow area/channel for the berm along Baseline B.

The scope of work for M12 includes equipment mobilization with multiple setups and relocation of discharge point; dredging pipeline management; dredged material discharge management; berm
re-shaping to final grades; mechanical excavation and placement to final berm grades; procurement and placement of geotextile material and graded riprap as shoreline protection; closing an existing breach; creating a new breach; construction of out-fall structure; bathymetric/topographic surveys before, during, and after berm placement and breach opening/closure; demobilization and site cleanup; and related ancillary work.

The location of the berm placement of material, placement of shoreline protection, breach opening/closure, and drop-outlet structure shall occur as indicated on the Drawings and Specifications.

1.2 PERIOD OF PERFORMANCE

The period of performance shall be 300 days.

1.3 SAFETY

The Contractor shall complete the work in accordance with the safety requirements of Port Authority.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 01 16 60 Add – ENVIRONMENTAL PROTECTION MEASURES

PART 1 GENERAL

1.1 SUMMARY

This section covers prevention of environmental pollution and damage as the result of construction operations under this Contract and for those measures set forth in the other Specifications. For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, affect other species of importance to man, or degrade the utility of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants. The environment shall be protected and all natural resources shall be preserved during construction. All Federal, State, and local laws and regulations shall be complied with during construction.

1.2 SUBMITTALS

A. Prior to construction, Contactor shall provide Environmental Monitoring Plan describing training and credentials for personnel for pollution control and environmental protection/monitoring.

B. Refer to Paragraph 1.8, “Protection of Environmental Resources,” for reporting requirements for required environmental monitoring.

1.3 CONTRACTOR FACILITIES

Contractor’s field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas approved by Port Authority. Temporary movement or relocation of Contractor facilities shall be made only on approval by Port Authority. Disposal areas shall not be located in any wetlands, water body, or stream bed. Fuel and lubricate equipment in a manner that protects against spills and evaporation. Provide a berm with impervious liner around fuel and liquid chemical storage tanks to contain the tank contents in the event of a leak or spill. No refueling shall be done onsite unless approved by Port Authority in advance with acceptable spill protection measures.

1.4 QUALITY CONTROL

Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. Contractor shall record on daily reports any problems in complying with laws, regulations, and ordinances and corrective action taken. Any damage caused by Contractor during construction shall be repaired, replaced, or restored to the satisfaction of Port Authority.

1.5 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL

Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (vegetative covers, and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control.
1.6 VOLATILE ORGANIC COMPOUNDS (VOC)

Contractors are required to comply with local, state, and federal VOC laws and regulations and shall have an acceptable VOC compliance plan. The plan 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 VOC’s, in the air quality district in which the start of work. 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 Contractor will take, a description of the actions which 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 compliance plan shall so state.

1.7 PROTECTION OF ENVIRONMENTAL RESOURCES

A. General: 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. Contractor shall confine his activities to areas defined by the Drawings and Specifications. Environmental protection shall be as stated in the following subparagraphs.

B. Protection of Land Resources: Prior to the beginning of any construction, Contractor shall identify all land resources to be approved by Port Authority. Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from Port Authority. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized.

C. Protection of Water Resources: Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities which are included in this Contract. Contractor is responsible for maintaining area drainage during construction. Water shall not be allowed to pond on any roadway surface, and runoff from adjacent properties shall not be impeded by Project Work.

D. Air Quality: The environmental coordination for this project included review by the Texas Commission on Environmental Quality (TCEQ). Based on TCEQ recommendations the following air quality measures are preferred for this project:
   1. Contractor is encouraged to apply for Texas Emission Reduction Plan grants;
   2. Contractor should exercise air quality best management practices;
   3. Contractor should use tugboats and support vessels that use clean fuels;
   4. Select assist tugs based on lowest NOx emissions instead of lowest price.

E. Protection of Fish and Wildlife Resources: Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to and damage of fish and wildlife. Prior to beginning of construction operations, Contractor shall list species that require specific attention and describe measures for their protection. At a minimum, Contractor shall have personnel onsite who are trained to identify and continuously observe the work area for the endangered and/or protected species described under Paragraph 1.8.F. Performing site observations may require having dedicated biologists or environmental scientists at the upland dredged material placement area to serve as environmental monitors. All costs for environmental monitoring shall be borne by Contractor. Environmental monitoring and observations shall be documented in Contractor’s daily activities reports each day regardless of whether or not species were observed.
F. **Other Protected Species:** Implement the following measures to avoid and minimize impacts to other federal- and state-protected species and habitats:

1. Instruct personnel associated with project of the need to identify eagles and colonial nesting birds and avoid impacting them during the breeding season.
2. Port Authority will coordinate with Texas Parks and Wildlife Department to determine the need for any environmental protection measures related to protection of bald eagles, brown pelicans, wading birds, and other bird species. If directed by Port Authority, Contractor shall provide environmental observers as stated in Paragraph 1.8.E.

1.8 **CONTROL AND DISPOSAL OF WASTES**

G. **Hazardous Waste:** Hazardous wastes are defined in 40 CFR 261. Hazardous wastes that are produced as a result of performing Work under this Contract shall be handled, stored, transported, and disposed of according to 40 CFR 262, where applicable. Prevent hazardous wastes from entering the ground, drainage areas, and surface waters. Immediately notify Port Authority of hazardous material spills. Also refer to Article 3.13 of the General Conditions for requirements if hazardous environmental conditions are encountered at the site.

H. **Sanitary Waste:** All sanitary waste shall be collected by a licensed sanitary waste management contractor from the portable units as necessary, or as required by local regulation.

I. **Construction Debris:** Contractor shall collect and properly dispose all trash and construction debris in accordance with all local and state solid waste management regulations and practices. No construction waste material shall be buried within the Project limits. Contractor shall store all waste materials in approved metal dumpsters or other containers approved by Port Authority. The dumpster shall be emptied as necessary or as required by local and state regulation and the contents hauled away for proper disposal.

1.9 **POST CONSTRUCTION CLEAN UP**

Contractor shall clean up areas used for construction to the satisfaction of Port Authority.

1.10 **RESTORATION OF DAMAGE**

Contractor shall restore all features damaged or destroyed during construction operations outside the limits of the approved Work areas. Such restoration shall be in accordance with the plan submitted for approval by Port Authority. This work will be accomplished at Contractor's expense without compensation.

**PART 2 – PRODUCTS**

(Not used)

**PART 3 – EXECUTION**

(Not used)

**END OF SECTION**
PART 1 – GENERAL

1.1 SUMMARY

The extended prices stated on Contractor’s Price Exhibit Form will be considered maximum Contract prices with unit price provisions. Unit price provisions are for Port Authority’s convenience in adjusting extended prices based on quantity adjustments resulting from Port Authority-initiated Change Orders. The extended prices shall be full compensation for furnishing all labor, materials, tools, equipment, plant supplies, superintendence, insurance, incidentals, services, overhead, and profit necessary to complete the construction of the various items of Work. Contractor’s Price Exhibit Form is not intended to itemize each and every labor, material, or incidental requirement. Any requirement, explicit or implied, as determined by Port Authority for Project completion and not specifically listed on the Contractor’s Price Exhibit Form shall be included in items with which they are considered subsidiary. Any item not specifically identified as an Additive/Alternate Price shall be considered as part of the Base Price, unless specified otherwise.

1.2 SUBMITTALS

Engineer’s approval is required for:

A. Certificates (Paragraph 1.3 D) – Certified Weight Tickets or Certified Barge Displacement Tickets for debris removal.

1.3 QUANTITIES AND MEASUREMENTS

A. Quantities: All quantities of Work stated on Contractor’s Price Exhibit Form are nominal estimates, computed by Engineer, based on the Contract Documents. Contractor shall verify these quantities by preparing its own estimates. In any case, prices stated shall reflect all Work required by the Contract Documents. No quantity adjustment shall be made for work performed outside the specified lines and grades, nor work completed within its specified tolerance.

B. Measurements: Only length, area, and/or volume measurements shall be made to compute the quantities of Work stated on Contractor’s Price Exhibit Form. Weight, load size/counts, and production rate/time shall not be valid measurement techniques, except as specified for debris removal.

C. Contract Adjustments: Port Authority reserves the right to adjust the quantities of Work stated on Contractor’s Price Exhibit Form as it deems appropriate. Adjustments must be in form of a Change Order to the Contract.

D. Certified Tickets: Submit certified weight tickets or certified displacement tickets for debris removal. Refer to Paragraph 1.4.F.
1.4 BASIS OF PAYMENT

A. Unit Price Provisions:

1. Extended prices stated on the Contractor’s Price Exhibit Form shall be considered maximum Contract prices (Lump Sum) unless the quantities of work are adjusted by a Port Authority-initiated Change Order.

2. If quantities of work are adjusted by Port Authority, the cost or credit to Port Authority shall be computed in accordance with the unit prices stated on the Contractor’s Price Exhibit Form.

B. Lump Sum/Progress Payments: Lump Sum Work items listed on the Contractor’s Price Exhibit Form will be paid for according to the estimated percentage of Work completed for each item. This amount shall be full compensation for completed in-place Work. Engineer will be the sole judge and make the final decision as to the percentage complete of each item and the monetary amount for progress payments to Contractor.

C. Mobilization/Demobilization: Payment Mobilization/Demobilization (Price Item No. 1) will be made on a lump-sum basis. Payment for mobilization will not exceed seventy percent (70%) of the amount stated for Mobilization/Demobilization. The total lump sum amount for Mobilization/Demobilization shall include all costs in connection with the mobilization and demobilization of all plant and equipment associated with Dredging necessary to perform the Work for the Base Bid, including costs associated with compliance with the National Dredging Quality Management Program.

D. Pre-Dredge Hazard Survey: Payment for Pre-Dredge Hazard Survey (Price Item No. 2) will be made on a lump-sum basis for costs associated with performing a Pre-Dredge Hazard Survey (magnetometer or similar) and related work as described in Section 35 20 00, “Construction Surveying.”

E. Dredging Construction Surveying: Payment for Construction Surveying (Price Item No. 3) will be made on a lump-sum basis for costs associated with BD and AD channel surveys. Costs shall include bathymetric surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

F. Allowance for Debris Removal from Dredging Template:

1. Payment for Debris Removal from Dredging Template (Price Item No. 4) will be made on a unit price (per ton) basis for costs associated with materials, labor, and equipment for removal and disposal of debris from the dredging template, as specified in Section 35 20 23, “Dredging.”

2. Debris removal during construction shall include all of the debris listed on the drawings that is within the dredging template, and any additional debris encountered within the dredging template during the course of work, that cannot be removed through ordinary dredging. Incidental debris that can be removed through ordinary dredging shall not be included in this pay item.

3. The Contract Price for Debris Removal shall include relocating the debris to an offsite disposal facility in accordance with applicable laws and ordinances. All disposal fees are the responsibility of Contractor.

4. Measurement for Debris Removal shall be per short ton of 2,000 pounds based on the Contractor’s submittal of Certified Weight Tickets or Certified Barge Displacement Tickets for debris actually removed. Sediment shall not be included in the debris weight.
G. Pipeline Management: Payment for Pipeline Management (Price Item No. 5) will be made on a lump-sum basis for costs associated with laying, relocating, removing, and handling shore pipelines to M12 Beneficial Use Placement Area; procurement of the materials and construction of ramps or installation of temporary culvert pipes which may be necessary for maintaining public access and laying the shore pipes; maintenance of pipeline during construction; final cleanup of pipeline routes; and any other related work.

H. BCC Dredging:

1. Payment for Pipeline Dredging (Price Item No. 6 and 7) will be made for removal, transportation, and placement of material as specified in Section 35 20 23, “Dredging,” and as shown on the Drawings. Payment for dredging will include costs for identification and removal of incidental debris and dredging obstructions, and any other related work.

2. Payment for Dredging (Price Item No. 6 and 7) will be based on computations of quantities removed from the pay templates specified in Section 35 20 23, “Dredging,” and as shown on the drawings, as measured by cubic yards in place. No payments will be made for material removed beyond the limits shown on the Drawings. Quantity computations shall be performed by Contractor and substantiated with BD and AD surveys conducted in accordance with Section 35 20 00, “Construction Surveying.” Port Authority reserves the right to conduct independent surveys and quantity computations to verify Contractor’s payment requests.

3. Acceptance and payment for Dredging may be requested for Work completed in segments as defined in Section 35 20 23, “Dredging.” Contractor may request payment for shorter segments; however, length of pay sections shall not be less than 500 feet.

4. Regardless of actual measured quantities, total payment for Dredging (Price Item No. 6 and 7) will not exceed the associated Extended Prices shown on Contractor’s Price Exhibit Form without an Port Authority-initiated Change Order (for example, to increase the Contract quantity).

5. All costs associated with the National Dredging Quality Management Program (Section 35 20 23.33, “National Quality Management Program Pipeline Hydraulic Dredge”) shall be considered subsidiary to the dredging cost.

I. Existing Revetment at Spilman Island Removal/Stockpile: Payment for removal of existing revetment and stockpiling material at Spilman Island (Price Item No. 8) will be made on a lump-sum basis for costs associated with excavating stone from existing revetment, disposal of existing geotextile within revetment system, and stockpiling graded riprap in designated area.

J. Replace Revetment at Spilman Island: Payment for shoreline protection replacement at Spilman Island (Price Item No. 9) will be made on a linear foot basis for costs associated with excavating/preparing revetment subgrade, procurement and placement of geotextile filter fabric (no separate payment for geotextile filter fabric will be made), and placement of stockpiled graded riprap to the lines and grades shown in the Drawings (verified by survey). Acceptance of the revetment shall be based upon onsite observation of completed work and review of the final surveys such that the revetment meets the limits and tolerances specified in the Drawings and Section 35 31 19 Add, “Revetment.”

K. Allowance for Additional Stone – Spilman Island Revetment: Payment for additional stone for completion of the revetment replacement at Spilman Island (Price Item No. 10) will be made on a per ton basis for procurement and placement of graded riprap needed (beyond what is available from existing material stockpile) to construct the revetment to the lines and grades...
shown in the Drawings (verified by survey). Stone will be measured by the short ton for payment by the truck weight tickets or the Barge Displacement Method.

1. **Truck Weigh Ticket Method**: Truck weight tickets from a certified scale will be accepted for determination of the weight of stone placed in the finished section. To determine the load, measurements will be taken before each truck is loaded and directly after it is loaded with acceptable stone.

2. **Barge Displacement Method**: Contractor shall provide a barge displacement table and hydrometer test reports for measurement and payment of graded riprap and submit it at least seven (7) days prior to the pre-construction conference and on a monthly basis for approval by the Engineer. It shall show the barge name or number, dimensions, name of owner, and name of fabricator for each barge. Contractor shall furnish a dimensioned drawing or sketch of each barge that is sufficient to verify the barge displacement table. The drawings shall show, at a minimum, the length, width, and depth of the barge, and dimensions of rakes. All new or modified barges shall be field checked for current dimensions by Contractor in the presence of Engineer. Each table shall contain the freeboard of the barge in feet and tenths from zero to the full depth of the barge and the corresponding gross displacement to the nearest ton.

Each barge shall be suitably marked with two displacement gaging lines along each side of the barge. Each gaging line shall be painted perpendicular to the edge of the barge and be no less than 4 inches wide and 1 foot long on both the deck and side of the barge. Barges with rakes shall have the displacement gaging lines placed at each corner of the box section between the rakes. If a barge has a box end or ends, the gaging lines shall be placed 4 feet from the box end. The freeboard will be measured at the 4 gaging locations and the displacement determined by the use of the “CELMV Standard Barge Tables” from the average of these measurements. The displacement shall be determined before and after the barge is unloaded and the difference between these values shall be the quantity delivered.

Barge displacement measurements shall be taken on final barge used to transport graded riprap to the project footprint. For example, if graded riprap is transported via barge to the project vicinity and then light-loaded onto a different barge before final placement of material in the project footprint, payment related measurements shall be taken on the light-loaded barge. Measurements shall be taken when the barge has a minimum of 1 foot clearance between the underside of the barge and the bay bottom.

A unit weight of 62.45 pounds/cubic foot is standard for fresh water and shall be applied to the displacement table and graded riprap quantities. The Contractor has the option to obtain water samples and determine alternative densities or unit weights of the water using the procedure explained below. If Contractor does not obtain water samples and densities according to this procedure, then no adjustments will be applied to the displacement table and graded riprap quantities.

Water sampling for density adjustments shall be performed by the Contractor during every barge measurement event, both when barges are fully loaded before material placement and empty. The water samples shall be taken in accordance with ASTM D 3370 (practice A-Grade Sample) at depths of 4 and 8 feet in the area where measurements are taken using a "Polypro" 2000 ml water sampler or approved equal. If water depth at measurement location is less than 8 feet, Contractor shall notify the Engineer and take water samples at half the water depth and at 6 inches above the existing grade. All water samples shall be tested to determine densities according to ASTM D 1429 (Method D - Hydrometer method). Certified test results shall be submitted to the Engineer. After review and approval of the test results by the Engineer, the average of the densities for each barge will be used to adjust the measurements.
L. Spilman Island Revetment Construction Surveying: Payment for Shoreline Protection Construction Surveying (Price Item No. 11) will be made on a lump-sum basis for costs associated with initial, interim, and final surveys. Costs shall include topographic surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

M. Mechanically Placed Berm (Baseline B): Payment for Mechanically Placed Berm at the M12 site (Price Item No. 12) will be made on a linear foot basis for costs associated with excavation of in-situ material from borrow areas and construction of the berm to the lines and grades as shown in the Drawings and described in Section 35 41 00, “Berm Construction.”

N. Hydraulically Placed Berm – Initial Placement (Baseline A): Payment for Hydraulically Placed Berm at the M12 site (Price Item No. 13) will be made on a linear foot basis for costs associated with movement of dredge pipe outfall and construction of initial template to the lines and grades as shown in the Drawings and described in Section 35 41 00, “Berm Construction.”

O. Final Shaping (Baseline A): Payment for Final Shaping (Baseline A) (Price Item No. 14) will be made on a linear foot basis for costs associated with final shaping and grading of material within recoverable areas along Baseline A to the lines and grades as shown in the Drawings and described in Section 35 41 00, “Berm Construction.”

P. Flotation Channel (Baseline A): Payment for Flotation Channel along Baseline A (Price Item No. 15) will be made on a linear foot basis for costs associated with excavation of in-situ material from channel and sidecast of material as shown in the Drawings and described in Section 35 20 23, “Dredging.”

Q. Berm-Flotation Channel Hazard Survey: Payment for Berm-Flotation Channel Hazard Survey (Price Item No. 16) will be made on a lump-sum basis for costs associated with performing a Hazard Survey (magnetometer or similar) and related work as described in Section 35 20 00, “Construction Surveying.”

R. Berm-Flotation Channel Construction Surveying: Payment for Berm-Flotation Channel Construction Surveying (Price Item No. 17) will be made on a lump-sum basis for costs associated with initial, interim, and final surveys. Costs shall include topographic surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

S. Berm Revetment: Payment for M12 Shoreline Protection (Price Item No. 18) will be made on a linear foot basis for costs associated with procurement of graded riprap, geotextile, excavation/preparation of shoreline protection subgrade, placement of geotextile material, and placement of graded riprap to the lines and grades shown in the Drawings (verified by survey). Acceptance of the revetment shall be based upon onsite observation of completed work and review of the final surveys such that the revetment meets the limits and tolerances specified in the Drawings and Section 35 31 19 Add, “Revetment.”

T. Berm Revetment Construction Surveying: Payment for Berm Revetment Construction Surveying (Price Item No. 19) will be made on a lump-sum basis for costs associated with initial, interim, and final surveys. Costs shall include topographic surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

U. Temporary Breach Closure: Payment for Temporary Breach Closure (Payment Item No. 20) will be made on a lump sum basis for costs associated with excavation and placement of in-situ material to temporarily close existing breach within berm along Baseline C.
V. New Breach Opening: Payment for New Breach Opening (Payment Item No. 21) will be made on a lump sum basis for costs associated with excavation and placement of in-situ material to open a new breach on existing berm of Baseline C.

W. Drop-Outlet Structure: Payment for Drop-Outlet Structure (Payment Item No. 22) will be made on a lump sum basis for costs associated with costs associated with procurement of materials, construction, excavation, and placement of the drop-outlet structure as described in the Drawings and Section 35 20 30.00 45, “Drop-Outlet Structure” and associated section.

X. Breach Opening/Closure/Outfall Construction Surveying: Payment for Breach Opening/Closure/Outfall Construction Surveying (Price Item No. 23) will be made on a lump-sum basis for costs associated with initial, interim, and final surveys. Costs shall include topographic surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

Y. Seeding: Payment for Seeding (Price Item No. 24) will be made on a linear foot basis for costs associated with seeding and fertilizing of the berm crown and interior and exterior slopes as described in Section 32 92 19, “Seeding.”

Z. Cedar Bayou Monitoring Surveys (during M12 Const.): Payment for Cedar Bayou Monitoring Surveys (Price Item No. 25) will be made on a lump-sum basis for costs associated with channel monitoring surveys to evaluate shoaling during M12 construction. Costs shall include bathymetric surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”

AA. Allowance for Cedar Bayou Sweep Dredge:

1. Payment for Cedar Bayou Sweep Dredge through mechanical dredging (Price Item No. 26) will be made for removal, transportation, and placement of material as specified in Section 35 20 23, “Dredging,” and as shown on the Drawings. Payment for dredging will include costs for identification and removal of incidental debris and dredging obstructions, and any other related work.

2. Payment will be based on computations of quantities removed from the pay templates specified in Section 35 20 23, “Dredging,” and as shown on the drawings, as measured by cubic yards in place. No payments will be made for material removed beyond the limits shown on the Drawings. Quantity computations shall be performed by Contractor and substantiated with BD and AD surveys conducted in accordance with Section 35 20 00, “Construction Surveying.” Port Authority reserves the right to conduct independent surveys and quantity computations to verify Contractor’s payment requests.

3. Acceptance and payment for Dredging may be requested for Work completed in segments as defined in Section 35 20 23, “Dredging.” Contractor may request payment for shorter segments; however, length of pay sections shall not be less than 500 feet.

4. Regardless of actual measured quantities, total payment for Allowance for Cedar Bayou Sweep Dredge (Price Item No. 26) will not exceed the associated Allowance Quantity and Extended Prices shown on Contractor’s Price Exhibit Form without a Port Authority-initiated Change Order (for example, to increase the Contract quantity).

BB. Cedar Bayou Construction Surveys: Payment for Cedar Bayou Construction Surveys (Price Item No. 27) will be made on a lump-sum basis for costs associated with BD and AD channel surveys. Costs shall include bathymetric surveying; preparation of associated quantity computations and drawings; and related work as described in Section 35 20 00, “Construction Surveying.”
PART 2 – PRODUCTS
(NOT USED)

PART 3 – EXECUTION
(NOT USED)

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 01 35 29.00 Mod – HEALTH, SAFETY AND EMERGENCY RESPONSE PROCEDURES

Section 01 35 29.00 Std – Health, Safety and Emergency Response Procedures of the Port of Houston Authority Standard Technical Specifications (December 2011) is modified as set forth below.

1.2 Delete the following sections:

Section 01 56 13.00 Std – Containment Barriers
Section 02 83 00.00 Std – Lead-Based Paint Removal and Disposal

1.3 Bullet 2 is revised as follows:

• Other federal, state, and local ordinances, statutes, and regulations as applicable.

1.4 Subsection C is revised as follows:

The Contractor’s Plan shall include but not necessarily be limited to, the following components, as appropriate:

1. Safe Work Practices
2. Engineering Safeguards
3. Personal Protective Equipment (PPE)
4. Training
5. Standard Operating Procedures
6. Emergency and Contingency Planning
7. Logs and Reports
8. Hazard Communication Program

The Contractor’s Plan shall be approved by signature of a designated representative of the Contracting firm, stating that the plan is in compliance with 29 CFR 1910 and 29 CFR 1926. The signed Contractor’s Plan shall be submitted to the Port Authority for review, prior to commencing site work activities.

3.1 Delete Part 3.1
3.2 Delete Part 3.2
3.3 Delete Part 3.3
3.4 Delete Part 3.4
3.5 Delete Part 3.5

Add the following section:

3.8 DREDGING PIPELINE SAFETY

Contractor shall reference U.S. Army Corps of Engineers EM 385-1-1, Section 19.G.03, “Submerged and floating dredge pipeline,” for regulations with the following exceptions:

A. Whenever buoyant or semi-buoyant pipeline is used, the dredge operator will assure that the pipeline remains fully submerged and on the bottom. When it is necessary to
raise the pipeline, proper clearances shall be made and maintained and the entire length of the pipeline shall be adequately marked at an interval not to exceed 400 feet to clearly show the pipeline length and course.

B. Indicators, such as signs or buoys that state “DANGER SUBMERGED PIPELINE” shall be placed at the beginning and end of the pipeline. In addition, indicators are required beginning in areas which reduce the charted depth by more than 10 percent, and, as a minimum, every 400 feet to clearly warn of the pipeline length and course.

C. Lengths of submerged pipeline located outside of the navigation channel which reduce the charted depth by more than 10 percent shall be identified with high visibility buoys marked with 360 degree visibility retro-reflective tape, such as orange neoprene buoys, placed at an interval not to exceed 400 feet to clearly show the pipeline length and course. Indicators meeting the requirements of Paragraph 3.8A above shall be placed midway between each high visibility buoy.

No other clauses or requirements of Section 01 35 29.00 Std – Health, Safety and Emergency Response Procedures of the Port of Houston Authority Standard Technical Specifications (December 2011) are modified hereby.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

Due to absence of physical access barriers around the project area, Contractor shall expect the potential for security risks to assets, equipment, and staff. Possible security concerns include but are not limited to theft, robbery, burglary, vandalism, and assault. It is the responsibility of the Contractor to protect his assets, equipment, and staff from security threats. Engineer or Port Authority shall not be deemed responsible for damages, losses, and harms incurred to Contractor’s assets, equipment, and staff from security threats.

1.2 RELATED SECTIONS

Section 35 20 23 Add - Dredging

1.3 SUBMITTALS

Prior to commencement of work, Contractor shall submit a Security Procedures Plan to Port Authority for approval. It is the responsibility of the Contractor to ensure his proposed security methods and procedures are adequate and comply with all Federal, State, and Local laws, rules and ordinances. Approval of a Security Procedures Plan shall solely confer Port Authority’s consent to execution of such plan on Port Authority’s property and shall not make the Engineer or Port Authority responsible for losses, damages, injuries, or harms incurred despite or during execution of such plan nor shall it confirm lawfulness of Contractor’s Security Procedures Plan.

The Security Procedures Plan shall at minimum include:

1. Cover Letter briefly explaining intended Security Procedures;
2. Drawings of proposed physical barriers, surveillance cameras, and lamp posts (if any); and
3. Name and address of security services subcontractor (if any).

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL

Contractor and his security services subcontractor (if any) shall obey all federal, state, and local laws and rules during conduct of security procedures. All security interventions shall be enacted in a professional, dignified, and humane manner. If necessary, it is the responsibility of the Contractor and his security services subcontractor (if any) to pay all related fees and appear in the court of law as plaintiff or defendant regarding all security-related matters.

3.2 PHYSICAL BARRIERS

If included in the Security Procedures Plan and upon approval by Port Authority, Contractor may install physical barriers at the project site. Physical barriers shall only be installed at locations
shown on the Security Procedures Plan. Approval from Port Authority is required should the Contractor wishes to modify locations of physical barriers. All physical barriers shall be removed from the site during demobilization.

3.3 LAMP POSTS

If included in the Security Procedures Plan and upon approval by Port Authority, Contractor may install lamp posts at the project site to maintain adequate lighting for security purposes. Lamp posts may only be installed at locations shown on the Security Procedures Plan. Approval from Port Authority is required should the Contractor wish to modify locations of lamp posts. Contractor is responsible for the energy supply required to operate lamp posts. All lamp posts shall be removed from the site during demobilization.

3.4 SURVEILLANCE CAMERAS

If included in the Security Procedures Plan and upon approval by Port Authority, Contractor may install surveillance cameras at the project site. Surveillance cameras may only be installed at locations shown on the Security Procedures Plan. Approval from Port Authority is required should the Contractor wish to modify locations of surveillance cameras. Contractor is responsible for the energy supply required to operate the cameras. All surveillance cameras shall be removed from the site during demobilization.

3.5 SECURITY PERSONNEL

If included in the Security Procedures Plan and upon approval by Port Authority, Contractor may employ security personnel to patrol the project site. All security personnel employed by the Contractor or his security services subcontractor shall be well-groomed and wear clean and pressed uniforms. Contractor shall ensure that security personnel receive orientation training regarding construction sites and known or potential hazards and methods for recognizing and avoiding known or potential hazards. All security personnel shall have adequate security training and be properly licensed and certified to bear and use service weapons.

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
PROJECT 11 – SEGMENT 3

SECTION 05 12 00.00 Mod – STRUCTURAL STEEL FRAMING

Section 05 12 00.00 Std- Structural Steel Framing of the Port of Houston Authority Standard Technical Specifications (December 2011) is modified as set forth below.

Delete the following sections:
1.2 Section 09 91 00.00 Std Miscellaneous Exterior Painting
   Section 09 96 00.00 Std High Performance Coatings
   Section 09 96 00.13 Std Crane Painting

Add the following:

2.10 D.4 Test 100% of CJP welds using ultrasonic or radiographic inspection. Randomly inspect 50% of all PJP and fillet welds or as indicated by magnetic particle or liquid penetrant inspection.

3.7 C.4 Test 100% of CJP welds using ultrasonic or radiographic inspection. Randomly inspect 50% of all PJP and fillet welds or as indicated by magnetic particle or liquid penetrant inspection.
PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

Work includes furnishing materials, labor, and equipment for the installation of geotextile filter fabric beneath the graded riprap (GRR) used to construct the breakwater in accordance with these Specifications and applicable Drawings.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 35 00 01 Add - Construction Surveying
Section 35 31 19 Add - Revetment

1.3 REFERENCES

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.

A. American Society for Testing and Materials (ASTM) Publications

D 4354  Standard Practice for Sampling Geosynthetics for Testing
D 4355  Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light (Xenon-Arc Type Apparatus)
D 4533  Standard Test Method for Trapezoidal Tearing Strength of Geotextiles
D 4632  Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
D 4751  Standard Test Method for Determining Apparent Opening Size of a Geotextile
D 4759  Standard Practice for Determining the Specification Conformance of Geosynthetics
D 4884  Standard Test Method for Seam Strength of Sewn Geotextiles
D 6241  Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

1.4 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an "E" designation are for information only.

1. Manufacturer’s Product Data (Paragraph 2.1, C)
2. Manufacturer’s Installation Instructions (Paragraph 3.3, C)
3. Certified Test Reports (Paragraph 2.1, D), E
4. Sewn Seam Details and Laboratory Test Reports (Paragraph 2. 1, E), E

5. Initial Survey (Paragraph 3. 2), E

1.5 DELIVERY, STORAGE AND HANDLING OF MATERIALS

Materials delivered to the site shall be inspected for damage, unloaded, and stored with the minimum of handling. Materials shall not be stored directly on the ground without a fabric or plastic liner beneath, and shall be kept free of dirt and debris.

PART 2 – PRODUCTS

2.1 GEOTEXTILE FILTER FABRIC

A. Filter Fabric: Filter fabric shall be pervious nonwoven sheet, consisting of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Sheets shall be formed into a stable network such that filaments or yarns retain their relative position to each other. Sheets shall be inert to chemicals commonly encountered in natural water, the soil conditions encountered at the site, and UV stabilized. The edges of sheets shall be selvedged or otherwise finished to prevent outer filaments or yarns from pulling away from the sheet.

B. Physical Properties: Conformance of filter fabric shall be in accordance with ASTM D 4759. Filter fabric shall be sampled in accordance with ASTM D 4354 and tested to verify the following minimum physical properties and requirements as shown in Table 1:

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Unit</th>
<th>Test Method</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent Opening Size</td>
<td>U.S. Sieve</td>
<td>ASTM D 4751</td>
<td>#100</td>
</tr>
<tr>
<td>Grab Tensile Strength</td>
<td>lb</td>
<td>ASTM D 4632</td>
<td>250 min.</td>
</tr>
<tr>
<td>Tensile Elongation</td>
<td>%</td>
<td>ASTM D 4632</td>
<td>50 (max.)</td>
</tr>
<tr>
<td>CBR Puncture Strength</td>
<td>lb</td>
<td>ASTM D 6241</td>
<td>625 min.</td>
</tr>
<tr>
<td>Trapezoidal Tear Strength</td>
<td>lb</td>
<td>ASTM D 4533</td>
<td>100 min.</td>
</tr>
<tr>
<td>Ultraviolet Resistance (500 Hours)</td>
<td>%</td>
<td>ASTM D 4355</td>
<td>70 min.</td>
</tr>
</tbody>
</table>

C. Acceptable Products: The following products may be used for geotextile filter fabric:

1. US Fabrics – 250NW
2. Mirafi 1100N
3. Propex Geotex 1001

Listing of specific manufacturer’s products shall not be construed as product approval without certified tests. Actual physical properties of the products furnished must conform to the minimum physical properties specified under paragraph 2.1, B. In addition to the minimum physical properties listed, other properties (such as fabric weight and weave type) shall be considered by the manufacturer in providing a product that is appropriate for the native material, method of installation, and method of GRR placement for the proper functioning of the filter.

D. Certified Test Reports: Submit manufacturer’s certified test results to the Engineer showing actual test values of the filter fabric physical properties. Certified test results shall be for tests performed within one year prior to the Notice to Proceed.

E. Sewn Seams: Submit details for sewn seams if sewn seams are planned. Details shall
address, but not be limited to, thread type, thread tension (sewing device), stitch density and type, overlap, and number of rows and type of chainstitch. Also submit laboratory test reports evaluating the load-transfer capability of the proposed seams in accordance with ASTM D 4884.

**PART 3 – EXECUTION**

3.1 **SUBGRADE PREPARATION**

The surface to receive the geotextile filter fabric shall be prepared by locating and removing obstructions or debris.

3.2 **INITIAL SURVEY**

Lines and grade of graded riprap (GRR) subgrade shall be surveyed by the Contractor and submitted to the Engineer prior to placement of geotextile fabric. Refer to Section 35 00 01, Construction Surveying.

3.3 **GEOTEXTILE FILTER FABRIC**

A. **General:** Geotextile fabric shall be placed over the prepared subgrade as indicated on the drawings.

B. **Protection:** Work shall be sequenced so that geotextile filter fabric are not exposed more than 7 days from the time rolls are removed from their protective covering and are fully covered by GRR or opaque temporary coverings. During periods of shipment and storage, geotextile fabric shall be protected from direct sunlight, ultra-violet rays, and high temperatures and in accordance with any other instructions of the manufacturer. Unpackaged rolls or sheets shall be protected with temporary opaque coverings.

C. **Placement:** Geotextile fabric shall be placed in accordance with the manufacturer’s instructions, but placement method shall meet, as a minimum, the following criteria:

1. Construction equipment and vehicles shall not operate directly on geotextile fabric, unless otherwise permitted by the Engineer.

2. Geotextile fabric sheets shall be loosely laid and conform to surface irregularities so as to minimize tension in the sheets when subsequent stone is placed.

3. Laps between geotextile sheets shall be no less than 3 ft except where specified on the drawings. When used, sewn seams must be pre-approved by Engineer. Sewn seams shall be installed in accordance with manufacturer’s recommendations.

4. Geotextile fabric sheets shall not be staked down such that they are taut and subject to significant puncture or tearing during stone placement.

5. Loose staking of geotextile fabric or placement of GRR to tack edges of geotextile fabric prior to loading central portion of breakwater to maintain alignment may be required.

6. Method of GRR placement shall be such that geotextile fabric sheets are not pulled apart at the laps or significantly punctured or torn.

**END OF SECTION**
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 31 23 16.30 Add - DROP-OUTLET STRUCTURE EXCAVATION,
FILLING AND BACKFILLING

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

The work includes furnishing labor, equipment, and other incidentals necessary to perform excavation, stockpiling, structural excavation and backfill for the drop-outlet structures and other incidental work specified.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 33 40 01.10 Add – Effluent Pipe
Section 35 20 30 Add – Drop-Outlet Structure
Section 35 41 22 Add – Berm Construction

1.3 REFERENCES

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

A. American Society for Testing and Materials (ASTM) Publications


1.4 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an “E” designation are for information only.


1.5 QUALITY CONTROL

Establish and maintain quality control for excavation operations to assure compliance with specified requirements, and maintain records of quality control for construction operations including but not limited to the following:

1. Equipment: Type, size, and suitability for construction of the prescribed work.

2. Structural Evaluation: Check grade, slopes, and dimensions for compliance with design sections.

3. Tolerances: Check fills to determine if placement conforms to prescribed grade and design section.

4. Construction: Layout, maintaining existing drainage, moisture control, thickness of layers, spreading and compacting.
5. Soil: Classification of soils, placing and compacting of structural fill, and density tests.

6. Control Testing: Perform control testing, including particle size analysis. No separate measurement and payment will be made for control testing required in this Subparagraph. Include the costs for control testing in the Contract prices for items of work to which the work is incidental thereto.

7. Reporting: Records of inspections and tests, as well as the records of corrective action taken, shall be documented in Contractor's daily activities reports.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fill Materials for Perimeter Berm Construction: Refer to Section 35 41 00 Add, “Berm Construction.”


C. Bentonite Fill: Sodium Bentonite Chips, Southwestern Materials Inc. 3/8-inch Chips, or Wyo-Ben Enviroplug, or approved equivalent.

D. Unsatisfactory Material: Unsatisfactory materials include man-made fills; trash; refuse; deleterious materials, backfills from previous construction; and materials containing root and other organic matter, frozen material or any contaminated materials.

2.2 EQUIPMENT FOR COMPACTION AROUND STRUCTURES

A. Hand Tamping: Hand tamping shall be used in the compaction of structural fill within 3 feet of a structure and near structures where vehicular equipment cannot be used. These hand tampers shall be power driven, hand operated type.

B. Alternative Compaction Equipment: Contractor may propose alternative types of compaction equipment not included in these specifications. The suitability of the alternative equipment shall be demonstrated to Contracting Officer by a field test conducted by and at the expense of Contractor. The alternative compaction equipment shall be capable of properly compacting the soil so that no planes of weakness or laminations are formed in the fill. Additionally, the alternative compaction equipment shall not detrimentally affect adjacent structures. The field test shall consist of compacting a minimum of three layers of an area of embankment with the alternative type equipment.

C. Miscellaneous Equipment: Scarifiers, disks, spring-tooth or spike-tooth harrows, spreaders, power tampers and other equipment shall be of types suitable for the required construction. Sprinkling equipment shall be designed to apply water uniformly and in controlled quantities to variable widths of surface.

PART 3 - EXECUTION

3.1 STRIPPING

A. General: Stripping shall be done in accordance with Section 35 41 00 Add, “Berm Construction.”

B. Construction Plan: Prior to construction, Contractor shall submit a detailed Construction Plan outlining work sequence and scheduling of earthwork at drop-outlet structures with respect to
any adjacent embankment repairs and dredged material discharge. Excavation shall be performed using a method that will ensure that the area within and immediately surrounding the site are continually and effectively drained. Water shall not be permitted to accumulate in the excavation areas. The excavation shall be drained to prevent softening of the foundation bottom, undercutting of footings, or other actions detrimental to proper construction procedures. Unless otherwise shown, backfill and fill for the drop-outlet structures shall be sloped to drain away from the structures. Normal ground water level in the project area varies. Silt and sand materials in the area may become saturated or water bearing and during excavation the slopes may be subject to sloughing. Prior to making the compacted fills and backfills, foundation areas shall not be permitted to accumulate water.

3.2 EXCAVATION

A. Common Excavation: Common excavation shall consist of removal of materials to install new footing and new drainage pipes. Care shall be exercised by Contractor not to excavate below the grades shown to remove unsatisfactory materials, unless otherwise directed. Excessive excavation, as determined by Engineer, due to the fault or negligence of Contractor shall be backfilled to grade. In the inside slope or clay blanket repair areas, excessive excavations shall be backfilled with satisfactory fill materials as specified in Section 35 41 00 Add, “Berm Construction.” Limited areas within the inside slope that cannot be compacted due to space constraints can be backfilled with granular bentonite.

B. Structural Excavation: Make the required excavations for the construction of the drop-outlet structures. Fill material from required structural excavation shall be used in the structural backfill that is placed and compacted as specified in Section 35 41 00 Add, “Berm Construction.” Excavation for the structures shall conform to the dimensions and elevations for the structures as shown. Excavation carried below indicated depths of the structures will not be permitted except to remove unsatisfactory materials. Unsatisfactory materials shall be excavated 2 feet below the depth of concrete foundation and the drainage pipes, and replaced with satisfactory material. Material removed below these depths shall be replaced to the indicated excavation grade with satisfactory materials placed and compacted as specified in Section 35 41 00 Add, “Berm Construction”, at no additional cost to Port Authority.

C. Grade Tolerances: Excavation of side slopes shall not be more than 0.2-foot above or below the grade indicated, and shall not vary more than 0.2-foot in 10 feet as measured with a straightedge.

D. Removal of Unsatisfactory Soils: The removal of soils that are considered to be unsatisfactory shall be required in certain areas where compacted fill is to be placed. Soft yielding material encountered in the surface that will not adequately support construction equipment shall be removed to a minimum depth of 3 feet. Contractor shall excavate these areas and backfill them as specified in the Paragraph “Backfill” below and Section 35 41 00 Add, “Berm Construction.” Unsatisfactory materials may be disposed in the interior of M12. Unsatisfactory material at surfaces to receive fill shall be removed and replaced with satisfactory materials. The placing and compaction of satisfactory materials shall be as specified in the Section 35 41 00 Add, “Berm Construction.”

3.3 SLIDES

In areas of saturated soils, the soils become very soft and loses its strength which may cause settlement of the embankment. Some sliding is expected during construction. If sliding occurs in the fill or excavation during construction, or after completion but prior to acceptance, Contractor may be required to cut out and remove the slide and backfill the excavated area with compacted fill. If the slide is caused through fault of Contractor, the foregoing operation shall be performed without cost to Port Authority.
3.4 BACKFILL

A. Backfill Around Piles and Other Structures: Material shall consist of satisfactory material and shall be obtained from the required excavation. The moisture content of the material shall be adjusted to within the moisture content range specified in Section 35 41 00 Add, “Berm Construction.” Material shall be placed in maximum 4-inch to 6-inch thick layers prior to compaction and shall be thoroughly compacted with power-driven hand tampers to the density of the surrounding earth. Backfilling shall be carried out in areas that are continually and effectively drained.

B. Bedding and Backfilling Around Pipe: Except in zone of impermeable clay on interior slope of embankment, the pipe foundation areas shall be backfilled with Granular Fill as shown on the drawings which shall be densified with applicable equipment. The Granular Fill shall be in maximum 6-inch thick layers and compacted with power-driven tampers to the density of the surrounding earth. Granular Fill shall completely bed the pipe.

After bedding pipe in Granular Fill or Bentonite, backfill with material over pipe in 6-inch layers and compact with power-driven hand tampers until the pipe has a minimum of 2 feet of cover. The remainder of the backfill or fill over pipe shall be placed and compacted as specified for compacted fill in Section 35 41 00 Add, “Berm Construction.” At no time will heavy equipment for spreading and compaction of material be operated within 2 feet of a pipe. Backfilling shall be carried out in areas that are continually and effectively drained.

C. Final Subgrade: Soft spots encountered within the subgrade foundation area shall be removed, replaced by approved random fill materials of similar soil type, and compacted as specified.

END OF SECTION
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The work includes furnishing materials, labor, and equipment for seeding berms in accordance with these specifications and applicable drawings.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 35 41 00 Add – Berm Construction

1.3 REFERENCES

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.

A. United States Department of Agriculture (USDA) Regulation
B. Rules and Regulations under the Federal Seed Act and the Texas Seed Law

1.4 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an “E” designation are for information only.

1. Certificate of compliance that the seed meets specification (Paragraph 2.1).
2. Manufacturer’s Product Data for Fertilizer (Paragraph 2.2).
3. Certificate of compliance that the fertilizer meets specification (Paragraph 2.2).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Seed Protection: Protect from drying out and from contamination during delivery, on-site storage, and handling.
2. Fertilizer Delivery: Deliver to the site in original, unopened containers bearing manufacturer’s chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer may be furnished in bulk with certificate indicating the above information.

B. Storage:

1. Seed, Fertilizer Storage: Store in cool, dry locations away from contaminants.
2. Handling: Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.1 SEED

A. Classification: Seed containers shall carry a label showing the percent purity and germination, name of the seed, and that the seed meets the requirements of the USDA and applicable state laws. Use seed that has been treated with an approved fungicide. Seed that has become wet, moldy, bears a test date older than five months, or otherwise damaged in transit or storage will not be accepted. Seeds of the species specified herein shall have 85 percent live seed, and shall be free of weeds. Each species of variety of seed shall be furnished and delivered in separate bags. Seed is to be mixed before sowing, the mixing shall be done in a commercial seed-mixing machine or by equally thorough hand mixing after sampling and testing have been completed. Seed planting shall be done between the dates specified for each type, except as specifically authorized in writing. The seeds planted per acre shall be of the type specified with the mixture, rate, and planting dates as shown in Table 1. Contractor shall provide certificate of compliance that seed meets specifications.

<table>
<thead>
<tr>
<th>Mix</th>
<th>Application Rate (pounds/acre)</th>
<th>Planting Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 Mix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hull ed Common Bermuda</td>
<td>50</td>
<td>March 15 to Sept. 15</td>
</tr>
<tr>
<td>(Cynodondactylon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hull ed NK-37 Bermuda Grass</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Sand Love Grass</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Type 2 Mix</td>
<td></td>
<td>Sept. 16 to March 14</td>
</tr>
<tr>
<td>Hull ed Common Bermuda</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Unhulled Common Bermuda</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Crimson Clover (Trifoliumincarnatum)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Hull ed NK-37 Bermuda Grass</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

2.2 FERTILIZER

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

- 13 percent available nitrogen
- 13 percent available phosphorus
- 13 percent available potassium

The fertilizer shall be balanced with the inclusion of trace minerals and micronutrients including mychoral fungicide. Contractor shall provide Manufacturer’s Product Data and certificate of compliance that fertilizer meets specifications.
2.3 WATER

Source of water shall be of suitable quality for irrigation, containing no elements toxic to plant life. Water shall be fresh and have no more than 10 parts per thousand salt.

PART 3 - EXECUTION

3.1 PREPARATION

A. **Extent of Work:** Provide soil preparation (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

1. The soil surface shall be re-graded to the lines and grades specified and shall be free of ruts and other disturbances. The soil shall be scarified or otherwise loosened to a depth of not less than 4 inches except as otherwise specified below or directed. Clods shall be broken and the top 2 to 3 inches of soil shall be worked into an acceptable seedbed by the use of soil pulverizers, drags, harrows, or by other approved methods. Rock and debris, 3 inches or larger, shall be removed prior to the application of seed and fertilizer. The preparation of seedbeds shall not be done when the soil is frozen, extremely wet or dry or when the Contracting Officer determines that it is in an otherwise unfavorable working condition.

2. Fertilizer shall be applied at the rate of 400 pounds per acre. Fertilizer shall be incorporated into the soil to a maximum 4-inch depth.

3.2 SEEDING

A. **Seed Application Seasons and Conditions:** Immediately before seeding, restore soil to proper grade. Do not seed when ground is in an unsatisfactory condition for seeding. Apply seed within twenty-four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Do not apply seeds when weather is too windy, hot or drying, or other adverse conditions exist.

B. **Seed Application Method:** Seeding method shall be broadcasted and drop seeded. Seed shall be uniformly broadcast at the rate of 90 lb/acre for season 1 mix and 120 lb/acre for season 2 mix. Use broadcast or drop seeders. Cover seed uniformly to a maximum depth of 1/2 inch in clay soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

C. **Water:** Seeded areas shall be kept evenly moist for a period of 10-14 days immediately following placement. When watering seeded areas, a fine spray shall be used to prevent erosion of seeds or soil.

3.3 ACCEPTANCE

A satisfactory stand of vegetation shall be healthy and vigorous with scattered bare spots not larger than 1-foot square, and with the bare spots not exceeding 5% of each seeded areas.

An inspection shall be held by the Engineer to make note of deficiencies in germination. Germination should occur within 10 to 14 days after seeding depending upon weather conditions. Adequate coverage shall be achieved in 30 to 45 days. Final inspection with the Engineer shall be scheduled within 45 to 60 days after seeding. The Contractor shall repair/reseed areas not properly germinating with 4 weeks.

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 33 40 01.10 Add - EFFLUENT PIPE

PART 1 GENERAL

1.1 SUMMARY

The work covered in this Section consists of furnishing plant, labor, equipment, materials, and supplies and performing the operations in connection with installing steel pipe for the new drop-outlet structures to function as effluent pipe.

1.2 RELATED SECTIONS

Section 01 25 00 Add– Measurement and Basis of Payment
Section 05 12 00.00 Mod– Structural Steel Framing
Section 31 23 16.30 Add– Drop-Outlet Structure Excavation, Filling, and Backfilling
Section 35 20 30.00 45 Add– Drop-Outlet Structure
Section 35 41 00 Add– Berm Construction

1.3 REFERENCES

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

A. American Society of Mechanical Engineers (ASME) Publications

B31.4 Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquid (2016)
BPVC SEC IX BPVC Section IX-Welding, Brazing and Fusing Qualifications (2017; Errata 2018)
BPVC SEC V BPVC Section V-Nondestructive Examination (2017)

B. American Society for Testing and Materials (ASTM) Publications


C. American Welding Society (AWS)


D. U.S. Naval Sea Systems Command (NAVSEA)
1.4 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an “E” designation are for information only.

A. Preconstruction Submittals:
   1. Welder Qualification
   2. Welding Operations, E
   3. Detailed Work Plan, E

B. Shop Drawings:
   1. Steel Drainage Pipes, E. Detail drawings showing length, and type of welds, and indicating pre-weld and postweld heat treatment as required. The drawings shall show the welding procedure specification (WPS) to be used at each weld location.

C. Product Data:
   1. Welding Procedure Qualifications, E
   2. Steel Drainage Pipe, E
   3. Coating, E

D. Test Results:
   1. Pipe Welding Inspection. Written records and drawings indicating locations of welds made by each welder or welding operator.
   2. Pipe Welding Tests
   3. Pipe Coating Inspection
   4. NDE Testing. Certified copies of test reports demonstrating conformance to applicable pipe specifications shall be submitted before the pipes are installed.

E. Certificates:
   1. Welder Qualification, E
   2. Welding Inspectors, E
   3. NDE Personnel Certification, E
   4. Testing Laboratory Certification, E. Qualifications of testing laboratory or the Contractor's quality assurance organization.

PART 2 - PRODUCTS

2.1 MATERIALS AND WORKMANSHIP

A. Steel Drainage Pipes: The steel pipes shall be 36.0 inch outside diameter as shown and shall conform to the requirements of ASTM A139/A139M, as applicable, shall be fabricated from steel sheet conforming to ASTM A36/A36M, and shall be a minimum of 1/2 inch wall thickness. Only intact new pipe will be accepted. Submit certified copies of test reports demonstrating the tested pipes conform to pipe specifications before installation.
2.2 COATING

Both inner and outer surface areas of the steel pipe shall be coated with two (2) coats of Devtar 5A corrosion control coating or equivalent products as approved. Surface preparation and paint application shall follow manufacturer’s recommendations. Safety precautions included with the application instructions shall be observed during storage, handling, and use. If minor damages or scratches in or to the coating during placement are found, touch up with two (2) coats of Devtar 5A corrosion control coating or equivalent products as approved prior to backfill, after drying thoroughly.

PART 3 - EXECUTION

3.1 GENERAL

Each pipe shall be carefully examined for flaws before being laid, and if found defective or damaged it shall not be used. Pipe shall be laid to the grades and alignment shown. Proper equipment shall be provided for lowering sections of pipe into the trenches. Pipe in place shall be tested and inspected before backfilling.

3.2 WELDING OPERATIONS

A. General:

1. Prior to construction, Contractor shall provide a Detailed Work Plan that includes procedures which define methods of compliance to contract drawings and specifications.

2. Welding shall be performed in accordance with qualified procedures using qualified welders and welding operators with Welder Qualification Certificates. Welders and welding operators shall have valid Qualifications prior to performing any welding operation. Welding shall not be done when the quality of the completed weld could be impaired by the prevailing working or weather conditions.

3. Welding of hangers, supports, and plates to structural members shall conform to Section 05 12 00.00 Structural Steel Framing.

4. Welding procedure shall be performed in accordance with AWS B2.1/B2.1M and ASME BPVC SEC IX, and ASME B31.4 for drainage pipe field welds.

5. All joints unless indicated otherwise, in carbon steel piping systems shall be welded. Unless otherwise approved, all girth welds shall be complete penetration groove welds made in accordance with qualified welding procedures. The root pass on carbon steel pipe shall be by the GMAW or GTAW process.

B. Base Metal Preparation: Mechanical grinding of thermal cut ends shall be used to remove the heat affected area but should be limited to maximum 1/8 inch.

C. Weld Joint Fit-Up: Parts that are to be joined by welding shall be fitted, aligned, and retained in position during the welding operation by the use of bars, jacks, clamps, or other mechanical fixtures. End welds shall be properly aligned prior to welding in accordance with ASME BPVC SEC IX. When temporary attachments are used, they shall be the same material as the base metal, and shall be completely removed by grinding or thermal cutting after the welding operation is completed. If thermal cutting is used, the attachment shall be cut to not less than 1/4 inch from the member and the balance removed by grinding. After the temporary attachment has been removed, the area shall be visually examined.
D. **Preheat and Interpass Temperatures:** Preheat temperatures shall meet the requirements specified by ASME BPVC SEC IX. The maximum interpass temperatures shall not exceed 500 degrees F for carbon steels. Preheat techniques shall be such as to ensure that the full thickness of the weld joint preparation and/or adjacent base material, at least 3 inches in all directions, is at the specified temperature. Preheating by induction or resistance methods is preferred. When flame heating is used, only a neutral flame shall be employed. Interpass temperatures shall be checked on the surface of the component within 1 inch of the weld groove and at the starting location of the next weld pass, and for a distance of about 6 inches ahead of the weld, but not on the area to be welded.

E. **Production Field Welding Instructions:**

1. Welding shall not be done when the ambient temperature is lower than 0 degrees F.

2. Welding is not permitted on surfaces that are wet or covered with ice, when rain is falling on the surfaces to be welded, or during periods of high winds, unless the welders and the work are properly protected.

3. Gases for purging and shielding shall be welding grade and shall have a dew point of minus 40 degrees F or lower.

4. The oxygen content of the gas exiting from the purge vent shall be less than 2 percent prior to welding. The flow rate shall be that required by the approved weld procedure specification.

5. The purge on groove welds shall be maintained for at least two parses or 3/16 inch whichever is greater.

6. Any welding process which requires the use of external gas shielding shall not be done in a draft or wind unless the weld area is protected by a shelter. This shelter shall be of material and shape appropriate to reduce wind velocity in the vicinity of the weld to a maximum of 5 mph (440 fpm).

7. Tack welds to be incorporated in the final welds shall have their ends tapered by grinding or welding technique. Tack welds that are cracked or defective shall be removed and the groove shall be retacked prior to welding. Temporary tack welds shall be removed, the surface ground smooth, and visually inspected. For low-alloy and hardenable high-alloy steels, the area shall be magnetic particle examination inspected.

8. Each qualified welder shall be assigned an identification symbol. All welds shall be permanently marked with the symbol of the individual who made the weld.

F. **NDE Testing Frequency:** Provide 10 percent radiographic testing for all underground piping. Provide random radiographic testing in accordance with ASME B31.4. Provide 100 percent liquid dye penetration or magnetic particle tests for all underground drainage piping except the areas being tested by other specified methods.

G. **NDE Testing:** NDE shall be as required by ASME B31.4 and in accordance with written procedures. Procedures for radiographic, liquid dye penetrant, magnetic particle or ultrasonic tests and methods shall conform to ASME BPVC SEC IX or ASME B31.4. The approved procedure shall be demonstrated to the satisfaction of the Engineer. In addition to the information required in ASME BPVC SEC IX and ASME B31.4, the written procedures shall include the timing of the NDE in relation to the welding operations and safety precautions.

The services of a qualified testing agency approved by the Engineer shall be employed by the Contractor for testing of piping welds. Costs of testing, including retesting of repaired welds,
shall be borne by the Contractor. Procedures for radiographic inspection shall be in accordance with NAVSEA T9074-AS-GIIB-010/271 or ASTM E94/E94M. Weld ripples or surface irregularities that might mask or be confused with the radiographic image of any objectionable defect shall be removed by grinding, or other suitable mechanical means. The weld surface shall be merged smoothly with the base metal surface.

H. Inspection and Tests by the PHA: The PHA may perform inspection and supplemental nondestructive or destructive tests as deemed necessary. The cost of supplemental NDE will be borne by the PHA. The correction and repair of defects and the re-examination of weld repairs shall be performed by the Contractor at no additional cost to the PHA. Inspection and tests will be performed as required for visual inspection and NDE, except that destructive tests may be required also. When destructive tests are ordered by the Engineer and performed by the Contractor and the specimens or other supplemental examinations indicate that the materials and workmanship do not conform to the contract requirements, the cost of the tests, corrections, and repairs shall be borne by the Contractor. When the specimens or other supplemental examinations of destructive tests indicate that materials or workmanship do not conform to the specification requirements, the cost of the tests and repairs will be borne by the PHA. When destructive tests are made, repairs shall be made by qualified welders or welding operators using welding procedures which will develop the full strength of the members cut. Welding shall be subject to inspection and tests in the mill, shop, and field. When materials or workmanship do not conform to the specification requirements, the work may be rejected.

3.3 EXAMINATIONS, INSPECTIONS, AND TESTS

A. Tests and Inspections: Pipe Welding Tests, Pipe Welding inspection, Pipe Coating Inspection and NDE shall be performed by the Contractor to detect surface and internal discontinuities in completed welds. The services of a qualified commercial inspection or testing laboratory or technical consultant meeting the requirements of paragraph "Inspection and NDE Personnel", approved by the Engineer, shall be employed by the Contractor. All tack welds, weld passes, and completed welds shall be visually inspected. In addition, magnetic particle or liquid dye penetrant examination shall be performed on root passes. Radiographic, Liquid dye penetrant, Magnetic particle or Ultrasonic examination shall be required as indicated. When inspection and testing indicates disqualifying defects in a weld joint, the weld shall be repaired by a qualified welder in accordance with paragraph 3.05. Submit weld inspection and NDE field testing reports to the Engineer.

The person performing the weld inspection shall perform the following:

1. Verify that the base materials and consumable welding materials conform to the specifications and that welding filler metals used are as specified for each base material.

2. Verify that the welding equipment to be used for the work is appropriate for use with the welding procedure specification and has the capability to meet the applicable requirements of the welding procedure.

3. Verify that only approved or qualified welding procedures are used for the work.

4. Verify that the edge preparation or joint geometry meet the requirements of the welding procedure and drawings.

5. Verify that the specified filler metals are used and that filler metals are maintained in proper condition, per requirements, or as recommended by the manufacturer.

6. Verify that the technique and performance of each welder, welding operator, and tack welder are as specified.
7. Verify that the work conforms to requirements of the applicable standards, drawings, or other documents.

8. Verify that the work inspected is identified and documented in accordance with specified requirements.

9. Prepare clear and concise reports and verify that records of the results of examinations are maintained.

10. Verify the approved WPS pre-heat and post heat procedures are being used.

11. Welders found making defective welds shall be removed.

B. Visual Inspection: Weld joints shall be inspected visually as follows:

1. Before welding - for compliance with requirements for joint preparation, alignment and fit-up, and cleanliness.

2. During welding - for cracks and conformance to the approved welding procedure.

3. After welding - for cracks, contour and finish, bead reinforcement, undercutting, overlap, weld slag on the interior of the pipe and size of welds. Visual examination of the interior of the pipe may be performed by any of the remote means allowed by ASME BPVC SEC V, visual inspection.

3.4 ACCEPTANCE STANDARDS

Acceptance standards shall be in accordance with ASME B31.4 and ASME BPVC SEC IX.

3.5 CORRECTIONS AND REPAIRS

A. General: Disqualifying defects shall be removed and repaired as specified in ASME B31.4, unless otherwise specified. Disqualifying defects discovered between weld passes shall be repaired before additional weld material is deposited. After defect removal is complete and before rewelding, the area shall be examined by the same test method which first revealed the defect to ensure that the defect has been eliminated. After rewelding, the repaired area shall be reexamined by the same test method originally used for that area. Any indication of a defect shall be regarded as a defect unless reevaluation by NDE or by surface conditioning shows that no disqualifying defects are present.

B. Defect Removal: Defective or unsound weld joints shall be corrected by removing and replacing the entire weld joint, or for the following defects corrections shall be made as follows:

1. Excessive Convexity and Overlap: Reduce by removal of excess metal.

2. Excessive Concavity of Weld, Undersized Welds, Undercutting: Clean and deposit additional weld metal.


4. Crack in Weld or Base Metal: Remove crack throughout its length, including sound weld metal for a distance of twice the thickness of the base metal or two inches, whichever is less, beyond each end of the crack, followed by the required rewelding. Complete removal shall be confirmed by magnetic particle inspection for carbon steel. Inspection procedures shall comply with the requirements of ASME B31.4.
5. Poor Fit-Up: Cut apart improperly fitted parts, and reweld.

3.6 MAINTAINING CLEANLINESS OF PIPING

Keep the interior and ends of new piping affected by the Contractor's operations thoroughly cleaned of foreign matter and water before and after being installed. Piping systems shall be kept clean during installation by means of plugs or other approved methods. When work is not in progress, open ends of piping and fittings shall be closed so that no water or other foreign substance may enter the pipes or fittings. Piping shall be inspected before placing into position. The interior of each length of pipe shall be cleaned after welding; A swab, with a leather or canvas belt disc to fit the inside diameter of pipe, shall be pulled through each length of pipe after welding in place. It shall be the Contractor's responsibility for insuring that the interior of the piping is free of foreign matter including weld slag when it is connected into the system.

3.7 EXCAVATION

Installation of the pipes shall be sufficiently sloped back or shored up with sheeting and bracing to prevent the excavation walls from caving in. Excavation shall only be carried to the extent necessary to properly join and install the pipe. Care shall be taken not to excavate below the line and grade of the pipeline as shown.

3.8 BACKFILL AND COMPACTION

Backfill required to place the pipe shall conform to the applicable provisions specified herein, and in the Section 31 23 16.30 Add, "Drop-Outlet Structure Excavation, Filing, and Backfilling." Excavation for the pipe which has been carried below the line and grade shown shall be backfilled with satisfactory material to establish a firm bedding for the pipe at the required alignment and grade. When backfilling around the pipe, care shall be taken to ensure that areas underneath the haunches of the pipe are thoroughly filled and compacted, leaving no voids.

3.9 REMOVAL OF UNSTABLE MATERIAL

Removal and replacement of unsatisfactory soils shall conform to the Section 31 23 16.30 Add, "Drop-Outlet Structure Excavation, Filing, and Backfilling."

END OF SECTION
SECTION 35 20 00 Add – CONSTRUCTION SURVEYING

PART 1 GENERAL

1.1 SUMMARY

Construction Surveying includes furnishing materials, labor, and equipment for hazard, topographic, and hydrographic surveying where required under the Contract Documents.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 35 20 23 Add – Dredging
Section 35 31 19 Add - Revetment
Section 35 41 00 Add – Berm Construction

1.3 REFERENCES

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 (USACE) Publications:
EM 1110-1-1005  (2007) Control and Topographic Surveying

1.4 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an “E” designation are for information only.

1. Name of Registered Professional Land Surveyor (Paragraph 1.5 A)
2. Surveying Plan (Paragraph 1.5 B), E
3. Survey Submittal Log (Paragraph 3.2 B)
4. Pre-Dredge Hazard Survey (Paragraph 3.3)
5. Channel Dredging Surveys and Quantity Computations (Paragraph 3.4 A), E
6. Multi-Beam Surveys (Paragraph 3.5), E
7. Berm Initial, Interim, Final Grading, and Final Acceptance Surveys (Paragraph 3.4 B), E
8. Revetment Initial, Interim, and Final Surveys (Paragraph 3.4 C), E

1.5 QUALITY ASSURANCE

A. General: All survey plots submitted to Engineer shall be sealed by a professional land surveyor registered in the State of Texas, experienced in topographic and bathymetric surveying, and familiar and experienced with the USACE’s surveying guidelines in Engineer
Manuals (EM) 1110-1-1005 and 1110-2-1003. Prior to commencing Work, Contractor shall provide name and credentials of professional land surveyor (PLS) who will oversee surveys. Use of a PLS who is certified as an American Congress on Surveying and Mapping (ACSM) Hydrographer is strongly encouraged.

B. Surveying Plan: As part of the Dredging Work Plan required under specification Section 35 20 23, “Dredging,” Contractor shall provide description of methods and equipment to be applied for required surveys as well as quality control and quality assurance (QA/QC) procedures to be applied. Contractor shall also provide documentation that survey equipment meets the Minimum Performance Standards for Corps of Engineers Hydrographic Surveys, as shown in Table 3-1 of Engineer Manual (EM) 1110-2-1003, and a description of calibration and other QA/QC procedures to be applied. No other equipment shall be used for surveying without prior notification to Engineer. Refer to Paragraph 3.5.B for additional QA/QC requirements for multi-beam surveys.

A survey plan for surveying the berms at M12 and shoreline protection (M12 and Barbours Cut Channel) shall also be prepared. Contractor shall provide Engineer a plan that coordinates surveying activities with construction sequence. The plan shall also describe surveying methods, equipment, and accuracy. Minimum vertical and horizontal accuracies for all surveying methods shall be ±1.5” and 1 ft RMS, respectively. GPS-based systems shall not be applied without establishing a local base station unless approved by Engineer.

C. Transducer Frequency: Where electronic fathometers/echosounders are applied for bathymetric surveys, transducer frequency shall be consistent between “Before Dredging” (BD) and “After Dredging” (AD) surveys within any particular area. Measurements shall normally be determined based on high frequency (200 kHz) data. Low frequency (40 kHz) data shall require prior written concurrence from Engineer.

PART 2 PRODUCTS

(NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Dredging: Contractor shall provide pre-dredge hazard survey; and Before Dredge (BD) and After Dredge (AD) surveys for measurement and acceptance of Work items. Plots showing lines and grades, and quantity computations shall accompany all payment requisitions. Refer to Table 1 for a general summary of the required surveys.

B. Berm Construction: Contractor shall provide initial pre-construction, interim (initial placement), final grading, and final acceptance surveys for measurement and acceptance of Work items. Plots showing lines and grades, and quantity computations shall accompany all payment requisitions. Refer to Table 1 for a general summary of the required surveys.

C. Revetment: Contractor shall provide initial (post-dredge, revetment pre-construction), interim (revetment grading), and final acceptance surveys for measurement and acceptance of Work items. Plots showing lines and grades, and quantity computations shall accompany all payment requisitions. Refer to Table 1 for a general summary of the required surveys.
<table>
<thead>
<tr>
<th>Survey</th>
<th>Intended Purpose</th>
<th>Submittal(s) Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Dredge Hazard Survey</td>
<td>Magnetometer or similar survey required to locate and avoid pipelines, utilities,</td>
<td>Before commencing physical dredging</td>
</tr>
<tr>
<td></td>
<td>hazards, and obstructions.</td>
<td></td>
</tr>
<tr>
<td>BD</td>
<td>Transects: Single-Beam and Topographic survey transects to establish baseline</td>
<td>Before commencing physical dredging (material extraction) at each survey transect.</td>
</tr>
<tr>
<td></td>
<td>condition for calculation of pay volumes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-Beam Survey: Required for general, overall documentation of pre-dredging</td>
<td>Prior to commencing dredging</td>
</tr>
<tr>
<td></td>
<td>bathymetry.</td>
<td></td>
</tr>
<tr>
<td>AD</td>
<td>Transects: Single-Beam and Topographic survey transects to document final</td>
<td>Upon completion of physical material extraction at each survey transect (required with each Invoice).</td>
</tr>
<tr>
<td></td>
<td>dredging locations and depths, verify that material extraction has not occurred</td>
<td></td>
</tr>
<tr>
<td></td>
<td>beyond specified limits, and determine pay volumes. (Reference Paragraph 3.5).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-Beam Survey: Required to document conditions within final dredging locations</td>
<td>Upon completion of physical material extraction.</td>
</tr>
<tr>
<td></td>
<td>and verify that material extraction has not occurred beyond specified limits.</td>
<td></td>
</tr>
<tr>
<td>Initial Survey - Berm</td>
<td>To verify the existing condition prior to commencement of berm construction.</td>
<td>Before commencing physical dredging/excavation at each survey transect.</td>
</tr>
<tr>
<td></td>
<td>Transects: 50 ft intervals.</td>
<td></td>
</tr>
<tr>
<td>Interim Survey - Berm</td>
<td>To determine in-place fill quantities, retention rates, etc. for berm construction.</td>
<td>Daily upon filling sections.</td>
</tr>
<tr>
<td></td>
<td>Transects: Initial survey 50 ft intervals.</td>
<td></td>
</tr>
<tr>
<td>Final Shaping and Grading</td>
<td>To ensure the constructed berms meet the required lines and grades for interim</td>
<td>Upon completion of 50 foot sections.</td>
</tr>
<tr>
<td>Survey - Berm</td>
<td>measurement and payment. Transects: Initial survey 50 ft intervals.</td>
<td></td>
</tr>
<tr>
<td>Final Acceptance Survey -</td>
<td>To provide for final acceptance of the work. Transects: 50 ft intervals.</td>
<td>Upon completion of final shaping and grading.</td>
</tr>
<tr>
<td>Berm (by Port Authority)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial Survey – Revetment</td>
<td>To verify the existing condition of post-dredge slopes prior to commencement of</td>
<td>Upon completion of dredging and prior to revetment construction.</td>
</tr>
<tr>
<td>(Not required at M12)</td>
<td>revetment construction. Transects: 50 ft intervals.</td>
<td></td>
</tr>
<tr>
<td>Interim Survey - Revetment</td>
<td>To verify existing conditions upon completion of excavation and grading for</td>
<td>Upon completion of 50 foot sections.</td>
</tr>
<tr>
<td></td>
<td>revetment installation. Transects: 50 ft intervals.</td>
<td></td>
</tr>
<tr>
<td>Final Survey - Revetment</td>
<td>To ensure the constructed revetment meets the required lines and grades for</td>
<td>Upon completion of 50 foot sections and final geotextile and riprap installation.</td>
</tr>
</tbody>
</table>
3.2 SURVEY PLOTS

A. General: All construction surveys submitted to Engineer shall be in the form of plan-view, cross section plots, and digital data. All surveys shall be referenced to the project datums shown on the Drawings. Plots shall be transmitted digitally in PDF and AutoCAD format. All plots shall legibly and clearly display the following information:

1. Project name and owner (Port Houston Authority)
2. Professional Land Surveyor’s seal, signature, and business affiliation (required on pdf transmittals)
3. Date(s) surveys were performed
4. Location and description of survey control
5. Vertical and horizontal datums
6. Sheet name and number
7. Name of Contractor
8. Drawing scale(s)
9. Transducer frequency (where fathometer/echo sounders used)
10. Submittal title (e.g., “Segment 3 BD”)

Survey plots shall include the following:

1. Plan sheets clearly documenting locations, limits, and dimensions of completed Work (as applicable) and locations where cross sections were taken. Bathymetry and topography shall be plotted using an elevation color scale.
2. Cross-section sheets providing an overlay of sequential survey transects (as applicable) along with specified templates. A legend shall be provided indicating the date and survey type (e.g., BD, AD, etc.) for each transect shown.
3. Cross-sectional areas calculated by comparing the BD and AD surveys.

B. Digital Data: In addition to plots in pdf format, all survey submittals shall include digital data on labeled CD or DVD. Digital data shall include the following:

1. A submittal log documenting surveys submitted to date with descriptors for survey dates and locations.
2. AutoCAD files
3. ASCII files containing the following Northing, Easting, Elevation, and Station for Single Beam and Topographic surveys; and Northing, Easting, and Elevation for Multi-beam survey.
4. PDF files with signed Registered PLS seal

3.3 PRE-DREDGE HAZARD SURVEY

Prior to commencing dredging, Contactor shall perform a hazard survey (magnetometer, side-scan sonar, sub-bottom profiler, and/or similar method) over the entire area to be dredged to search for surface debris, uncharted pipelines, and/or other anomalies on or below the existing
seafloor. Hazard survey shall be supplemented with probing as required to determine depth of uncharted hazards/obstructions. Probing shall be coordinated with utility owners. Contractor shall be solely responsible for determining necessary extent and methods of pre-dredge hazard survey. Planned scope of pre-dredge hazard survey shall be summarized in Surveying Plan (Paragraph 1.5.B). Results of the pre-dredge hazard survey shall be provided with a summary of findings, interpretation of any located anomalies, and considerations for dredging.

3.4 SURVEY TRANSECTS

A. Dredging Transects: The survey transects specified herein apply to all Single-Beam and Topographic surveys performed by Contractor for acceptance and/or submittal with monthly pay requests. Survey transects shall be collected at location of cross-sections shown on the Drawings and 100 ft intervals within the extents of the channel. Shot spacing along each transect shall not exceed 20 ft.

   1. Before Dredging (BD) Surveys: A survey shall be performed prior to dredging at each required survey transect. BD surveys within each transect shall be performed within 15 days before commencement of dredging within that transect.

   2. After Dredging (AD) Surveys: An AD survey shall be performed to document dredging and for calculation of pay volumes and shall be submitted to Port Authority with each invoice. AD survey at each transect shall be performed within 15 days after completion of dredging within that transect.

B. Berm Transects: The survey transects specified herein apply to all Topographic surveys performed by Contractor for acceptance and/or submittal with monthly pay requests. Survey shots shall be taken along each 50 ft station along the berm alignment within the limits of construction shown on the drawings. Survey shots along transects shall be taken at all significant grade breaks and at maximum horizontal spacing of 5 ft on center. At a minimum, transects shall extend from 20 feet either side of the berm toe.

C. Revetment Transects: The survey transects specified herein apply to all Topographic surveys performed by Contractor for acceptance and/or submittal with monthly pay requests. Survey shots shall be taken along each 50 ft station along the revetment alignment within the limits of construction shown on the drawings. Survey shots along transects shall be taken at all significant grade breaks and at maximum horizontal spacing of 5 ft on center. At a minimum, transects shall extend from 20 feet either side of the revetment section.

3.5 MULTI-BEAM SURVEYS

A. General: Multi-beam (acoustic sweep) surveys shall be performed before and after dredging. Contractor shall provide these surveys to Port Authority as described below. Contractor shall provide Port Authority and USACE with a minimum of 24 hours notice prior to the performance of multi-beam surveys. Contractor shall afford Port Authority and USACE representatives the opportunity to be present on the survey vessel during collection of multi-beam survey data. Port Authority and USACE reserve the right to perform a QA multi-beam survey to verify accuracy and completeness of Contractor’s surveys.

B. Survey Equipment and QA/QC: Equipment applied for multi-beam surveys shall comply with the guidelines stated in EM 1110-2-1003. Contractor shall perform patch tests and quality assurance tests as described in Chapter 11 of EM 1110-2-1003. Documentation of tests shall be submitted to Port Authority with overall survey results.

C. Survey Limits: Surveys shall provide 100% coverage of required dredging limits.
D. **Before Dredging (BD) Multi-Beam Surveys:** BD Multi-Beam survey shall be performed within 15 days prior to commencement of dredging.

E. **After Dredging (AD) Multi-Beam Surveys:** AD Multi-Beam survey shall be performed as soon as practicable after completion of dredging. Should any shoals, lumps, or other lack of contract depth be disclosed by this examination, Contractor shall remove same and repeat surveys to show that acceptance area is clear.

F. **Quantity Computations:** After completion of dredging, Contractor shall provide volume calculations to Port Authority based on comparison of BD and AD surfaces. Contractor shall create BD and AD surfaces (triangulated irregular network or similar) using BD and AD Multi-Beam surveys supplemented by topographic BD and AD survey shots collected at Survey Transects (refer to Paragraph 3.4). This volume will not serve as the contract pay quantity and is for informational purposes only. The volume shall be provided within 10 days of after Project 11 - Segment 4 is cleared to required dimensions.

G. **Data Processing:**

1. Selected representative "shot," “average,” and “minimum” depths shall be derived from the entire edited multi-beam dataset. Extraneous noise and spikes shall be removed from the raw dataset before any other data processing is performed.

   a. Shot depth shall be applied to represent the general condition of the bottom for plotting and graphical purposes. Shot depth shall be defined as the depth reading closest to the center of 5 ft x 5 ft cells.

   b. Average depth shall be applied for volume computations (not for pay purposes). Average depth shall be defined as the average of all depths within 3 ft x 3 ft cells. Volume calculations shall be performed through development of a triangulated irregular network (TIN) as described on page 15-11 of EM 1110-2-1003.

   c. Minimum depth shall be applied to determine acceptance to the required depth as described on page 11-44, “Dredge Clearance & Acceptance Surveys (Shoal/Strike Detection)” of EM 1110-2-1003. Minimum depth shall be defined as the “shoalest” depth within a 3 ft x 3 ft cell. Shoals shall be delineated by a minimum of 3 hits over successive passes. A single high spot unsupported by other data will be disregarded.

H. **Plots:** Contractor shall provide survey data plots within 10 days of completion of field surveys. Plots shall consist of surface renderings for visualization of each BD and AD survey. A color scheme shall be applied that clearly highlights shoals and/or locations that exceed the allowable dredging depth.

   1. Shot depth plots shall be printed at a scale of one inch = 200 feet with a cell size of 40 ft x 40 ft.

   2. Average depth plots are not required.

   3. Minimum depth plots shall be printed at an overall scale of one inch = 200 ft. In addition, a surface rendering of each shoal shall be printed on separate sheets at a scale of one inch = 20 ft.

I. **Acceptance:** Contractor shall submit “minimum depth” plots showing no depths above the required contract depth, at which time Engineer/Port Authority will accept the dredging work as being complete.

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 35 20 23 Add – DREDGING

PART 1 GENERAL

1.1 SUMMARY

Dredging work includes furnishing materials, labor, and equipment for dredging, transport of dredged material, and placement of dredged material in accordance with these Specifications and applicable Drawings. Material shall be excavated by Cutterhead/Suction Pipeline Dredge for material in Barbours Cut Channel. Hopper and mechanical (e.g., clamshell) dredging is not permitted. Dredging within Cedar Bayou and to construct flotation channels shall be performed using mechanical (e.g., clamshell) dredging.

1.2 EXISTING CONDITIONS

The drawings represent conditions existing as of the date of their preparation based on surveys performed by the Port Authority. However, to reflect anticipated shoaling occurring between the dates of preparation of the drawings and the dates of the “Before Dredging (BD)” sections, the estimated dredging quantities stated in the attached Exhibit A: Price Exhibit have been adjusted accordingly. The depths and elevations shown will be verified and corrected by fathometer soundings taken by Contractor before dredging.

1.3 RELATED SECTIONS

A. Technical Specifications:
Section 01 22 10.01 Add – Measurement and Basis of Payment.
Section 01 16 60 Add – Environmental Protection Measures
Section 35 20 00 Add – Construction Surveying
Section 35 20 23.33 Add – National Dredging Quality Management Program Pipeline Dredge

B. Appendices:
Appendix A – Geotechnical Investigation Data
Appendix B – Geophysical Investigation Data

C. Attachments:
Attachment 1 – Quantity Summary Table

1.4 REFERENCES

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

U.S. Army Corps of Engineers (USACE) Publications:
EM 385-1-1 (2014) Safety and Health Requirements

1.5 SUBMITTALS

Engineer’s approval is required for submittals with an “E” designation; submittals not having an “E” designation are for information only.
1. Daily Activities Reports (Paragraph 1.12.G)
2. Logs/Records (Paragraph 1.12.B)
3. Dredging Work Plan (Paragraph 1.12.D)
5. Request for Temporary Removal of Aids to Navigation (Paragraph 1.13)
6. Dredge Pipeline Map (Paragraph 3.9.A), E
7. Spill Contingency Plan (Paragraph 3.10)
8. Surveys (Refer to Section 35 20 00, “Construction Surveying”), E

1.6 CHARACTER OF MATERIAL

A. Barbours Cut Channel: The material to be removed is primarily new-work (virgin-cut) material. Bidders are expected to examine the worksite and geotechnical data and, after investigation, decide for themselves the character of materials.

B. Cedar Bayou Channel: The material to be removed is maintenance material.

1.7 UTILITIES ACROSS THE LIMITS OF DREDGING

It is Contractor's responsibility to investigate the location of utility and pipeline crossings. Contractor shall take precautions against damages which can result from dredging operations in the vicinity of the utility and pipeline crossings. If damage to utilities or pipelines occurs as a result of dredging operations, Contractor shall suspend dredging until the damage is repaired and approved. Costs of these repairs and downtime of the dredge and attendant plant shall be at Contractor's expense.

1.8 KNOWN PIPELINE/UTILITY CROSSINGS

There are pipelines and utilities which are within the work limits. Pipelines and utilities identified by Port Authority and Engineer are shown on the Drawings. Additional pipelines and utilities may exist. Prior to work, Contractor shall contact the following to verify pipeline locations:

1. Lonestar Notification Center
   1-713-223-4567 or 1-800-669-8344

2. Texas 811 (Dig-Tess)
   1-800-344-8377

1.9 WORK BY OTHER CONTRACTORS IN THE VICINITY

During the course of this Contract, other contractors may be performing work in the vicinity, such as mowing the dikes of the Placement Areas (PAs). The Port Authority may hold coordination meetings between the various contractors, the U.S. Army Corps of Engineers, the U.S. Coast Guard Vessel Traffic Service, Houston Pilots Association, dock/facility operators, and users of the channel on an as-needed basis. Contractor will be expected to attend these coordination meetings.

1.10 ORDER OF WORK

Contractor shall begin dredging no later than 21 days after issuance of Notice to Proceed.
1.11 QUALITY ASSURANCE

C. Permits

1. Port Authority-Obtained Permits: The Federal authorizations for this project included completion of an Environmental Impact Statement (EIS) by the U.S. Army Corps of Engineers for the Houston Ship Channel Expansion Channel Improvement Project. Refer to the following report for documentation of the environmental regulatory approvals for this work: “Final Integrated Feasibility Report – Environmental Impact Statement for Houston Ship Channel Expansion Channel Improvement Project, Harris, Chambers, and Galveston Counties, Texas,” prepared by USACE Galveston District. A copy of this report is available from Port Authority.

2. Contractor-Obtained Permits: Contractor shall be responsible for all permits not provided by Port Authority, including the following:

   a. Water Quality: Contractor shall be responsible for coordination of Texas Commission on Environmental Quality (TCEQ) Storm Water Program TPDES General Permit TXR150000 as applicable for any land-based work on this project.

   b. Notice to Mariners: Contractor shall provide U.S. Coast Guard a work schedule within seven days after the construction Notice to Proceed has been received so that a Notice to Mariners can be issued by the U.S. Coast Guard. A copy of this correspondence shall be provided to Engineer. Should Contractor encounter any objects on the seafloor which could be a hazard to navigation, it shall notify the U.S. Coast Guard, any other pertinent agencies, and Engineer immediately as to the location of said object and any other pertinent information necessary for the U.S. Coast Guard to issue a Notice to Mariners.

3. Contractor shall make application for and pay for any necessary permit fees, temporary or permanent utility interruption fees, and/or re-location fees for any Contractor-obtained permits.

D. Logs/Records: Contractor shall provide documentation as may be required for Port Authority to comply with its obligations under the Permits listed in Paragraph 1.12.A.

E. Environmental Protection Requirements: Refer to Section 01 16 60, “Environmental Protection Measures.”

F. Dredging Work Plan: Prior to commencing Work, Contractor shall provide a Dredging Work Plan containing the planned procedure and timing for the work to be performed. The plan will be reviewed by Engineer for general conformance with the project design intent. The plan shall include the following:

1. The planned number and type of dredges to be used.

2. Dredging sequence.

3. Dredged material placement area sequence.


5. Description of bed leveling apparatus and operation (Paragraph 3.7.C).
6. Spill Contingency Plan (Paragraph 3.10).

7. Site specific management plan for water quality monitoring (Paragraph 3.11.H).

G. Easements: Permits authorizing the laying of shore pipe, and for placement of dredged material in M12, shall be requested from the Port Authority. The instruments authorizing the laying of dredge pipelines on shore may contain certain restrictions relative to specific route, location, and general use of the land. These instruments form a part of these specifications and Contractor is to strictly comply with the terms thereof.

H. Construction Observation: At the request of Port Authority/Engineer, Contractor shall provide boats, boatmen, laborers, and materials necessary for Port Authority/Engineer to observe the Work.

I. Daily Activities Reports: Contractor shall provide daily reports documenting completed/ongoing/upcoming work, comparison of scheduled versus actual work completed, adverse weather or other problems that cause delays, and other items as may be required throughout these specifications. Reports shall be completed for every calendar day from the Notice to Proceed to the date of complete demobilization. Reports shall be submitted via email to Port Authority and Engineer daily. Reports shall include the following information:
   1. Weather and marine conditions.
   2. Problems that cause delays.
   3. Equipment and personnel on site.
   4. Percent of project completion.
   5. Status of pre-construction submittals.
   7. Approximate cubic yards dredged.
   8. Approximate quantity and location of debris removed from channel.
   9. Locations where dredging occurred and material was placed.
  10. Dredge pipeline locations/routes and discharge points.
  11. General composition and consistency of material dredged.


1.12 TEMPORARY REMOVAL OF AIDS TO NAVIGATION

The temporary removal or changes in locations of channel markers may be required to facilitate dredging operations. Refer to Paragraph 1.15.C for notification requirements.

1.13 SUBSURFACE DATA

A. Geotechnical investigation data are provided in Appendix A. These data represent the most recent information available. Detailed laboratory test data from the geotechnical investigation are available upon request. Variations may exist in the soil conditions between sample locations. Contractor shall draw its own conclusions as to the character of the in-situ soil materials.

B. Contractor shall be aware that debris will be encountered during dredging. Refer to Paragraph 3.8 regarding Contractor’s requirements for locating surface and subsurface debris and potential dredging obstructions.
C. Geophysical Investigation Data (i.e., magnetometer and side scan sonar data) obtained by Port Authority are provided in Appendix B. This information is made available as a courtesy to Contractor but is not necessarily complete, accurate, or correct.

1.14 NOTIFICATION PRIOR TO COMMENCEMENT OF DREDGING OPERATIONS

A. Contractor shall notify the Resident Engineer at the Northern Area Office of the U.S. Army Corps of Engineers (USACE), Galveston District, in writing and electronically at least 10 days prior to commencement of dredging activities. Documentation of notice shall be provided to Engineer prior to commencement of dredging.

B. Contractor shall notify the U.S. Coast Guard (USCG) to arrange a pre-dredging Safety Coordination Meeting at least 15 days prior to commencement of dredging activities. It is Contractor’s responsibility to contact Vessel Traffic Service Houston/Galveston (VTS) at 281-464-4837 to coordinate and schedule this meeting. Contractor is to inform the Port Authority at least 48 hours prior to the scheduled meeting so that the Port Authority Representative may attend. In addition, comply with all other USCG requirements including submittal of a Channel Obstruction Request and submittal of a work schedule for issuance of Notice to Mariners (see paragraph 1.12.A). The following items shall be discussed at the pre-dredging Safety Coordination Meeting regarding the VTS Area:

1. Location of intended operation.
2. Description of intended operation including channel obstructions anticipated by Contractor.
3. Configuration of dredge pipelines and equipment in or along the channel, including pipeline staging.
4. Termination point of dredge pipelines in or along the channel.
5. Time required to re-open channel or move for vessel traffic.
6. Plan for managing operating impairments, including VHF-FM radios.
7. Names of the dredges and assist boats being used.
8. Traffic consideration required. For example: slow bell, no meeting or overtaking, and advance notice requirements.
9. Point of contact, phone numbers and working frequencies.
10. The master of dredge or floating plant is to immediately notify the VTS of changes to the above report, and at the completion of operations.
11. The VTS operating area includes the Houston Ship Channel from the sea buoy to the Buffalo Bayou Turning Basin, Galveston Channel, Texas City Channel, Bayport Ship Channel, Barbours Terminal Channel, and 10 miles of the Intracoastal Waterway.
12. Communications with the Vessel Traffic Center, call sign “HOUSTON TRAFFIC,” is to be accomplished via VHF-FM Channel 12 or 13. The Traffic Center guards both Channel 12 and Channel 13 on a 24 hour basis.
13. The master of a dredge or floating plant is to be aware of and comply with the provision of the order relating to lighting and bunkering operations and multiple vessel moorings, and will notify the VTS when refueling operations are to be conducted.

C. The temporary removal or changes in locations of channel markers may be required to facilitate dredging operations. Notify Port Authority at least 30 days prior to the date that the removal or change in location of channel markers will be required so USCG can perform the work and so navigation interests may be informed sufficiently in advance of the proposed
removal or change in location. Contractor shall not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with aids to navigation.

1.15 SIGNAL LIGHTS

A. Contractor shall display signal lights and conduct his operations in accordance with the general regulations of the Department of the U.S. Army and the USCG. 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 plant working in navigable channels, as set forth in Commandant U.S. Coast Guard Instruction M16672.2, Navigation Rules: International – Inland (COMDTINST M16672.2) or 33CFR81 Appendix A (International) and 33 VFR 84 through 89 (inland) as applicable.

1.16 PLANT

A. General Requirements: Keep the necessary dredge equipment and attendant plant on the job to meet the requirements of the work. The dredge equipment and attendant plant is to be in satisfactory operating condition and capable of safely and efficiently performing the work as set forth in specifications and be subject to inspection by the Port Authority’s representative at all times.

B. Capacity: No reduction in the capacity of the dredge equipment and attendant plant employed to execute the work shall be made without written approval of the Port Authority. The measure of the capacity of the dredge equipment and attendant plant is to be its actual performance on the work to which these specifications apply.

1.17 INSPECTION

A. The presence of the Port Authority’s on-site representative will not relieve Contractor of responsibility for the proper execution of the work in accordance with the specifications. Contractor is required to furnish the following items.

1. Equipment: At the request of the Port Authority, furnish the use of boats, boatmen, laborers, and material forming a part of the ordinary and usual equipment and crew of the dredging plant as may be reasonably necessary for Port Authority and its representatives to inspect and observe the work.

2. Transportation: At the request of the Port Authority, furnish suitable transportation from all points on shore designated by the Port Authority to and from the various pieces of plant, and to and from the PAs. If Contractor refuses, neglects, or delays compliance with these requirements, the specific facilities may be furnished and maintained by the Port Authority, and the cost thereof will be deducted from the amounts due or to become due Contractor.

PART 2 PRODUCTS

2.1 BRIDGE-TO-BRIDGE RADIO TELEPHONE EQUIPMENT

All dredge and self-propelled attendant floating plant shall be radiotelephone equipped to comply with the provisions of the Vessel Bridge-to-Bridge Radiotelephone Act (Public Law 92-63). This will require, as a minimum, radiotelephone equipment capable of transmitting and receiving on 156.6 MHZ (Channel 12) and 156.65 MHZ (Channel 13). Multi-channel equipment also requires 156.8 MHZ (Channel 16). Dredge tugs and tenders shall be considered towing vessels within the meaning of these requirements.
2.2 LOOKOUTS AND RADIO COMMUNICATIONS

Contractor shall have a lookout posted in the dredge control room at all times to monitor the movement of vessels around the dredge plant, perform radio communications with company work boats, and deliver passing arrangements with other commercial, fishing, and recreational vessels. The lookout shall be competent in USCG and Federal Communication Commission’s radio communications procedures and requirements and be trained in the Vessel Bridge-to-Bridge Radiotelephone Act. Lookout shall maintain up-to-the-minute information as required to prevent collisions. Each company work boat 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 ENGINEER, CONTRACTOR MAY BE REQUIRED TO CEASE OPERATIONS UNTIL THIS PROVISION IS COMPLIED WITH. ANY SUSPENSION, DELAY, OR INTERRUPTION OF WORK ARISING FROM NONCOMPLIANCE OF THIS PROVISION SHALL NOT BE CONSTRUED AS STANDBY TIME.

2.3 MATERIAL TO BE REMOVED

A. Dredged Material: Dredged Material includes any material—including but not limited to soil, mud, sediment, sand, clay, silt, gravel, and incidental debris—that can be removed via ordinary dredging. The dredged material to be removed is primarily new-work material. As described in Paragraph 1.13, explorations, including core borings, to determine the character of materials to be removed have been obtained by the Port Authority.

B. Debris: Debris includes material such as metal bands, pallets, pieces of broken cable, rope, stumps, broken piles, and other miscellaneous objects that cannot be removed through ordinary dredging. As described in Paragraph 1.13, explorations, including sidescan sonar and magnetometer surveys, have been obtained by the Port Authority to help identify debris.

PART 3 EXECUTION

3.1 AREAS TO BE DREDGED

Required dredging areas are shown on the Drawings.

3.2 CONDUCT OF DREDGING WORK

A. Pre-Dredging Safety Coordination Meeting: Prior to arrival on location and commencing dredge operations, Contractor shall arrange a pre-dredging safety coordination meeting between the dredge operators, pilots, towing industry representatives, Vessel Traffic Service (VTS), USCG, Port Authority, and USACE. Refer to Paragraph 1.14.B for additional requirements.

B. Protection of Existing Waterways: Conduct dredging operations using a method that will ensure that material or other debris are not pushed outside of the dredging limits or be otherwise deposited in existing side channels, basins, docking areas, or other areas being used by vessels. Contractor will be required to change its method of operations as may be required to comply with the above requirements. If bottom material or other debris is pushed into areas noted above as a result of Contractor's operations, the same is to be promptly removed by and at the expense of Contractor to the satisfaction of the Port Authority.

C. Adjacent Property and Structures: No dredging shall occur within 25 feet of an existing bulkhead, dock, wharf, revetment, mooring structure, pile, or other existing structure unless specifically stated or shown otherwise on the drawings. Damage to private or public property
or structures resulting from the disposal or dredging operations are to be repaired promptly by and at Contractor’s expense. Damage to structures as a result of Contractor’s negligence will result in suspension of dredging and require prompt repair at Contractor’s expense as a prerequisite to the resumption of dredging. Where dredging to obtain the required dimensions might endanger a structure, the Port Authority shall be notified. Upon notification, the Port Authority may reduce the required excavation in the vicinity of this structure.

3.3 PREPARATION

A. Pre-Dredge Hazard Survey: Prior to dredging, a magnetometer survey, side-scan sonar survey, sub-bottom profile survey, and/or other similar survey shall be performed to search for uncharted pipelines and other anomalies within the dredging template. Refer to Section 35 20 00, “Construction Surveying,” for requirements of pre-dredge hazard survey. In addition to performing pre-dredge hazard survey, Contractor shall locate and avoid pipelines, cables, and other hazards prior to anchoring, spudding, laying/removing dredge pipeline, etc. throughout the course of the Work. If utility damage occurs as a result of dredging operations, Contractor shall suspend dredging until the damage is repaired and approved. Costs of these repairs and downtime of the dredge and attendant plant shall be Contractor’s responsibility.

B. Debris Removal: Prior to dredging, Contractor shall rake the dredging areas and remove any surface debris from the dredging template. Refer to Paragraph 3.8 for debris removal requirements.

C. Emergency Spill Response Equipment: Prior to commencing dredging activities, sufficient spill response equipment, i.e. boom, etc. shall be on-site and ready for deployment in the event of an emergency or accident.

3.4 SURVEYING

Refer to Specification Section 35 20 00, “Construction Surveying,” for surveying requirements.

3.5 AUTOMATIC IDENTIFICATION SYSTEM

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 dredges used under this Contract.

3.6 OBSTRUCTION OF NAVIGATION AND USACE COORDINATION

A. Port Authority will not undertake measures to keep the channel free from vessels or other obstructions. All work shall be conducted in such manner to obstruct navigation as little as possible. If the plant does obstruct the use of channels or passages and makes traffic movement difficult or endangers the passage of vessels, said plant shall be promptly moved on the approach of any vessel to the extent necessary to afford a practicable passage. Refer to Paragraph 1.15 for required coordination with the USCG. Contractor shall comply with all “moving security zone” requirements set forth by USCG. Delays caused by vessel traffic shall not be considered justification for Standby Time.

B. Project site is located adjacent to existing ship docks which may be utilized by others during construction. Contractor shall coordinate with Port Authority and schedule work so that dredging operations do not impact use of adjacent docks, and so that use of adjacent docks by others does not impact Contractor’s dredging work schedule. Delays caused by use of docks by others shall not be grounds for standby time, claims, changed conditions, or time extensions to the Contract.
3.7 DREDGING

A. Material Removal: All dredging shall be performed within the limits and depths shown on the drawings.

B. Dredging Limits/Tolerance: Dredging shall not extend below the allowable depths shown on the Drawings and/or specified herein. Contractor shall establish such control as may be necessary to ensure that the allowable dredging depths are not exceeded. The dredge cut tolerance/allowable overdepth shall be as indicated on the Drawings and specified herein.

C. Bed Leveling: Final leveling of a dredged area may be performed with a drag bar or other approved apparatus. Bed leveling by dragging the bottom shall be allowed only in areas specified for dredging. Shop drawings and photographs showing proposed dragging apparatus shall be included in Contractor’s Dredging Work Plan (Paragraph 1.11.F).

D. Excessive Dredging: Contractor shall not dredge any material beyond the allowable overdepth and specified limits shown on the Drawings. Such dredging shall be considered excessive Overdepth dredging, or excessive side or end slope dredging. Contractor shall be responsible for damage to adjacent property due to overdredging, and shall pay for all repairs or refilling and compacting to the designed grade.

E. Protection of Existing Waterways: Contractor shall conduct dredging operations in a manner that prevents displacement of material or debris outside of the dredging limits or otherwise causes deposition within adjacent portions of existing channel or side channels, basins, docking areas, or other navigable areas. Such material shall be removed immediately at Contractor’s expense.

3.8 DEBRIS WITHIN THE DREDGING LIMITS

A. Contractor shall remove debris including but not limited to broken cable, rope, chains, stumps, rock, concrete rubble, tires, piles, and other miscellaneous trash from the dredging template. The Port Authority has no knowledge of existing wrecks, wreckage, or other material of the size or character that would require the use of explosives or special or additional plant for its economical removal.

B. Removed debris shall become the property of Contractor and shall be disposed of in accordance with applicable law and applicable codes and standards. Contractor shall dispose debris at a disposal facility outside Port Authority’s property.

C. In the event that existing conditions of debris differ materially from those shown on the drawings and described in the geotechnical and geophysical data in Appendices A and B, an adjustment in contract price or time of completion, or both, will be made in accordance with the following:

1. Contractor shall promptly, and before the site conditions are disturbed, provide notification to Port Authority of unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

2. Port Authority will investigate the site conditions promptly after receiving Contractor’s notice. If conditions do materially so differ and cause an increase or decrease in Contractor’s cost of, or time required for, performing any part of the work under this Contract, whether or not changed as a result of the conditions, an equitable adjustment will be made under this section through a Change Order or other written agreement in
accordance with and subject to Section 8.09, “Claims for Changed Conditions,” of the General Conditions.

D. Pay requests for debris removal shall be substantiated by supporting evidence including but not limited to weight tickets and/or barge displacement measurements, timestamped and georeferenced photos of the debris, journal entries describing the debris, and log entries for delays caused specifically by the debris.

E. Port Authority and Engineer assume no responsibility for failure to show any or all debris and other obstructions on the Drawings, or to show them in their exact location. Failure to show will not be considered sufficient basis for claims for additional compensation for extra work in any manner whatsoever, unless the obstruction encountered necessitates substantial changes in the lines or grades, or requires the building of special work for which no provision is made in the Drawings and which is not essentially subsidiary to some item of work for which provision is made. It is assumed that as elsewhere provided Contractor has thoroughly inspected the site, is informed as to the correct location of surface structures, and has included the cost of such incidental work in the price bid, and has considered and allowed for all foreseeable incidental work due to variable subsurface conditions, weather such conditions and such work are fully and properly described on the drawings or not. Minor changes and variations of the work specified and shown on the Drawings shall be expected by Contractor and allowed for as incidental to the satisfactory completion of a whole and functioning work or improvement.

3.9 DREDGE PIPELINES

A. **Pipeline Map:** Contractor shall provide drawings showing all planned dredge pipeline routes, channel crossing details, pipeline anchor locations, and pipeline markings as part of the Dredging Work Plan (Paragraph 1.11.F). Drawings shall include pipe section joining methods. Pipeline maps shall be provided for each PA.

B. **Pipeline Routes:**

1. Dredge pipeline route to M12 shall follow the pipeline corridors shown on the Drawings. Contractor shall obtain approval from Port Authority for any alternate pipeline routes.

2. The dredge pipeline route to M12 is to follow closely the location shown or approved. Detailed right-of-way drawings showing the location of the pipeline routes with respect to property lines are available from the Port Authority. Refer to Paragraph 1.11.G regarding pipeline easements obtained by the Port Authority.

3. Pipeline corridors shown on Drawings may utilize drainage ditch easements and/or existing streams for a portion of the routes. The ditches and streams are prone to rapid water rise and strong currents from short-duration rain events. Routes may require passing pipeline through culverts along ditches. Contractor shall ensure security of pipelines for stability and leak control within steams, ditches and culverts, plus be responsible for protecting streams and ditches such that proper drainage is maintained. Contractor shall coordinate with Port Authority prior to placement of pipeline through Port Authority’s property and/or any private property, through culverts, and along any improved drainage ditches.

C. **Pipeline in Water:** Pontooned or submerged dredge pipeline shall be located, marked, and maintained so as not to interfere with navigation or present a hazard to boats and other channel users. Contractor shall mark navigation openings following USCG regulations as required in 33 C.F.R. 88.15. Should Contractor elect to use a submerged section in the dredge discharge pipeline for crossing a navigable channel, detailed Drawings of the submerged section shall be submitted as part of (or as an amendment to) the Dredging Work Plan.
Plan (Paragraph 1.12.D). The Drawings shall indicate the width and depth of the navigation opening and the method used to mark it by day and by night for the safety of navigation. The minimum bottom width of the submerged section shall match the bottom width of the channel template. The highest point on the pipe or ball connection across the bottom width of a submerged section shall not be higher than the authorized depth in the channel. Lighted buoys meeting the requirements of USCG Regulation 33 C.F.R. 62.25 shall be provided by Contractor to mark the navigation opening. A red buoy exhibiting a quick flashing red light shall mark the right side of the opening, and a black buoy exhibiting a quick flashing green light shall mark the left side of the opening. The frequency of the flashes shall not be less than 60 per minute. “Right side” and “left side” of the opening shall be in conformance with the lateral system of buoyage established by USCG. Requirements for the lighted buoys and descriptions of the lateral system shall be as found in the USCG publication CG 208 entitled “Aids to Navigation.”

D. Pipeline over Land: Pipelines shall not interfere with road traffic. Where pipeline is adjacent to existing roadway, signs shall be provided in both approach directions indicating “Utility Construction Ahead.”

E. Pipeline Interferences: To the extent such information was available to Port Authority/Engineer, pertinent details on the locations of existing utility pipelines and other facilities which may be encountered in trenching or jacking operations have been provided on the Drawings. Contractor shall investigate existing conditions to determine if additional interferences may exist.

F. Pipeline Leaks: Pipeline leaks or breaks shall be promptly reported to Engineer and repaired. Dredged material that is improperly placed due to leaks and/or breaks shall be removed immediately. Refer to Paragraph 3.12, “Unauthorized Placement of Material.”

G. Cleanup: Upon removal of pipeline, pipeline corridor shall be restored to original or better condition. Refer to Paragraph 3.13, “Preservation of Public and Private Property.”

3.10 SPILL CONTINGENCY PLAN

Contractor shall ensure that all hazardous material spills are immediately reported to the proper authorities, to Port Authority, and to Engineer. All hazardous material spills shall be immediately cleaned up in accordance with the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, and all changes and amendments thereto. In accordance with EM 385-1-1, Contractor shall use suitable methods such as dikes or curbs to prevent the spread of hazardous materials from above ground storage tanks and piping in case of leakage. Contractor shall provide and maintain an effective Spill Contingency Plan that includes the following as a minimum:

A. During all hours of operation, placement of dredged material within upland PAs shall be monitored continuously by field personnel experienced with dredging and operation/management of dredged material placement areas.

B. Contractor’s Spill Contingency Plan shall include the following procedures to be followed in the event of a spill of (1) dredged material outside of the specified PAs and/or (2) fuel, oil, hydraulic fluid, etc.:

1. Dredging shall cease immediately.

2. Contractor shall notify Port Authority and Engineer immediately.
3. Contractor shall submit a specific cleanup plan to Engineer. No cleanup actions will commence until the plan has been submitted to Engineer. All cleanup actions shall be at Contractor’s expense.

4. Contractor shall identify and have available the names and contact information of companies having portable hydraulic dredged or vacuum pumps that would be ready to clean up any dredged material discharge from the project due to being misplaced or associated with a spill.

3.11 DREDGED MATERIAL PLACEMENT

A. Dredged material shall be transported by hydraulic means and placed in the Baseline A berm footprint at M12 shown on the Drawings. Material shall be discharged within the discharge corridors shown on the drawings. Material from Cedar Bayou shall be placed in the ODMDS.

B. Contractor shall have sole responsibility for safe operation and maintenance of the placement during dredging activities. Refer to Section 35 41 00 Add, “Berm Construction” for details on dredged material placement at M12.

C. Every effort has been made to give pertinent details of the location of utilities, pipelines, and other facilities which may be encountered in trenching or jacking operations. Investigate existing conditions and be satisfied that no additional construction which may interfere with dredge pipeline laying specified herein exists.

3.12 UNAUTHORIZED PLACEMENT OF MATERIAL

A. Contractor will not be paid for dredged material that is not deposited in specified location. Contractor may be required to remove misplaced material and deposit it where directed by Port Authority/Engineer without cost to Port Authority/Engineer.

B. During the progress of the Work, worn out discharge pipe, wire rope, scrap metal, timbers, broken concrete, or any other such type of rubbish or obstructive material shall not be discarded in M12, ODMDS, water, along the shoreline, or anywhere else on public or private property. Such material that may be encountered during the dredging activities shall become the property of Contractor and be removed from the Project Site and disposed of in accordance with applicable law, codes, and standards.

C. Contractor shall indemnify and hold harmless Port Authority/Engineer from any and all losses, expenses, damages, demands, and claims asserted against or sustained by Port Authority/Engineer as a result of or alleged to be the result of illegal, improper, or unauthorized disposal of dredged material or objectionable material.

3.13 PRESERVATION OF PUBLIC AND PRIVATE PROPERTY

Unless otherwise shown on the drawings for removal and relocation, all existing navigation channels, docks, mooring piles, seawalls, jetties, groins, bulkheads, informational and directional signs, fences, roads, ditches, houses/decks, driveways, ramps, private or public grounds, camp facilities, water wells and tanks, station markers, mile markers, and other structures or improvements that are damaged as a result of Contractor’s operations under these Specifications shall be repaired or rebuilt by Contractor at his expense. The areas used by Contractor in laying and maintaining his pipelines shall be restored to the same or better condition as existed prior to commencement of the Work. Upon completion of the Work, all trenches and cuts shall be backfilled to original ground level, the ends of temporary culverts shall be fully closed with wooden bulkheads, and trenches and bank cuts shall be backfilled to the original ground level.

3.14 HOUSTON-GALVESTON VESSEL TRAFFIC SERVICE AREA
Comply with the following requirements while operating within the VTS Area.

A. **General:** When Contractor’s dredge or floating plant is to be operated within the VTS Area, Contractor shall furnish the Vessel Traffic Center the following report at least 30 minutes prior to beginning operations:
   1. Location of intended operation.
   2. Description of intended operation including Channel obstructions.
   3. Configuration of pipelines and equipment in or along the Channel.
   4. Termination point of pipelines in or along the Channel.
   5. Time required to re-open Channel or move for vessel traffic.
   6. Operating impairments, including VHF-FM radios.
   7. Names of the assist boats being used.
   8. Traffic considerations required, for example: slow bell, no meeting or overtaking, and advance notice requirements.
   9. Point of Contact phone numbers and working frequencies.

B. **Report Changes:** Contractor shall immediately notify the VTS of changes to the above report and at the completion of operations.

C. **Vessel Traffic Service Location:** The VTS Area consists of the navigable Channels between the Galveston Entrance Channel Buoy 1 and the Houston Turning Basin, Galveston Channel, Texas City Channel, the Gulf Intracoastal Waterway, Bayport Channel and Galveston-Freeport Cutoff from mile 346 to mile 352.

D. **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.

E. **Operations:** The master of a dredge of floating plant is to 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 VTS when refueling operations are to be conducted.

### 3.15 WORK IN THE VICINITY OF OTHER CONTRACTORS

Coordinate dredging operations, through the Port Authority, with other Contractors who may be working in the vicinity (for example: revetment, jetty repairs, and berm construction).

### 3.16 DREDGE PLANT INSTRUMENTATION

The Dredge Plant Instrumentation is a part of the dredge plant and shall be functional at all times. If failure of any part thereof occurs, repair the failed part within the next 36 hours restoring full operations. If the system is not fully functional within this period, the particular plant affected will be considered non-responsive to this Contract requirement and shall either be replaced or a redundancy part added to render the plant fully operational to include the monitored data at no additional increase in price or time to this Contract.
3.17 ESTIMATED QUANTITY OF MATERIAL

Within the limits of available funds, Contractor shall excavate the entire quantity of material necessary to complete the work specified whether the quantities involved are greater or less than those estimated. The work is to be done in accordance with this Contract and at the Contract price or prices, subject to the provisions of Paragraph 3.20, “Variations in Estimated Quantities – Dredging.”

3.18 QUANTITY SURVEYS

A. Dredging quantity surveys shall be conducted by Contractor in accordance with Section 35 20 00, “Construction Surveying.” The data derived from these surveys will be applied to compute the quantities of work performed and the actual construction completed and in place.

B. Contractor shall determine when a before dredging (BD) survey is required to establish a volume baseline or an after dredging (AD) survey is required to support a request for a progress payment. Contractor shall perform the computations necessary to determine the quantity of work that has been performed or is finally in place, including intermediate periods for which progress payments are requested.

3.19 FINAL EXAMINATION AND ACCEPTANCE

A. General: Perform AD survey as soon as practicable after the completion of any Channel Segment. If shoals, lumps, or other lack of Contract depth are disclosed by this survey, Contractor shall remove same by dragging the bottom or by dredging at the Contract rate for dredging. If the bottom is soft and the shoal areas are small and form no material obstruction to navigation, the removal of the shoal may be waived at the discretion of the Port Authority. Contractor shall notify Port Authority and U.S. Army Corps of Engineers when final surveys are to be made so they have opportunity to accompany Contractor’s survey party. When the area is found to be in a satisfactory condition, it will be accepted finally.

B. Determination of Pay Quantities: The total estimated amount of material to be removed from within the specified limits, including side and end slopes, anticipated shoaling occurring prior to the dates of the BD surveys, incidental material during dredging (see Paragraph 3.19.D), and overdepth, is shown in the Quantity Summary Table attached to this specification. Pay quantities for actual work will be determined based on AD surveys performed by Contractor for each Channel Segment. Refer to Section 01 25 00, “Measurement and Basis of Payment,” for additional conditions of payment, and Section 35 20 00, “Construction Surveying,” for additional conditions of Acceptance.

C. Overdepth: To cover inaccuracies of the dredging process, material actually removed from within the specific area(s) to be dredged to depths as specified on the Drawings will be estimated based on the BD and AD surveys and paid for at the Unit Price rate for Dredging. The maximum amount of allowable overdepth dredging is listed in the Quantity Summary Table (attached).

D. Side and End Slopes: Dredging for side slopes shall follow, as closely as practicable, the lines indicated or specified. There shall be no vertical faces greater than 6 feet along side slopes. Material actually removed from within approved limits to provide for final side and end slopes as specified on the Drawings, but not in excess of the amounts originally above these limiting side and end slopes, will be estimated based on BD and AD surveys and paid for at the Unit Price for Dredging. In computing the limiting amount of side and end slopes, net dimensions, without allowance for Overdepth, shall be applied.
E. **Incidental Material:** Any adjacent material that migrates into the required dredging limits as physical dredging is being performed shall be considered incidental material. No adjustments in pay volume will be made for such incidental material.

F. **Final Examination:** In addition to the AD surveys to be conducted by Contractor pursuant to Section 35 20 00, "Construction Surveying" and Contractor's obligations thereunder, Port Authority shall maintain the right, in its sole discretion, to perform a survey of a particular Channel Segment after Contractor has reported completion of the dredging for such Segment. Port Authority's survey will be performed within 30 days of Port Authority's receipt of Contractor's AD survey. If shoals, lumps, or other lack of contract depth are disclosed by Port Authority's survey, Contractor shall remove same by dragging the bottom or by dredging. Contractor shall then resurvey the Segment and re-submit it to Engineer. If more than two surveys by Port Authority of a Segment are necessary for removal of shoals disclosed at prior surveys, the cost of the third and any subsequent surveys will be charged against Contractor.

G. **Excessive Dredging:** Material taken from beyond the limits specified will be deducted from the total pay volume as excessive overdepth dredging or excessive side or end slope dredging, for which payment will not be made. Nothing herein shall be construed to prevent payment for the removal of shoals performed in accordance with Paragraph 3.19.F.

### 3.20 VARIATIONS IN QUANTITIES

A. Contractor is cautioned that funding on this Contract is based on the quantities shown in the Price Exhibit. Therefore, Contractor is not to exceed the estimated quantities in the Contract bid line items without prior specific authorization, and only with a signed modification issued by the Port Authority. Contractor shall specifically notify Port Authority, in writing, once Contractor reaches approximately 75 percent of the quantities specified in the Contract Line Items. This notification will be separate and in addition to other reporting required elsewhere in this Contract. Contractor shall notify Port Authority as soon as it recognizes that the estimated quantities are not sufficient to complete the work indicated and specified.

B. If the actual total quantity of material within the required dredging prism varies from the Quantity Summary Table (attached), an equitable adjustment will be processed in accordance with FAR 52.211-18, Variation in Estimated Quantity. The equitable adjustment applies only to the quantity within the required dredging prism, which does not include the allowable overdepth. If the total quantity of material to be paid for and actually removed under this Contract exceeds the limit established by FAR 52.211-18, Variation in Estimated Quantity, an additional time will be allowed at the rate of 1 calendar day for each 5,000 cubic yards in excess of the established limit. Contractor shall not exceed the estimated quantities in the Contract Line Items without prior authorization and only with a signed modification issued by the Port Authority.

C. If Contractor exceeds the estimated quantities without a signed modification in place, it will be considered unauthorized work for which Contractor may not be reimbursed. Once the potential quantity overrun is identified, the Port Authority may, among other choices, provide additional funds (if available) to complete the work and equitably adjust the quantities in the Contract Line Item, modify the work to fit within the estimated quantities, consider the Contract complete once the contractually indicated quantities have been reached, or terminate the Contract for the convenience of Port Authority.

D. This provision is not to be interpreted as an order for Contractor to stop work upon reaching 75 percent of the estimated quantities, it merely requires notice and potential corrective action at that point. However, absent further specific direction, Contractor shall be prepared to stop work at no additional cost to Port Authority once 100 percent of the line item quantity has been obtained.
3.21 DISPOSAL FEES

There are no disposal fees imposed by Port Authority for placement of dredged material in the PAs shown on the Drawings.

3.22 CLEANUP

Upon completion of the work, dredging plant, including pipeline, ranges, buoys, survey stakes, piles, signage, cables, and any other markers or obstructions placed by or for Contractor shall be removed.

END OF SECTION
<table>
<thead>
<tr>
<th>Section No.</th>
<th>From Station</th>
<th>To Station</th>
<th>Length of Station (ft)</th>
<th>Required Depth (CY)</th>
<th>Allowable Overdepth (CY)</th>
<th>Total Estimate (CY)</th>
<th>Placement Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Template</td>
<td>15+27</td>
<td>67+11</td>
<td>5,184</td>
<td>2,137,500</td>
<td>88,500</td>
<td>2,226,000</td>
<td>M12 Berm</td>
</tr>
<tr>
<td>South Template</td>
<td>9+63</td>
<td>31+98</td>
<td>2,235</td>
<td>787,500</td>
<td>7,200</td>
<td>794,700</td>
<td>M12 Berm</td>
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<tr>
<td>TOTAL (New Work Dredging)</td>
<td></td>
<td></td>
<td>7,419</td>
<td>2,925,000</td>
<td>95,700</td>
<td>3,020,700</td>
<td></td>
</tr>
</tbody>
</table>
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 35 20 23.33 Add – NATIONAL QUALITY MANAGEMENT PROGRAM PIPELINE HYDRAULIC DREDGE

PART 1  GENERAL

1.1 DESCRIPTION

The work under this Contract requires use of the US Army Corps of Engineers (USACE) National Dredging Quality Management Program (DQM) to monitor the dredge's status at all times during the Contract and manage data history.

This performance-based specification section identifies the minimum required output as well as the precision and instrumentation requirements. The requirements may be satisfied using equipment and technical procedures selected by the Contractor.

1.2 RELATED SECTIONS

Section 35 20 23 Add – Dredging

1.3 SUBMITTALS

Engineer's approval is required for submittals with an "E" designation; submittals not having an "E" designation are for information only.

1. Preconstruction Submittals: Dredge Plant Instrumentation Plan Revisions or Addendum (Paragraph 1.7) E

2. Test Reports: Data Appropriately Archived e-mail, Contractor Data Backup (Paragraph 3.3.D); E

3. Certificates: Letter of National Dredging Quality Management Program Certification (Paragraph 1.6); E

1.4 PAYMENT

No separate payment will be made for the installation, operation, and maintenance of the DQM-certified system as specified herein for the duration of the dredging operations; all costs in connection therewith will be considered a subsidiary obligation of the Contractor and covered under the Contract unit price for dredging in the bid schedule.

1.5 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM CERTIFICATION

The Contractor is required to have a current certification from the DQM Program for the cutter/suction head hydraulic dredge instrumentation system to be used under this Contract. Standard Operating Procedures (SOP) and criteria for certification are presented on the DQM website at https://dqm.usace.army.mil.

1.6 DREDGE PLANT INSTRUMENTATION PLAN (DPIP)

The Contractor shall have a digital copy of the Dredge Plant Instrumentation Plan (DPIP) on file.
with the DQM Support Center. While working on site, the Contractor shall also maintain on the dredge a copy of the DPIP, which is easily accessible to Port Houston/Engineer personnel at all times. This document shall accurately describe the sensors used, the configuration of the system, how sensor data will be collected, how quality control on the data will be performed, and how the sensors/data-reporting equipment will be calibrated and repaired if it fails. A description of the computed dredge-specific data and how the sensor data will be transmitted to the DQM database shall also be included. Prior to the start of work, the Contractor shall submit to the DQM Support Center any addendum or modifications made to the plan subsequent to its original submission. Requirements and a template for the DPIP are available on the DQM website at https://dqm.usace.army.mil.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 REQUIREMENTS FOR REPORTED DATA

Provide, operate, and maintain all hardware and software to meet these specifications. Also be responsible for the replacement, repair, and calibration of the sensors and other necessary data acquisition equipment needed to supply the required data.

The procedure to complete a repair shall be documented and completed as soon as practical. If repair is not possible within two business days of any sensor failure, a plan and timeline to complete the repair shall be submitted. Upon completion of a repair, replacement, installation, modification, or calibration, the Contractor shall notify the Engineer. The Engineer may request recalibration of the sensors or other hardware components at any time during the Contract as deemed necessary.

Keep a log of sensor repair, replacement, installation, modification, and calibration in the dredge's onboard copy of the DPIP. The log shall contain a three-year history of sensor maintenance, including the time of the sensor failures (and subsequent repairs), the time and results of sensor calibrations, the time of sensor replacements, and the time that backup sensor systems were initiated to provide the required data. It shall also contain the name of the person responsible for the sensor work.

Sensors installed shall be capable of collecting parameters within the specified accuracies and resolutions indicated in the following subparagraphs and transmit these parameters to the DQM database. All data shall be transmitted in JSON message bundles. Each bundle can contain multiple message types. Sensor data shall be transmitted as work event messages, and data which relates to the operational state of the dredge or its sensors shall be transmitted as state event messages. (See Paragraph titled "Parameter Transmission to the Web Service.")

A. Message Bundle Data: Every message bundle shall contain descriptive data that relates the message to a given dredge plant and date/time. The start of a message bundle shall be identified by the tag “DQM_data”.

1. Messages: Messages contain operational data that populates the DQM database for a dredge plant. A message shall consist of an event type and its associated data (as defined in Paragraph titled “Dredge Events”), a date/time stamp indicating when the event occurred or started, and a comment providing clarification or metadata about the situation. There are multiple event types, but they all fall into one of two categories - work events and state events.
a. Message Time: In a work event message, message time is the date and time that the data is collected from the sensors; in a state event message, message time is the date and time that the state event begins. The message time shall be reported to the nearest second and referenced to Coordinated Universal Time (UTC) time based on a 24-hour format (YYYY-MM-DD HH:MM:SS). In order to ensure accuracy and reliability, the time stamp shall be synchronized to UTC format from an accurate, unchangeable source (for example, a GPS National Marine Electronics Association (NMEA) datastring). Message time shall be identified by the tag "msg_time".

b. Comment: Comments concerning the work event or state event messages being transmitted provide descriptive information that relates to the data. An example of a comment for work event data is information about a sensor issue; an example of a comment for state event data is a description of operations. A comment shall be identified by the introductory tag "comment", and the comment shall consist of no more than 250 characters.

2. Dredge Events – Work Event: There are two types of dredge event messages - work event messages and state event messages. Work event messages contain data that are instantaneously collected or calculated from sensors and are logged as a series of events. Work events are triggered by a time interval change (as described in Paragraph titled "Work Event Messages"). All work event messages shall be initiated by the header tag "work_event".

a. Vertical Correction: The variation of the water level from the vertical datum for the river stage or tidal gage described in the state events shall be obtained using appropriate equipment to give the water level with an accuracy of plus/minus 0.1 ft. Vertical correction values above project datum described in the dredging specification shall be entered with a positive sign and those below with a negative sign. The tag for vertical correction shall be "vert_correction".

b. Cutter/Suction Head Location and Movement: The X, Y, and Z components of the cutter/suction head location shall be monitored. Additional calculations made from the observed values determine the rates of movement to track the progress of the dredge.

b.1. Cutter/Suction Head Horizontal Position: The forwardmost point of the cutter/suction head shall be obtained using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values reported as negative. Position values shall be identified by the tags "ch_latitude" and "ch_longitude".

b.2. Cutter/Suction Invert Depth: Cutter/suction invert depth is the depth of the invert of the suction mouth relative to the surface of the water. Instrumentation shall be capable of reporting to an accuracy of plus/minus 0.5 foot and a resolution to the nearest 0.1 foot with no tidal adjustments. Minimum accuracies are conditional to relatively calm water. The tag "ch_depth" shall be used to identify the cutter/suction head depth.

b.3. Cutter/Suction Head Heading: The cutter/suction head heading is the angle of the centerline of the cutter/suction head and dredge ladder measured relative to true north. All headings shall be provided using industry-standard equipment. The heading shall be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. The tag "ch_heading" shall be used to identify the cutter/suction head heading.
c. Dredge Activity: Dredge activity shall be monitored using a combination of the following parameters.

c.1. Slurry Velocity: A flow-metering device, calibrated according to the manufacturer’s specifications, shall be used to record the slurry velocity to the nearest 0.01 fps with an accuracy of plus 0.1 fps. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. The slurry velocity shall be measured for the same pipeline inside diameter as that used for the slurry density measurement. The tag "slurry_velocity" shall be associated with this value.

c.2. Slurry Density: A density-metering device, calibrated according to the manufacturer’s specifications, shall be used to record the slurry density to the nearest 0.01 g/cc. It is understood that the accuracy of this sensor can vary based on several factors, including the type of material, the magnitude of the cut, and the length of time since calibration. If the manufacturer does not specify a frequency of recalibration, calibration shall be conducted prior to the commencement of work. Continuous monitoring of this sensor ensures that drift and other factors inherent in the dredging process can be accounted for in monitoring dredge activity. The tag "slurry_density" shall be associated with this value.

c.3. Pump RPM: The pump rpm is the number of revolutions per minute measured for the slurry pump shaft. The shaft revolution rate (rev/min) shall be measured with the highest level of accuracy that is standard on the vessel’s operational displays either at the bridge or in the engine room. This value shall be identified by the tag "rpm".

c.4. Pump Vacuum: The vacuum pressure of the dredge pump(s) (inches of mercury) shall be measured as near to the eye as practicable in the pump's suction pipe with the highest level of accuracy that is standard on the vessel's operational displays either at the leverman's controls or in the engine room. Vacuum pressure shall be identified by the tag “vacuum”.

c.5. Pump Outlet Pressure: The pump outlet pressure shall be measured in the discharge line on the pump side of the flap valve in terms of pounds per square inch (psi) on a gauge. Pump outlet pressure shall be identified by the tag "outlet_psi".

d. Outfall Information (Open Water/Spill Barge Disposal): The X and Y position of the terminal end of the outfall pipe shall be monitored continuously and the position reported as part of the work event string.

d.1. Discharge Horizontal Position: The horizontal position of the outfall end of the discharge pipe shall be obtained using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/ Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Position values shall be identified by the tags "outfall_latitude" and "outfall_longitude".

3. **Dredge Events - State Event**: There are two types of dredge event messages - work event messages and state event messages. State event messages provide information about the current state of the dredge equipment or operations. They are created and sent only when a state changes. Since state events often cannot be collected in real time, state events are tagged with a date time stamp (referenced to Coordinated Universal Time).
Time (UTC)) that indicates when the state change happened relative to the work event message tag. This data is considered to be "true" until another state event tag is received. Each type of state event message shall be indicated by a specific header tag as enumerated in the following subparagraphs. State events can be transmitted along with work event message bundles directly by the Contractor using the indicated format, or they can be entered on the "State" tab in the DQM-provided software.

a. Message Time: The state event time is the date and time that the event starts. The leverman's time shall be entered to the nearest second as local time and automatically converted to and reported in UTC based on a 24-hour format (YYYY-MM-DD HH:MM:SS). Message time shall be identified by the tag "msg_time".

b. Contract Event: Information concerning the Contract under which dredging is being performed shall be reported at the start and completion of each Contract using the header tag "contract_event".

b.1. Contract Number: The Port Houston-assigned Contract number for the project shall be reported using the tag "contract_number".

b.2. Contract Start and End: The start and end of a Contract shall be reported using the tag "event_type" with the appropriate value of "start" or "end".

c. Tide Station/River Stage Gage Event Properties associated with the vertical correction (see Paragraph titled "Vertical Correction") for the tide station/river stage gage shall be grouped together under the header tag "station_event". This information shall be sent at the start of the Contract and each time the dredge has moved enough to change the station being used.

c.1. Station Name: The station name is a concise name defining the tide station/river stage gage begin referred to. It shall be introduced by the tag "station_name", and it shall consist of a descriptor of no more than 25 characters.

d. Length of Pipe Event: The leverman’s estimate of the length of pipe downflow from the dredge pump, measured to the nearest whole foot, shall be reported under the header tag "pipe_length_event". This information shall be sent at the start of the Contract and at the completion of each 24-hour period ending at midnight local time.

d.1. Floating Pipe: The total length of floating pipe shall be reported with the tag "length_floating".

d.2. Submerged Pipe: The total length of floating pipe shall be reported with the tag "length_submerged".

d.3. Shore Pipe: The total length of shore pipe shall be reported with the tag "length_land".

d.4. Booster Pump Event: Information concerning the booster pumps being used shall be included under the header tag "booster_pump_event". A message shall be sent to indicate any change in the status of the booster pumps being used.

e. Dredge Advance: The dredge advance, the total forward progress of the dredge relative to the centerline of the cut, shall be measured to the nearest whole foot and cumulatively calculated over a 24-hour period from midnight to midnight local time. It shall be identified by the tag "advance_daily". The msg_time associated with this tag shall be reported as the first timestamp of the following 24-hour period (based on the
local time) rather than as midnight of the day for which the value was calculated, and it shall be reported in Greenwich Mean Time (GMT).

f. Outfall Information: The X and Y position of the terminal end of the outfall pipe shall be monitored and sent at the start of the Contract and thereafter according to the following table. Discharge Heading and Pipe Elevation may be omitted if the dredge is not discharging into an upland disposal site. For beach nourishment, the horizontal X and Y position of the outfall shall be sent at the start of the Contract and at the completion of each 24-hour period ending at midnight local time.

<table>
<thead>
<tr>
<th>Discharge Location</th>
<th>Horizontal Position</th>
<th>Discharge Pipe Elevation</th>
<th>Discharge Outfall Heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>Continuous Work Event</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Scow</td>
<td>Upon Change</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Beach</td>
<td>Every 24 Hours</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Upland</td>
<td>Upon Change</td>
<td>Upon Change</td>
<td>Upon Change</td>
</tr>
</tbody>
</table>

f.1. Discharge Location: Information on where the slurry is being discharged shall be reported with the tag "outfall_location". Acceptable values include "upland", "open water", "beach", and "scow".

f.2. Discharge Horizontal Position: The horizontal position of the outfall end of the discharge pipe shall be obtained using a positioning system operating with a minimum accuracy level of 3-10 feet horizontal Circular Error Probable (CEP). It shall be reported as Latitude/Longitude WGS 84 in decimal degrees with West Longitude and South Latitude values being reported as negative. Position values shall be identified by the tags "outfall_latitude" and "outfall_longitude".

f.3. Discharge Outfall Heading: The discharge outfall heading is the angle relative to true north measured from the centerline of the pipe in the direction of discharge. All headings shall be provided using industry-standard equipment. They shall be accurate to within 5 degrees and reported to the nearest whole degree with values from 000 (true north) to 359 degrees referenced to a clockwise positive direction convention. The discharge heading shall be identified by the tag "outfall_heading".

f.4. Discharge Outfall Heading: The discharge pipe elevation is the height of the outfall measured in feet and tenths of a foot relative to the project datum. The required accuracy is contingent upon Contract requirements. The tag "outfall_elevation" shall be used to identify this elevation.

g. Non-effective Work Event: Delays and dredge downtime shall be reported at the conclusion of the event. The reason for the non-effective work time shall be submitted under the header tag "non_eff_event" within 24 hours of the event.

g.1. Non-effective Work Interval: The start and end times for the non-effective work event shall be reported using the tags "msg_start_time" and "msg_end_time".

g.2. Dredge Function Code: The dredge operator indication of production delays, as listed on Form 4267, shall be transmitted at the end of the non-effective interval. Dredge function event messages shall be identified by the tag "function_code" and shall consist of one of the following standardized entries to indicate the operation:

   AGV     Assisting Grounded Vessels
   CCH     Change Cutterhead
g.3. Additional Comments: The "comment" tag shall be used to provide additional explanation for the noted delays or downtimes. For example, when the code "LDPV" (Loss Due to Passing Vessel) is indicated, the name of the vessel and the number of tows shall be listed with the "comment" tag.

3.2 NATIONAL DREDGING QUALITY MANAGEMENT PROGRAM SYSTEM REQUIREMENTS

The Contractor’s DQM system shall be capable of collecting and transmitting information to the DQM onboard computer. The applicable parameters from Paragraph titled "Requirements for Reported Data," shall be recorded as events locally and continuously transmitted to the DQM database anytime an Internet connection is available. The dredge shall be equipped with a DQM computer system consisting of a computer, monitor, keyboard, mouse, data modem, Universal Power Supply (UPS), and network hub. The computer system shall be a standalone system, exclusive to the DQM monitoring system, and shall have USACE DQM software installed on it. If a hardware problem occurs, or if a part of the system is physically damaged, then the Contractor shall be responsible for repairing it within two business days of the determination of the condition or submitting a plan and timeline for repair if the repair will take more than two business days.

A. Computer Requirements: Provide a dedicated onboard computer for use by the Dredging Quality Management system. This computer shall run the USACE DQM software and receive data from the Contractor’s data-reporting interface. This computer must meet or exceed the following performance specifications:

- **CPU**: Intel or AMD processor with a (non-overclocked) clock speed of at least 1.8 gigahertz (GHz)
- **Hard Drive**: 250 gigabytes (GB); internal
RAM | 4 gigabytes (GB)
---|---
Ethernet Adapter Connector | 10 or 100 megabit (Mbit) internal network card with an RJ 45
Video Adapter | Must support a resolution of 1024x768 at 16-bit color depth
Keyboard | Standard 101-key keyboard
Mouse | Standard 2-button mouse
Monitor | Must support a resolution of 1024x768 at 16-bit color depth
Ports | 2 free serial ports with standard 9-pin connectors; 1 free USB port
Other Hardware | Category 5 (Cat-5) cable with standard RJ-45 plugs connecting the network adapter to the network hub; one spare cable

Install a fully licensed copy of Windows 7 Professional Operating System on the computer specified above. Also install any necessary manufacturer-provided drivers for the installed hardware.

This computer shall be located and oriented to allow data entry and data viewing as well as to provide access to data ports for connection of external hardware.

B. Software: The DQM computer's primary function is to transmit data to the DQM shoreside database. No other software which conflicts with this function shall be installed on it. The DQM computer shall also have the USACE-provided Dredging Quality Management Onboard Software (DQMOBS) installed on it by DQM personnel.

C. UPS: Supply an Uninterruptible Power Supply (UPS) for the computer and networking equipment. It shall interface with the DQM computer to communicate UPS status, and it shall provide backup power at 1 kVA for a minimum of 10 minutes. Ensure that sufficient power outlets are available to run all specified equipment.

D. Internet Access: Maintain an Internet connection capable of transmitting real-time data to the DQM server as well as enough additional bandwidth to clear historically queued data when a connection is re-established. The telemetry system shall always be available and have connectivity in the Contract area. If connectivity is lost, unsent data shall be queued and transmitted upon restoration of connectivity. The Contractor shall acquire and install all necessary hardware and software to make the Internet connection available for data transmission to the DQM web service. The hardware and software shall be configured to allow the DQM Support Center remote access to this computer, and the telemetry system shall be capable of meeting these minimum reporting requirements in all operating conditions.

In areas with poor cellular service and at the local District's discretion, it may be required to manually download the data on a daily basis using the protocol for retrieving and submitting backup files provided by the DQM Support Center. This method of data transmission should
be used only if Internet connectivity is unavailable at the dredging site, and it should be considered a temporary measure.

E. Data Routing Requirements: Onboard sensors continually monitor dredge conditions, operations, and efficiency and route this information to the shipboard dredge-specific system (DSS) computer to assist in guiding dredge operations. Portions of this Contractor-collected information, as described in this specification, shall be routed to the DQM computer on a real-time basis. Standard sensor data shall be sent to the DQM computer via an RS-232 serial interface with a baud rate of 9600 or 19200bps. The serial interface shall be configured as 8 bits, no parity, and no flow control.

Information regarding changes in the state of the dredge shall be digitally logged and transmitted as close to the time of the occurrence as possible. These events can either be included in a separate message bundle going to the DQM onboard computer, or they can be entered on the "State" tab in the DQM Pipeline Software.

3.3 DREDGE MONITORING DATA

A. General: Onboard sensors continuously collect dredging data in support of the dredge Contractor's operations. Portions of this Contractor-collected information, as described in this specification, and calculations based on them shall be stored and transmitted to the DQM database on a near real-time basis. Additionally, information regarding the state of the dredge shall be digitally logged and transmitted.

B. Data Measurement Frequency: The frequency of data transmission is dependent on the type of message being sent. Work Event messages contain data that are instantaneously collected or calculated from sensors and are logged as a series of events. State event messages are activated by a change in the dredge state.

1. Work Event Messages: Data shall be logged as a series of events. Each event shall consist of a dataset containing dredge information (as defined in Paragraph titled "Requirements for Reported Data"). Each set of measurements (for example, time and position) shall be considered an event, and there shall be a 6-12 second interval between work events. This interval shall remain consistent across event types for the dredge plant. A standard data string shall be recorded within one second of an event trigger with the time stamp and all parameters reflecting when the event happened.

2. State Event Messages: A set of descriptive information (event name, time, description, comment) shall be considered a state event. These events shall be recorded within 24 hours of a change in state with the time stamp reflecting when the event happened.

C. Parameter Transmission to the Web Service: The data shall be formatted as JSON (JavaScript Object Notation, as defined at http://www.json.org) strings of arbitrary length. These JSON strings represent a hierarchical data structure consisting of a message bundle which may contain 0-3 automatic data messages and any number of manual data messages. A tag/parameter is reported only when it contains a value. No "Null" value strings shall be included in a message bundle.

****************************
Message bundle
****************************
{

"DQM_Data": { "messages":
{
"work_event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"vert_correction": <floating point 100th decimal place>,
"ch_latitude": <decimal to 6 decimal places>,
"ch_longitude": <decimal to 6 decimal places>,
"ch_depth": <floating point 100th decimal place>,
"ch_heading": <integer value 000-359>,
"slurry_velocity": <floating point 100th decimal place>,
"slurry_density": <floating point 100th decimal place>,
"pump_rpm": <integer>,
"vacuum": <floating point 100th decimal place>,
"outlet_psi": <floating point 100th decimal place>,
"comment": <string>},
},
"contract_event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"contract_number": <string>,
"event_type": <string - "start" or "end">,
"comment": <string>
},
"station_event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"station_name": <string>,
"comment": <string>
},
"pipe_length_event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"length_floating": <integer>,
"length_submerged": <integer>,
"length_land": <integer>,
"comment": <string>
},
"booster_pump_event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"booster_total": <integer>,
"comment": <string>
},
"advance_Event": {
"msg_time": <24-hour UTC time YYYY-MM-DD HH:MM:SS>,
"advance_daily": <integer>,
"comment": <string>
} }
D. Contractor Data Backup: Maintain an archive of all data sent to the DQM computer during the dredging Contract. The COR may require, at no increase in the Contract price, that the Contractor provide a copy of these data covering specified time periods. The data shall be provided in the same JSON format as would have been transmitted to the DQM computer. There shall be no line breaks between the parameters, and each record string shall be on separate line. The naming convention for the files shall be <dredgename>_<StartYYYYMMddhhmmss>_<EndYYYYMMddhhmmss>.txt. Data submission shall be via a storage medium acceptable to the COR. At the end of the dredging Contract, the Contractor shall call the National DQM Support Center prior to discarding the data to ensure that it has been appropriately archived. Record the following information in a separate section at the end of the dredge's onboard copy of the DPIP:

- Person who called the National DQM Support Center
- Date of the call
- DQM representative who gave permission to discard the data

On the same day that the call is made, but prior to discarding the data, the Contractor shall submit a "Data Appropriately Archived" e-mail to the local USACE District's COR with the above information and cc: the DQM Support Center representative who granted the permission. In addition to the above information, the following shall also be included in the e-mail:

- Project name and Contract number
- Dredge start and end dates
- Name of the dredge

3.4 PERFORMANCE REQUIREMENTS

The Contractor's National Dredging Quality Management Program's data transmission shall be fully operational at the start of dredging operations. To meet Contract requirements for operability, the Contractor's system shall provide an accurate data string return and be compliant with hardware requirements. Data string return is defined as the number of quality records within an event or state tag sent by the Contractor's system to the DQM database. Quality data strings
are considered to be those providing accurate values for all parameters reported when operating according to the specification. Repairs necessary to restore data return compliance shall be made within two business days, or a plan and timeline for repair shall be submitted if the repair will take more than two business days. Failure by the Contractor to report quality data within the specified time window for dredge measurements as stated in the specifications (see Paragraphs titled "Internet Access", "Data Measurement Frequency" and "Parameter Transmission to the Web Service"), may result in withholding of up to 10 Percent of item payment.

3.5 QUALITY ASSURANCE CHECKS

Quality assurance (QA) checks are a part of the DQM dredge certification procedure. They are required prior to the commencement of dredging and, at the discretion of the COR, periodically throughout the duration of the Contract. The SOP and criteria for QA checks are presented on the DQM website at https://dqm.usace.army.mil.

3.6 CONTRACTOR QUALITY CONTROL:

The dredging Contractor shall designate a Quality Control Systems Manager (QCSM), who shall develop and maintain daily procedures to ensure quality control (QC) of the dredge Contractor's DQM system. These methods shall include the procedure by which data being collected is checked against known values, and verification that the telemetry is functioning. These procedures shall be outlined in the DPIP and submitted prior to the Notice to Proceed. In the event a Contractor Quality Control (CQC) Report is required, daily annotations shall be made in the Daily CQC Report, documenting all actions taken on each day of work, including all deficiencies found and the corrective actions taken.

3.7 LIST OF ITEMS PROVIDED BY THE CONTRACTOR

- DPIP Paragraph 1.6.
- DQM System Paragraph 3.2
- Dredge Data Paragraph 3.3

END OF SECTION
PORT OF HOUSTON AUTHORITY

TECHNICAL SPECIFICATIONS FOR

HSC ECIP – SEGMENT 3 DREDGING

SECTION 35 20 30.00 45 Add – DROP-OUTLET STRUCTURE

PART 1  GENERAL

1.1  SECTION INCLUDES

The work covered in this Section consists of furnishing plant, labor, materials, equipment and performing the work in connection with constructing a new Drop-outlet Structures. All structure member materials used for the new drop-outlet structure fabrication shall be new unless specifically noted on the drawings. The term "Drop-outlet Structure" includes, but is not limited to, support stanchions, support bracing, columns, beams, concrete footings, walkways, grating, catwalks, handrails, discharge pipes, piles, and other miscellaneous items as shown on the Drawings.

1.2  RELATED SECTIONS

SECTION 01 22 10.00 Std – Measurement of Quantities
SECTION 03 21 00.00 Std – Reinforcing Steel
SECTION 03 31 00.00 Std – Structural Concrete
SECTION 05 12 00 00 Mod – Structural Steel Framing
SECTION 09 96 56.01 Std – Epoxy Coatings – Coal Tar
SECTION 31 62 16.16 Std – Steel H Piles
SECTION 31 23 33.00 Std – Trenching and Backfilling
SECTION 31 41 33.00 Std – Trench Safety System

1.3  REFERENCES

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AMERICAN WELDING SOCIETY (AWS)
AWS D1.1/D1.1M (2015; Errata 1 2015; Errata 2 2016) Structural Welding Code - Steel

AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)
AWPA C2 (2003) Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes

AWPA M4 (2015) Standard for the Care of Preservative-Treated Wood Products

ASTM INTERNATIONAL (ASTM)


ASTM A500/A500M (2018) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes


NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)


SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC AB 1 (2015; E 2017) Mineral and Slag Abrasives


SSPC Paint 16 (2006; R 2015; E 2015) Coal Tar Epoxy-Polyamide Black (or Dark Red) Paint


SSPC PS 11.01 (1982; E 2004) Black (or Dark Red) Coal Tar Epoxy Polyamide Painting System

U.S. ARMY CORPS OF ENGINEERS (USACE)


U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40CFR 261 Identification and Listing of Hazardous Waste

40CFR 262.22 Number of Copies

40CFR 263 Standards Applicable to Transporters of Hazardous Waste

49CFR 171 General Information, Regulations, and Definitions

1.4 SUBMITTALS
A. Shop Drawings for: Structure, Steel Railings and Handrails, Grating, Protective Coatings, and Coating.

B. Product Data for: Structural Steel, Steel Railings and Handrails, Galvanizing, Grating, Coal Tar Epoxy-Polyamide, Aliphatic Polyurethane Abrasive, Blasting Material Inorganic Zinc.

   1. Submit certificates of compliance for Aliphatic Polyurethane from suppliers which demonstrate compliance with the applicable specifications for lumber treatment and galvanizing.
   2. The producer of the treated wood products is to provide certification at WWPI 08, Best Management Practices (BMP) for the use of Treated Wood in Aquatic Environments were utilized, including a written description and appropriate documentation of the BMP used.

D. Manufacturer’s Instructions, Submit manufacturer’s instructions for Protective Coatings including details of thinning, mixing, handling, and application.

E. Refer to submittal requirements of the RELATED SECTIONS mentioned above.

F. Closeout Submittals for: Inspection Reports Pile, Driving Records Inspection, and Forms.

1.5 PROTECTION

A. Safety: The Contractor is to be responsible for instructing its employees in appropriate safety practices. The Contractor and its personnel is to adhere to the applicable safety requirements as outlined in the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1.

B. Working on the Drop-Outlet Structure: Provide the following items when workers are working on the drop-outlet structure:
   1. Life jackets when water is present.
   2. A method of communication other than cellular phones.
   3. At least two individuals are required to be present when working on the structure.

1.6 ENVIRONMENTAL PROTECTION

In addition to the requirements of the Section 01 16 60 Environmental Protection Measures, comply with the following environmental protection criteria:

A. Waste Classification, Handling, and Disposal: Contractor shall be responsible for the proper disposal of hazardous and non-hazardous waste generated during this project. Waste generated from abrasive blasting lead-containing paints with recyclable steel or iron abrasives are to be disposed as a hazardous waste or be stabilized with propriety pre-blast additives regardless of the results of 40 CFR 261, App 11, MTD 1311. Where stabilization is preferred, employ a propriety blast additive that has been blended with the blast media prior to use. Hazardous waste is to be placed in properly labeled closed containers and be shielded adequately to prevent dispersion of the waste by wind or water. Evidence of improper storage will be cause for immediate shutdown of the project until corrective action is taken. Non-hazardous waste is to be stored in closed containers separate from hazardous waste storage areas. Hazardous waste is to be transported by a licensed transporter in accordance with 40 CFR 263 and 49 CFR 171, Subchapter C. Non-hazardous waste shall be transported in accordance with local regulations regarding waste transportation. In addition to the number of manifest copies required by 40 CFR 262.22, one copy of each manifest is to be supplied to the Owner prior to transportation.
B. **Containment:** Contain debris generated during paint removal operations in accordance with the requirements of SSPC Guide 6, Class 3A. Where required, the containment air pressure is to be verified visually. Where required the minimum air movement velocity is to be 100 fpm for cross draft ventilation or 60 fpm for downdraft ventilation.

1.7 **DELIVERY, HANDLING, AND STORAGE**

Materials are to be delivered in their original, unopened containers bearing the manufacturer’s name, shelf-life, product identification, and batch number.

Coatings, thinners, and cleaners are to be stored in tightly closed containers in a covered, well-ventilated area where they will be protected from exposure to extreme cold or heat, sparks, flame, direct sunlight, or rainfall. Manufacturer’s instructions for storage limitations are to be followed.

**PART 2 PRODUCTS**

2.1 **MATERIALS**

A. **Concrete:** Concrete shall conform to the requirements in the Section 03 31 00.00 Std, “Structural Concrete.” Concrete shall be Class E in accordance with Section 03 31 00.00 Std, “Structural Concrete.”

B. **Structural Steel:** Structural Steel shall conform to the requirements of Section 05 12 00 00 Mod, “Structural Steel Framing.”

C. **H-Piles:** Steel H-Piles shall conform to the requirements of Section 31 62 16.16 Std, “Steel H Piles.”

D. **Grating:** Grating shall be galvanized welded steel grating and consist 1 1/4- inch by 3/16-inch rectangular bearing bars spaced at 1 3/16-inch centers and cross bars welded at 4-inch centers. End banding bars of 1 1/4-inch by 3/16-inch are to be welded to the ends of every bearing bar. The top surface of the bearing bars shall be serrated for slip resistance. The grating shall be secured to the supporting members with two galvanized saddle clips at every support. The grating material is to meet the requirements of ASTM A1011/A1011M and ASTM A510 and be galvanized in accordance with ASTM A123/A123M.

E. **Drainage Pipe:** Drainage Pipe is to meet the requirements of the Section 33 40 01.10 45 Add, “Effluent Pipe.”

F. **Steel Railings and Handrails:** Design handrails system to resist a single concentrated load of 200 pounds applied in any direction at any point on the handrail or top rail to produce the maximum load effect on the element being considered and to transfer this load through the supports to the structure. Handrail system shall also be designed to resist a load of 50 pounds per foot applied in any direction along the handrail or top rail and to transfer this load through the supports to the structure. NAAMM AMP 521, provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts.

Provide steel handrails, including inserts in concrete, steel pipe conforming to ASTM A53/A53M or structural tubing conforming to ASTM A500/A500M, Grade A or B of equivalent strength. Provide steel railings of 2 inches nominal size. Railings to be hot-dip galvanized.

Fabrication: Joint posts, rail, and corners by one of the following methods:

1. Flush-type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8-inch hexagonal-recessed-head setscrews.

2. Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 6 inches long.

3. Railings may be bent at corners in lieu of jointing, provided bends are made in
suitable jigs and the pipe is not crushed.

G. Lumber: Lumber shall be southern yellow pine rough No. 1, dense, minimum allowable bending stress of 1,350 psi. Cuts in lumber or abraded surfaces of new work are to receive a field treatment in accordance with AWPA M4.

1. Treated Lumber: Treated lumber shall be furnished and installed by the Contractor on the sides of the structures from the top of the concrete slab or headwall to 2 feet below the lower deck of the structure. Lumber thickness and length shall be as shown. Lumber is to be 4-inch nominal width. Lumber to be furnished shall be straight, even sawed, sound, and entirely free from defects which can impair its durability or its usefulness for the purpose intended. Lumber shall bear the official Grade mark of the association under whose rules it is purchased or, in lieu thereof, each shipment shall be accompanied by a certificate of inspection issued by the inspection association. Lumber shall have a Chromated Copper Arsenate (CCA) preservative treatment and be accompanied by a certificate with Best Management Practices from a recognized treatment company certifying the amount of treatment.

2. Preservative Treatment: Preservative Treatment by pressure processes shall be in accordance with AWPA C2. Lumber shall receive a treatment of 2.5 pcf of CCA solution.

H. Scour Protection at Pipe Outfall: Stone for scour protection at pipe outfall shall meet the requirements of Section 35 31 19 Revetment.

2.2 FABRICATION

A. Structural Steel: Structural Steel is to be fabricated in accordance with Section 05 12 00 00 Mod, “Structural Steel Framing.”

2.3 PROTECTIVE COATINGS

A. Galvanizing: Galvanizing of steel handrails, grating, pipe sleeve, and headwall steel plate are to conform to the requirements of ASTM A123/A123M. Galvanizing coating thickness grade is to be “G85” or 2 ounces of hot-dip zinc coating per square foot of surface area in accordance with ASTM A123/A123M. Galvanized areas damaged, abraded, or where galvanized material has been broken by field welding, cutting, drilling, handling, storage, or by other methods are to be coated with two coats of Galvaweld or other field coating materials as approved.

B. Coating: Structural steel, except steel handrails, is to be painted in accordance with Section 09 96 56.01 Std, “Epoxy Coatings – Coal Tar.” Structural steel is to be entirely painted from concrete foundation to the top of the drop-outlet structure.

2.4 ABRASIVE BLASTING MATERIAL

Abrasive blasting materials are to be per SSPC Painting Manual, Chapter 2.4, and SSPC AB 1.

PART 3 EXECUTION

3.1 INLET HEADWALLS

Inlet headwalls are to be constructed of 1/2-inch thick steel plate as shown on drawings.

3.2 ERECTION OF STRUCTURAL STEEL

Erection of structural steel is to be in accordance with Section 05 12 00 00 Mod, “Structural Steel
3.3 PILES

Sizes and locations of the steel piles shall be as shown on the drawings. Refer to SECTION 31 62 16.16 Std – STEEL H PILES for installation requirements.

A. Placement Of Piles: Piles shall be driven as accurately as practicable in the correct locations true to line laterally, longitudinally and vertically. Pile tips shall be driven to the minimum tip elevation shown on drawings. The final locations of piles shall be placed so that the framing members may be erected without excessive straining, crimping or bending of the member or piles. Piles may be one piece or they may be cut and spliced with full penetration welds.

Piles shall terminate near the mid-depth of the slab and be field cut and welded to the original pile as directed. The concrete slab shall be extended parallel and perpendicular to the main slab, sufficiently to encase the pile with a minimum of 1-foot of concrete at any point through the slab.

3.4 COATING

Protective coating shall be applied in accordance with Section 09 96 56.01 Std, “Epoxy Coatings – Coal Tar.”

3.5 FIELD WELDING

Field welding shall be in accordance with Section 05 12 00 00 Mod, “Structural Steel Framing.”

3.6 COATING INSPECTION

On-site work as described herein is to be inspected for compliance with this specification by Contractors testing agency.

For all protective coatings applied on-site and off-site locations, the Contractor is to be responsible coating inspection. Inspector is to be present at the pre-work conference to address necessary clarification of inspection and specification requirements. Apparent deviation from the specified requirements or any out of tolerance condition is to be immediately reported to the Owner for determination of corrective action. Submit Inspection Reports performed by the Coating Inspector. Dry film thickness measurements of each coat is to be included in the Inspection reports.

Inspection Forms are to be submitted at the pre-work conference which are to be used by the Coating Inspector and forwarded to the Owner prior to delivery of the coated work to the job site.

3.7 CONTRACTOR QUALITY CONTROL

A. Compliance Inspection: Inspect for compliance with Contract requirements and record the inspection of the operations including but not limited to the following:

1. Materials. Certificates are to be submitted to show conformance with applicable specification requirements.

2. Lumber Installation. Boards are to meet minimum height. Length and width are to meet the specification requirements.

3. Galvanized Welds of Reinstalled Walkway and Treatment are to conform to specification requirements.

B. Records: A copy of the records of inspections and corrective actions taken are to be included in the daily quality control reports.

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 35 31 19 Add – REVETMENT

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

The work includes furnishing materials, labor, and equipment for construction of graded riprap (GRR) structures in accordance with these specifications and applicable drawings.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 31 05 19.13 Add – Geotextiles for Earthwork
Section 35 41 00 Add – Berm Construction

1.3 REFERENCES

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.

A. American Society for Testing and Materials (ASTM) Publications

C 535 Standard Test Method for Resistance to Degradation of Large-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine

D 75 Standard Practice for Sampling Aggregates

D 3740 Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D 5519 Standard Test Method for Particle Size Analysis of Natural and Man-Made Riprap Materials

D 6092 Standard Practice for Specifying Standard Sizes of Stone for Erosion Control

D 6473 Standard Test Method for Specific Gravity and Absorption of Rock for Erosion Control

E 329 Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.4 SUBMITTALS

Submittals under this section include the following:

1. Name, Location, and Historical Quality Reports from Quarry (Paragraph 1.6, B)

2. Qualifications/Certifications for Sampling/Testing Agency (Paragraph 1.6, B)

3. GRR Quality and Test Report Schedule and GRR Delivery Schedule (Paragraph 1.6, B)

4. GRR Quality Test Reports (Paragraph 1.6, B)
5. GRR Gradation Test Reports (Paragraph 1.6, B)

6. GRR Gradation Test Methodology Description (Paragraph 1.6, B)

7. Daily Activities Reports (Paragraph 1.6, C)

8. Initial Survey (Section 35 00 01 “Construction Surveying”)

9. Final Survey (Section 35 00 01 “Construction Surveying”)

1.5 STORAGE OF CONSTRUCTION MATERIALS

Construction materials unloaded from the barges, trucks, or railroad cars that cannot be immediately used for construction shall be stored in approved storage areas. Storage areas shall be located reasonably near the job site and approved by PHA. The storage areas shall be prepared by Contractor and made relatively smooth in order that all of the stored material may later be recovered free from dirt or other foreign materials.

1.6 QUALITY CONTROL / QUALITY ASSURANCE

A. Environmental Protection Requirements: Refer to Section 01 16 60, “Environmental Protection Measures.”

B. Materials Testing:

1. Contractor/Quarry shall provide all equipment and facilities for testing construction materials.

2. Acceptable GRR shall meet the quality acceptance criteria in paragraph 2.01, A, when tested in accordance with the procedures listed below:

   a. Sampling of the GRR shall be performed in accordance with ASTM D 75.
   b. The absorption of GRR shall be determined in accordance with ASTM D 6473.
   c. The unit weight of GRR shall be provided based on the apparent specific gravity determined in accordance with ASTM D 6473.
   d. The loss by abrasion of GRR shall be determined in accordance with ASTM C 535, processed and tested for No. 1 grading.
   e. The gradation of the GRR shall be determined in accordance with ASTM D 5519, Test Method C.

3. Throughout the duration of the work, Contractor/Quarry shall inspect, sample, and test construction materials for compliance with the specified requirements and record the inspection of all operations. All sampling and testing shall be performed by a qualified testing laboratory meeting the requirements of ASTM D 3740 and ASTM E 329, or a commercial testing facility qualified by U.S. Army Corps of Engineers (USACE) Materials Testing Center (MTC). A copy of the records of inspection, as well as the records of corrective action taken, shall be provided to Engineer. As a minimum, Contractor/Quarry shall perform quality control inspection and testing in accordance with the following requirements and Table 1, or approved alternative submittal schedule (see GRR Submittal No. 3).

   a. Gradation: Sample sizes shall consist of at least 50 stones per test and weigh at least 10 tons per test. Refer to paragraph 2.01 for gradation requirements.
   b. Quality: Refer to paragraph 2.01 for quality requirements.
   c. Placement: Continuous inspection of placement to ensure proper thickness and that material is not segregated. Refer to paragraph 3.03 for placement requirements.

4. Prior to performing quality or gradation testing of stone, Contractor shall provide at least 3 days advance notice, in writing, so that Engineer may have the opportunity to attend and
observe the testing. Contractor shall conduct gradation tests at the quarry, not at the project site.

5. Table 1 provides required submittals associated with GRR quality. Detailed descriptions of submittals are below.

<table>
<thead>
<tr>
<th>GRR Submittal Number</th>
<th>Submittal Description</th>
<th>Required Submission Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Name, Location, and Historical Quality Reports from Quarry</td>
<td>With Contractor’s Proposal Form.</td>
</tr>
<tr>
<td>2</td>
<td>Testing Laboratory Qualifications</td>
<td>With Contractor’s Proposal Form.</td>
</tr>
<tr>
<td>3</td>
<td>GRR Delivery, Staging, and Testing Schedule</td>
<td>Prior to transport or delivery of any GRR from quarry.</td>
</tr>
<tr>
<td>4</td>
<td>GRR Quality and Gradation Test Report 1</td>
<td>With or after GRR delivery, staging, and testing schedule but prior to transport or delivery of any GRR from quarry.</td>
</tr>
<tr>
<td>5</td>
<td>GRR Quality and Gradation Test Report 2</td>
<td>Prior to shipment of final ½ of total GRR quantity from quarry.</td>
</tr>
</tbody>
</table>

6. **GRR Submittal 1**: Contractor shall provide the name and location of the quarry that will be the source of the GRR for the project when submitting Contractor’s Proposal Form. Contractor shall also provide historical quality reports from the selected quarry with the Proposal Form to determine the acceptability of the GRR from the proposed source. Historical quality reports are not considered suitable alternatives to the quality and gradation reports required during construction. Quality and gradation reports during construction shall be from new tests performed on actual GRR to be used on the project.

7. **GRR Submittal 2**: Testing laboratory qualifications shall be submitted with Contractor’s Proposal Form.

8. **GRR Submittal 3**: Prior to commencing GRR delivery to project site, Contractor shall submit a GRR delivery, staging, and testing schedule, and a description of the planned gradation test procedure. The schedule shall describe when GRR quality and gradation testing will be performed to ensure that test results are available for Engineer’s review **prior to GRR being shipped from the quarry**. A minimum of 2 quality and 2 gradation tests are required and shall be provided at specified intervals to ensure compliance with quality and gradation requirements. The first quality and gradation test reports shall be performed, submitted, and reviewed by Engineer prior to delivery of any stone. The remaining quality and gradation tests shall be performed, submitted, and reviewed by Engineer at approximately one half (½) of total GRR quantity shipment from quarry and prior to shipment of final half (½) of total GRR quantity.

9. **GRR Submittals 4-5**: Contractor shall obtain Engineer’s review and confirmation of compliance of gradation and quality tests **prior to shipment of GRR** in the increments stated in Table 1. If a single shipment of GRR is planned to encompass multiple increments, Contractor shall submit the required number of test submittals and receive review and confirmation of compliance prior to shipment of GRR from quarry. Contractor may request variations to timeframes in Table 1 in GRR delivery, staging, and testing schedule.

C. **Daily Activities Reports**: Contractor shall provide a daily record of activities. Daily reports shall include approximate quantity (including tonnage of GRR transported from quarry) and
locations of GRR placement, and percent project completion.

PART 2 – PRODUCTS

2.1 GRADED RIPRAP (GRR) MATERIAL

A. Stone: All stone for GRR shall be a durable natural stone. It shall be free from visible cracks, clay pockets, cavities (vugs or “honeycombs”), laminations, and other defects that would tend to increase unduly its deterioration from natural causes. Stone shall not include objectionable quantities of dirt, sand, clay, and/or rock fines. Stone shall comply with quality parameters in Table 2.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Max/Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Weight</td>
<td>165 PCF</td>
<td>Min</td>
</tr>
<tr>
<td>Absorption</td>
<td>3%</td>
<td>Max</td>
</tr>
<tr>
<td>Loss by Abrasion</td>
<td>36%</td>
<td></td>
</tr>
</tbody>
</table>

The GRR shall be reasonably well graded and shall include essentially all stone sizes between the two extremes specified which will result in a dense, fairly well-graded material not having noticeable voids or a lack of the larger sizes. Bi-modal or gap graded stone gradation test results may result in rejection of the stone material. GRR armor stone size range (gradation) shall conform to the requirements specified below for M12 shoreline protection (Table 3-Figure 1) and Barbours Cut Channel/Spilman Island shoreline protection (Table 4-Figure 2).

<table>
<thead>
<tr>
<th>Particle Mass, lb</th>
<th>Percent Lighter than the Mass Specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>260 – 650</td>
<td>100</td>
</tr>
<tr>
<td>130 - 280</td>
<td>50</td>
</tr>
<tr>
<td>40 - 130</td>
<td>15</td>
</tr>
<tr>
<td>&lt;40</td>
<td>5 (MAX)</td>
</tr>
</tbody>
</table>
Figure 1. Graphical Gradation Limits of GRR – M12

<table>
<thead>
<tr>
<th>Particle Mass, lb</th>
<th>Percent Lighter than the Mass Specified</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 – 1500</td>
<td>100</td>
</tr>
<tr>
<td>500 - 760</td>
<td>50</td>
</tr>
<tr>
<td>200 - 520</td>
<td>15</td>
</tr>
<tr>
<td>&lt;55</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 4. Gradation Limits for GRR – Barbours Cut Channel/Spilman Island

Figure 2. Graphical Gradation Limits of GRR – Barbours Cut Channel/Spilman Island

B. **Stone Shape:** The greatest dimension of each stone shall not be more than three times its least dimension. The faces of individual stones shall be roughly angular, not rounded, in shape.

**PART 3 – EXECUTION**

3.1 **GEOTEXTILE FILTER FABRIC**

Refer to Section 31 05 19.13, “Geotextiles for Earthwork.”

3.2 **COORDINATION WITH QUARRY**

Contractor shall be knowledgeable of the methods used at the quarry to produce the GRR gradations specified, especially the effects of repeated handling. Contractor shall coordinate with the quarry and use loading and unloading methods that ensure that required gradations are provided for placement.

3.3 **GRR PLACEMENT**

A. **General:** GRR shall be placed over the prepared subgrade and geotextile fabric within the limits indicated on the drawings.

B. **Slope Preparation:** Slope of berm or shoreline to receive riprap protection shall be shaped and prepared as shown in Drawings. The excavated material shall be placed within the berm
template either on top of the berm crown or on the interior of Berm slope to the grades shown. Along Spilman shoreline excavated material shall be placed within placement area at direction of Engineer. Excess material shall be placed on the inside of the berm and graded smooth to allow water runoff.

C. Placement: The GRR layer shall be constructed as indicated on the drawings, and include the following characteristics:

1. A placement technique and drop height less than 1 foot shall be used that will not damage the geotextile materials.
2. Contact between individual stones shall be maximized on all sides. Each stone shall have at least three (minimum) points of contact with other stones.
3. GRR shall be placed and spread in such a manner that the various stone sizes produce a relatively uniform surface and a completed layer that is a reasonably well-graded, compact mass of rock with minimal percentage of voids. Smaller stones shall be placed as required to produce a relatively uniform finished outer surface.
4. Actual GRR limits shall be such that the finished surface of GRR is within the specified tolerance limits. Requirements with respect to the finished GRR crest elevation, crest width, and side slopes are provided in the drawings.

3.4 MISPLACED MATERIALS

If any stone is deposited elsewhere than in places designated or approved, the Contractor may be required to remove such misplaced material and redeposit it where directed at no additional cost to the PHA.

3.5 SURVEYING AND ACCEPTANCE

A. General: Contractor shall provide initial and final surveys, as described in Section 35 00 01, "Construction Surveying," for measurement and acceptance of GRR placement.

B. Acceptance Criteria: Acceptance of the GRR shall be based upon field observations and review of the final surveys to verify that the GRR meets the limits and tolerances specified in the drawings and the requirements of paragraph 3.3.

3.6 CLEANUP

Upon completion of the work, all plant, including ranges, buoys, stakes, piles, excess stone, and other markers or obstructions placed by or for Contractor shall be promptly removed.

END OF SECTION
PORT OF HOUSTON AUTHORITY
TECHNICAL SPECIFICATIONS FOR
HSC ECIP – SEGMENT 3 DREDGING

SECTION 35 41 00 Add - BERM CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

The work in this Section consists of furnishing all plant, labor, equipment, supplies, and materials for performing the operations to construct required berms to the lines and grades shown. The design of hydraulically placed berms at Atkinson Island is based on displacement of soft Bay bottom material and founding the berm on firm foundation.

A. Changes in Berm Alignment: The Engineer reserves the right to make changes in the berm alignments as may be found necessary before completion of the work.

1.2 RELATED SECTIONS

Section 01 25 00 Add – Measurement and Basis of Payment
Section 35 00 01 Add – Construction Surveying
Section 35 20 23 Add – Dredging
Section 35 31 19 Add – Revetment

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) Publications

D 2487 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.4 DEFINITIONS

A. Clearing: Clearing consists of the removal and satisfactory disposal of all above ground and below ground trees, downed timber, snags, slash, brush, garbage, trash, debris, fencing, and other items occurring in the designated areas to be cleared.

B. Grubbing: Grubbing consists of the removal and satisfactory disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Grubbing also includes filling of holes from the grubbing operation.

C. Stripping: Stripping consists of the removal and satisfactory disposal of crops, weeds, grass, and other vegetative materials to the ground surface and topsoil to a depth of 8 inches.

D. Satisfactory Materials: Satisfactory materials consists of materials classified in accordance with ASTM D 2487 as CL, CH, CL-ML, ML, SC, SP, SW, or SP-SW, free from: roots and other organic matter; contamination from hazardous, toxic or radiological substances; trash and debris.

E. Unsatisfactory Materials: Unsatisfactory materials shall not be used in any berm or other required fill. Unsatisfactory materials includes all other materials that are not defined above as satisfactory materials.
F. **Embankment**: The terms "berm" or "embankment" as used in these specifications are defined as the earth fill portions of the berm structure or other fills related to the berm structure, and all other fills within the limits of the berm.

G. **Excavation**: Excavation consists of removal of material to the lines and grades shown in the Drawings and specified in the Contract Documents, or as otherwise directed or approved by the Engineer.

H. **Initial Placement**: The Initial Placement shall be hydraulic fill discharged from the dredge pipe along the alignment for the required hydraulically constructed berms. The Initial Placement quantity along the berm shall provide sufficient material within the Recovery Limits to accomplish Final Shaping and Grading to Final Grade and shall be to the minimum lines and grades shown on the Drawings.

I. **Final Shaping and Grading**: This term is used to depict the construction work performed after Initial Placement of material, to bring the hydraulically placed material up to Final Grade.

J. **Final Grade**: The constructed elevations and grades, shown by cross sections, after completion of Shaping and Grading.

K. **Limits of Recovery**: For the work on this contract, this term will be used to refer to the limits of depth and distance from the newly constructed berm, within which material shown by cross sections after Initial Placement can be recovered during Final Shaping and Grading, to construct the berm to Final Grade. The bottom limit of recovery shall be minus 3 foot Mean Lower Low Water (MLLW) or existing bay bottom prior to Initial Placement, whichever is higher. The distance limit shall be determined by the Contractor as to the distance to the minus 3 foot MLLW contour, or existing bay bottom as applicable, and shown on the plotted surveys of Initial Placement cross sections, as specified. At no time shall displaced foundation materials (mud wave) be used to construct or shape the berms. Such unsuitable berm material incorporated into the berm construction shall be deemed misplaced material.

L. **Net Retention Rate**: The neat-line fill quantity, computed from minimum required Final Grade cross sections shown, divided by the gross quantity of material dredged, for a particular berm reach.

M. **Gross Retention Rate**: The sum of the actual quantity of fill measured within the Limits of Recovery, by Quality Control cross section surveys, divided by the gross quantity of material dredged, for a particular berm.

1.5 **NOTIFICATION AND COORDINATION OF WORK**

A. **Pipeline Companies**: The Contractor shall notify and coordinate work with pipeline companies at least 10 days before performing work near the pipelines in the vicinity of the site as shown. At Contractor's expense, necessary protective measures shall be provided as required by the Pipeline Company when crossing pipelines with a dredge submerged pipeline. Possible protective measures include but are not limited to, floating the dredge pipeline over and 100 feet each side of the pipeline or installing a protective padding between the submerged pipeline and pipeline.

1. **Coordination with Pipeline Companies**: Every effort has been made to give all pertinent details on the location of the pipelines. The data shown are believed to be substantially correct. However, the exact locations may vary from that shown; therefore, the Contractor shall cooperate with the respective PORT AUTHORITYs to establish the actual position of the pipelines. The following is furnished for information on verifying pipeline ownership:

Lone Star Notification Service (Texas One-Call) 1-813-223-4567 or 1-800-669-8344
1.6 GENERAL PROVISIONS

A. Lines and Grades: The berms shall be constructed to the minimum lines, grades, and cross sections shown, unless otherwise directed. The Port Authority/Engineer reserves the right to increase or decrease the foundation widths and slopes of the berms or make changes in the berms as may be deemed necessary to produce a safe structure.

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

C. Failures: The Contractor shall be advised that soft to very soft foundation materials are located at the project site and shall plan to execute construction accordingly. If a failure, including but not limited to slides, slumps, settlement, or erosion, of a portion of the berms occurs during its construction or after its completion, but prior to its acceptance, the Contractor shall reconstruct or repair that portion of the berms without additional cost to the Port Authority. Failures occurring after acceptance that are caused by Contractor operations or negligence shall be repaired by the Contractor without additional cost to the Port Authority. Should a failure occur, the Contractor shall cease all operations in the immediate vicinity of the failure and promptly notify the Engineer. No repairs shall be made until the Engineer approves the method of repair. Unless approved by the Engineer, any delays incurred by the Contractor for the failure or the investigation of the failure shall be at the expense of the Contractor.

D. Protection of Existing Service Lines and Pipeline Structures: Existing pipelines that are shown or the locations of which are made known to the Contractor prior to excavation or fill placement and that are to be retained, as well as pipelines encountered during excavation operations, shall be protected from damage during construction and, if damaged, shall be repaired by and at the expense of the Contractor. In the event that the Contractor damages existing pipelines that are not shown or the locations of which are not known to the Contractor, report of this damage shall be made immediately to the Engineer.

1.7 SUBMITTALS

Engineer's approval is required for submittals with an "E" designation; submittals not having an "E" designation are for information only.

A. Preconstruction Submittals:

1. Mechanical Berm Construction Plan, E. For the required mechanically constructed berm, a Mechanical Berm Construction Plan shall be submitted prior to the start of construction and shall include a description of the materials, equipment, construction techniques, sequences, and procedures for borrow excavation, dewatering of borrow materials, transport of material to fill sites, cut and fill work, and other specific information specified herein.

2. Hydraulic Berm Construction Plan, E. The Contractor shall submit a Construction Plan for placement and shaping of the hydraulically placed dredge materials to the required lines and grades shown. The plan shall be submitted at least 14 days prior to starting work on this project, including but not limited to the following:
a. The phasing and methodology to be used for construction of hydraulically constructed berm including discharge pipeline placements, with sketches when applicable, and techniques to maximize use of available satisfactory material.

b. Approximate Barbours Cut Channel (BCC) stations and elevations between which the material to be dredged is used to construct the hydraulically constructed berms at Atkinson Island Beneficial Use (BU) site M12.

c. Estimated start and completion dates for berm construction at Atkinson Island BU site M12.

d. Proposed pipeline routes (within the confines of the available routes shown) for the different sequencing of dredge fill placement and hydraulic fill berm construction.

e. A complete list of plant and equipment, with accompanying specification information to be used for the work.

f. A brief description of the proposed execution of required monitoring of the Initial Hydraulic Berm Fill Placement, as specified in Paragraph 3.10. The description shall include details on how the monitoring information will be used by the Contractor to monitor and control placement of hydraulic fill, to achieve the specified requirements to place sufficient hydraulic material at all locations along the berm. The description shall include details and calculations to be made during this contract to assess the production rate throughout this contract, and a description of the format the Contractor will use to report the hydraulic fill berm construction progress during the hydraulic fill placement.

g. Anticipated Placement Rate. The Contractor shall provide estimated rate of berm construction per 1,000-foot section expressed as cubic yards per linear foot of berm.

3. Quality Control Plan, E. Prior to construction the Contractor shall submit a Quality Control Plan prior to construction, detailing the requirements specified in Paragraph 3.10.

4. Site Erosion Protection Plan. The Contractor shall submit a Site Erosion Protection Plan detailing the approach and methods to protect the construction site from erosion and other damage that may occur due to the exposure of the site to open Bay and to ship wakes. The Plan shall be submitted within 14 days after acknowledgment of Notice to Proceed and before mobilization. In preparing the Site Erosion Protection Plan, the Contractor shall consider the

a. The Contractor shall be responsible for constructing the total amount of berm to the lines and grades shown. Recovery and use of bay bottom material will not be acceptable and shall be deemed misplaced material.

b. The Contractor shall be responsible for installation of shore protection to the lines and grades shown.

c. The Contractor shall be responsible for controlling the discharge of material during construction of the berm.

d. The Contractor shall recognize the limited amount of available acceptable berm building material when considering over-placement of material to compensate for erosion.

e. Port Authority will not compensate the Contractor for repairs to berms due to erosion or for other failures. The Contractor is solely responsible for protecting the site and shall place shore protection as soon as practical to ensure protection and reduce erosion.

f. The Contractor shall consider applicable means and methods, compatible with the Plan of construction, for protection of the construction site. Temporary physical barriers, if utilized, shall be removed upon completion of the work at no cost to Port Authority.

g. The phasing Plan and Schedule for construction of berms and installation of shore protection.
5. **Project Schedule**. E. The overall project schedule shall identify the construction phases as separate line items.

**B. Surveys:**

1. The Contractor shall submit the results of the Quality Control Surveys taken during construction of the berms within 24 hours of survey. Survey requirements are specified in Section 35 23 00 “Construction Surveying.”

**PART 2 - PRODUCTS**

**2.1 EQUIPMENT**

A list of equipment, with accompanying specifications information shall be submitted prior to commencement of construction.

A. **Crawler-Type Tractors:** Crawler-Type Tractors used for spreading and compacting on mechanically constructed berms shall weigh not less than 30,000 pounds, shall exert a unit tread pressure of not less than 5 pounds per square inch, and shall not be operated at a speed to exceed 5 miles per hour for mechanical berm placement.

B. **Power-Driven Tampers:** Compaction of material in areas where it is impracticable to use a crawler-type tractor shall be performed by the use of approved power-driven tampers of the rammer-type having a static weight of at least 70 pounds or by approved hydraulic-actuated tractor-mounted tampers.

C. **Dragline Equipment:** Dragline equipment used shall be approved types suitable for dragline and borrow berm construction.

D. **Miscellaneous Equipment:** Scarifiers, disks, motorized graders, spreaders and other equipment shall be of approved types suitable for construction of berm. Trucks, scrapers and other types of earth-hauling equipment, if used, shall be of approved types suitable for construction. Matting, if used, shall be of sufficient size, quantity and strength for the types of equipment that will work from or cross over the mats, and for the types of foundation on which matting will be placed upon during the period of construction that the matting is used.

E. **Equipment for Placement and Shaping of Hydraulic-Fill Berms:** Equipment used to facilitate movement of the dredge pipes to place hydraulic fill, construction of training berms to maximize retention of hydraulic fill, and grading and shaping of hydraulic-fill berms, shall be of low ground pressure design, suitable for work in marsh and other soft foundation conditions and may also consist of a spillbarge, shorepipe, or dredge.

**2.2 MATERIALS**

A. **Mechanical Berm:** Satisfactory materials for construction of "Mechanical Berm, Baseline I" shall consist of available nonorganic soils (classified as CL, CH, CL-ML, ML, SC, SP, SW, or SP-SW, in accordance with ASTM D 2487) excavated from approved borrow areas identified in the Drawings. Fill shall be free of debris and organic materials, however, shells encountered shall be treated as an exception. Stockpiles of hydraulic excavation for use as fill for mechanical berm construction is not permitted.

B. **Hydraulic Berm:** Satisfactory materials for construction of the hydraulic fill berms shall consist of available soils (classified as CL, CH, CL-ML, ML, SC, SP, SW, or SP-SW in accordance with ASTM D 2487) from material in the BCC new work (widening and flare) template.
PART 3 - EXECUTION

3.1 SITE CONDITIONS

Explorations to determine the character of materials at the site have been made, including core borings and probings and the results are as shown in the Drawings and Appendices of the Contract Documents. Displacement and settlement of the foundation material can be expected, and shall be anticipated by the Contractor during construction of the mechanically constructed berms and hydraulically constructed berms. The templates shown do not represent the total volume of excavated satisfactory materials needed to construct the mechanically constructed berms and hydraulically constructed berms to the lines and grades specified. The Contractor shall carefully review all geotechnical information provided and make their own conclusions regarding the amount of material excavation that will be needed to construct the specified berm templates prior to preparing the bidding documents.

3.2 FOUNDATION PREPARATION

No berm foundation preparation, other than specified clearing, grubbing and stripping will be required for berm construction.

3.3 EXCAVATION

Excavation shall consist of removal of material in preparing the foundations to the lines and grades shown in the Drawings, removal of material for the purpose of providing flotation for plant and equipment, removal of unsatisfactory material, and obtaining required fill materials for berm construction.

3.4 MECHANICAL BERM

A. General: Satisfactory materials used for "Mechanical Berm, Baseline B" shall be obtained from approved borrow areas adjacent to "Mechanical Berm, Baseline B" identified in the Drawings. The Contractor shall evenly distribute sufficient material at all locations along the berm so that the final new berm section can be constructed to the minimum lines and grades.

B. Unsatisfactory Materials: Unsatisfactory materials shall be disposed of in an appropriate manner, and placed in a location approved by the Engineer.

C. Workability of Semi-Compacted Materials: "Mechanical Berm, Baseline B" shall be constructed of semi-compacted materials. The moisture content of the material shall be maintained at a level that will allow for the optimum compaction with the equipment used as specified in Paragraph 3.4.D below. If, in the Engineer's opinion, the material is excessively wetted or dried, the Contractor shall take the necessary steps to dry or wet the material before continuing further construction with the materials.

D. Semi-Compacted Fill Construction: Semi-compacted fill templates shall be constructed using fill as defined under the Paragraph 2.2.A. Fill for the construction of semi-compacted Fill templates shall be excavated from approved borrow areas identified in the Drawings, or otherwise specified by the Engineer. Semi-compacted fill shall be placed with suitable equipment in uniform layers, which before compaction shall not exceed three feet in thickness. Each layer shall be compacted by not less than three coverages of a crawler-type tractor conforming to the requirements of the Paragraph 2.1.A.

E. Connection to Existing Cell Berms: Transition bay-facing slope and crown elevation to tie in with existing slopes of "Baseline C" existing berm to provide a continuous berm, as shown in
the Drawings. Abrupt changes in alignment, as determined by the Contracting Officer, will not be permitted.

F. Grade Tolerances and Shrinkage Allowances for Mechanical Berms: For acceptance, berms shall be constructed, as a minimum, to the grades and elevations shown. Tolerances shall include minus 0.5 foot on the crown height, crown width, and slopes. Final alignment of the "Mechanical Berm, Baseline B" shall be within 20 feet of the berm baseline shown unless otherwise approved. Transitions in alignments shall be smooth and no more than 2 feet in a 100-foot length. Abrupt changes in alignment, as determined by the Contracting Officer, will not be permitted.

3.5 HYDRAULIC BERM

A. General: Satisfactory materials used for "Hydraulic Berm, Baseline A" shall be obtained from the dredging of new work widening and flare templates in BCC. The Contractor shall evenly distribute sufficient hydraulic material at all locations along the berm so that the initial and final new berm section can be constructed to the minimum lines and grades. Discharge of hydraulically placed materials shall be placed in a direction away from or bayward from the existing berms and structures.

B. Unsatisfactory Materials: Unsatisfactory materials shall be disposed of in an appropriate manner, and placed in a location approved by the Contracting Officer.

C. Initial Placement: The initial placement of material for "Hydraulic Berm, Baseline A" shall consist of controlled discharge of the dredged material along the alignment of the required berms as shown in the Drawings, and as specified herein. The Contractor shall take reasonable measures available to retain satisfactory material within the specified limits of recovery, including the control of discharge actions specified herein. The limits of recovery as specified in the Paragraph 1.4.K may be extended by the Contractor, with approval of the Engineer, based on observed behavior of the discharged material, the type of equipment, and the procedures to be used to recover the initial placement material. The limits, that generally identify materials to be used for construction, shall be identified on individual cross sections to allow monitoring of initial placement as required by the specifications. Details of initial placement shall be included in the Construction Plan.

Initial placement by land based techniques and methods of placement via a discharge pipeline advanced and manipulated by shore based personnel and equipment such as dozers and backhoes is to be used within 200 ft of "Mechanical Berm, Baseline B" and existing berm. The initial placement of material for the hydraulically constructed berm consisting of controlled discharge of the dredged material through the use of a spillbarge techniques along the alignment of the required berm is required in all other locations.

D. Control of Discharge: In order to maximize retention of hydraulically placed material within the required fill template, the Contractor shall use a floating spillbarge or similar technique to control placement of the hydraulically transported berm material. The spill-barge should be equipped with spuds and/or anchor systems that will allow the barge to be moved both perpendicular and parallel to the centerline of berm as the material is discharged. In this manner, the material can be spread and brought up evenly to an elevation above the water surface. Additionally, the spill-barge shall be capable of varying the discharge elevation from an elevation of 3 feet below the water surface to a sufficient height above the specified construction template so that material may be hydraulically placed to the minimum lines and grades shown. The spill-barge should be fitted with a spreader, diffuser, or other effective means that will promote the displacement of soft materials. Where practical, the initial discharge shall be beneath the water surface, and the discharge point shall be raised vertically as the material increases in elevation. The Contractor shall include details in the Construction Plan regarding the proposed technique and equipment to be used to accomplish the required "Control of Discharge." The method used...
to place the hydraulic fill shall maximize the use of the material and minimize waste of satisfactory materials. The location of the discharge point of the spill-barge system shall be continuously monitored by electronic survey techniques and recorded at five-minute intervals while the spillbarge is at the work site. The data will be submitted on digital media in X,Y,Z,Time,Date ASCII format.

In those areas where the use of shoreline pipe and land-based discharge is permitted the Contractor shall take reasonable measures available to retain satisfactory material within the specified limits of recovery, including the control of discharge actions specified herein. The contractor shall use frequent movement of the discharge point during the initial placement, along with an effective directing of the discharge flow in the same direction as the berm advancement to retain the maximum quantity of material possible within the limits of recovery. Direction of the discharge flow, when discharging, shall be accomplished using marsh excavation equipment or suitable, approved alternative equipment, to provide for continuous removal of material mounding in front of the discharge or other locations that can result in lateral-direction “wash” of material from the limits of recovery. Materials shall be placed in a manner that displaces the soft foundation materials and prevents the “bridging” of soft sediments that may result in the failure or adverse settlement of the berm. The Contractor shall use a "Y" valve or lateral "shunt" discharge line for discharging water and unsatisfactory materials toward the inside of the planned placement area to minimize erosion of previously placed berm. Training berms may be used to maximize the retention rate of the hydraulically placed fill.

E. Mechanical Placement: Satisfactory material placed on top of the hydraulic berms during shaping and dressing shall be placed in loose lifts not exceeding 18 inches and shall be mechanically compacted by not less than three (3) passes of a crawler-type tractor which shall not be operated at a speed to exceed 5 miles per hour. Satisfactory material that becomes mixed with unsatisfactory materials, including displaced foundation materials, is no longer satisfactory material and shall be disposed of in the interior of Cell M12.

F. Final Shaping and Grading: Upon acceptance of the initial placement hydraulic fill sections, final shaping and grading may commence. Recoverable material shall be used to construct the berms to the final grade template as shown in the Drawings. To the maximum extent practicable, satisfactory recoverable material on the Bay side of the cells shall be used to raise the berms to the final grade template. Excess satisfactory recoverable material shall not be wasted. Recoverable satisfactory material on the Bay side of the berms shall be stockpiled on top of or on the interior slope of the initial placement hydraulic berms, and graded and shaped to allow for drainage. No separate payment will be made for the stockpiles. It shall be the Contractor’s responsibility to protect the work site and to repair eroded or otherwise damaged accepted sections of berm prior to placement of shore protection at no additional cost to the Port Authority.

G. Grade Tolerances:

1. Initial Placement: For acceptance, berms shall be constructed, as a minimum, to the grades and elevations shown. Tolerances shall include minus 1.0 to plus 1.0 foot on the crown height. For initial placement, slopes shall be at the angle of repose of the material as shown in the Drawings.

2. Final Shaping and Grading: For acceptance, berms shall be constructed, as a minimum, to the grades and elevations shown. Tolerances shall include minus 0.5 to plus 0.5 foot on the crown height, crown width, and slopes. Final alignment of the "Hydraulic Berm, Baseline A" shall be within 20 feet of the berm baseline shown unless otherwise approved. Transitions in alignments shall be smooth and no more than 2 feet in a 100-foot length. Abrupt changes in alignment, as determined by the Engineer, will not be permitted.
3.6 PROTECTION OF THE WORKSITE

The location of Atkinson Island in Upper Galveston Bay is subject to ship wakes from the Houston Ship Channel, Cedar Bayou Channel and significant fetch length and storm influences on wave height. The Contractor shall expect erosion of unprotected berms. The Contractor shall be responsible for protecting the work site and for repair of eroded or otherwise damaged berms at no additional cost to the Government. Considerations to be made for the design of the Site Erosion Protection System are specified.

3.7 ACCEPTANCE AND CORRECTIVE ACTION

A. Acceptance of Completed Berms: The berms will be accepted as described in Section 01 25 00, “Measurement and Basis of Payment”. There will be no intermediate acceptance of the berms. Acceptance will be based on topographic surveys performed by the Contractor as specified in Section 35 20 00, “Construction Surveying.” Request for acceptance shall be in writing. The Port Authority may perform field check surveys. The Port Authority survey checks will govern discrepancies. If the final survey cross sections for a particular acceptance section show that the acceptance template as shown has been achieved, the berm section will be accepted as complete.

B. Corrective Action: Sections not conforming to the minimum acceptance template shall be corrected by the Contractor at no additional cost to the Port Authority. The Contractor shall be responsible for repair of damages to the berms resulting from construction equipment operation, settlement, subsidence, slides, displacement and handling of foundation materials, normal seasonal weather related damage, and Contractor negligence. After acceptance of a section, the Contractor shall be responsible for damages to the berms resulting from its operations or negligence.

3.8 CONTRACTOR QUALITY CONTROL

A. Quality Control Inspections: The Contractor shall conduct daily Quality Control inspections of the construction activities for compliance with these 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 Quality Control Reports shall be submitted on an approved Quality Control Report form. Retention Rate Monitoring information shall be submitted on an approved Retention Rate Spreadsheet. Required survey information and plots of the surveys shall be attached to the Quality Control Reports and Retention Rate Spreadsheets, as specified.

B. Monitoring of Initial Placement: Monitoring of the initial placement material shall be made based on Contractor Quality Control cross section surveys, taken as specified herein. Quantity calculations required for completing the Retention Rate Spreadsheet shall be made for each 24-hour period. The required Report information and entries to the Spreadsheet shall be recorded daily. In areas where surveys indicate the quantity of material within the limits of recovery is below the calculated amount required to construct the required berm, the Contractor shall hydraulically place additional material and perform additional surveys to verify material quantity is within the specified tolerance. Corrective action is required in areas where surveys indicate replacement and is at the Contractor's expense. If volume calculations indicate insufficient material placement or excessive replacement, a note of this shall be made on the Quality Control Daily Report. The Contractor shall then make required adjustments to the work procedure to accomplish proper distribution of initial material placement.

C. Retention Rate Spreadsheet: A Retention Rate Spreadsheet, programmed to make appropriate calculations, shall be set up on a Microsoft Excel 2000, or later, spreadsheet computer program, with the following column headings which are required for Retention Rate Monitoring and reporting: Date, End Stations of Berm Constructed (last 24 hours), End Stations...
of Berm Constructed to Date, Berm Cross Section Station, Neat Line Cross Section Area computed to the original Bay bottom (cubic yards per linear foot of berm), Actual Cross Sectional Area (as placed by the dredge expressed in cubic yards per linear foot of berm), Over-placement Ratio, Average End Area (Actual), Distance, Volume Between Cross Sections, Cumulative Berm Volume as placed by the dredge, Quantity of Cross Sectional Area retained in the Acceptance Template, Gross Dredging Between Stations, Gross Dredging to Date (cubic yards and cubic yards per linear foot of berm), Gross Dredging (last 24 hours in cubic yards and cubic yards per linear foot of berm), Anticipated Placement Rate, Gross Retention Rate, Net Retention Rate, Over-placement (or Under-placement) Quantity and Acceptance (check). Copies of a previously used example spreadsheet and explanation of use will be provided to the Contractor at the Pre-construction Conference.

D. Quality Control Report: A copy of the records of Quality Control inspections and tests, as well as the records of corrective action shall be submitted as directed. In addition, the Quality Control Report shall include the information required to accomplish monitoring of Initial Placement, including ongoing Retention Rates, as specified. The Report shall include a description of the Control of Discharge and a discussion of prior and ongoing placement activities during the previous 24 hours, to include the following items:

1. Date
2. Gross dredging quantity for the last 24 hours
3. Gross dredging quantity to date
4. End stations of Initial Placement, Shore Protection Placement, and Final Shaping and Grading for the last 24 hours
5. End stations of Initial Placement, Shore Protection Placement, and Final Shaping and Grading to date
6. Station and Offset Boundaries of dredging for the last 24 hours
7. Control of Discharge, other comments

E. Quality Control Daily Report: A Quality Control Daily Report form, containing blanks for required information shall be developed by the Contractor for use during this contract. A copy of the Quality Control Report form shall be submitted with the Quality Control Plan for approval.

F. Submittal of Reports: Daily reports shall be submitted in both hard copy and electronic form as directed. A copy of the completed spreadsheet shall be attached to the Daily Quality Control Report on the Thursday of each week, or as directed. Additionally, on the Thursday of each week or as often as directed, the Contractor shall send the spreadsheet to email addresses that will be provided at the Pre-construction Conference.

G. Compliance Inspection: The Contractor shall inspect for compliance with contract requirements and record the inspection of operations including, but not limited to the items specified below:

1. Placement of fill
2. Unsatisfactory materials, including silts and sandy silts, are not used in berm construction
3. Construction to lines and grades shown
4. Misplaced materials - Monitoring and removal if required
5. Length of berm constructed and quantity of satisfactory material utilized, and estimated quantity of remaining satisfactory material required for berm construction
6. Drainage of ponded water, as required between hydraulically-placed fill and existing berms

H. Records: A copy of the records of the compliance inspections, tests, and records of corrective action shall be submitted as directed.

END OF SECTION