1. All existing conditions shall be verified by the contractor prior to commencing construction activities. The contractor shall notify the port authority and engineer immediately of any conflict or discrepancies.

2. The contractor shall make his own arrangements and obtain permission from applicable property owners for staging areas and loading barges on public or private property. All costs associated with preparation and use of support facilities for this project shall be paid by the contractor. These areas shall be restored to pre-project conditions upon completion of work.

3. The contractor shall take measures to protect all existing improvements within and adjacent to the work area. Any damage caused by the contractor’s activities shall be replaced or repaired at the expense of the contractor and at no cost to the port authority. Structures that are to be protected from damage or repaired if damaged include but are not limited to fences, levee embankments, outlet structures, drainage pipes, roads, ditches, private or public ground, and other structures or improvements.

4. The contractor shall take precautions, secure equipment and protect the work against adverse weather conditions and surges. Wake influences from passing vessels shall be made to access shallow areas through the use of light-loaded barges or other equipment suitable for shallow water. Excavation for access and floating is not permitted unless granted by the port authority.

5. The dredging project may be adjacent to environmentally sensitive areas. The contractor shall avoid/minimize impacts to these areas during the course of construction. Any damage caused by the contractor’s activities shall be restored at the expense of the contractor and at no cost to the port authority. The port authority shall be the sole assessor as to whether environmental impacts have occurred as a result of the contractor’s activities. The port authority reserves the right to suspend work at any time if impacts occur and until satisfactory corrective measures are implemented by the contractor.

6. Construction equipment shall not operate on private property unless permission has been acquired by the contractor from the land owner.

7. The project is located within the limits of the Houston Ship Channel, which is highly utilized by marine traffic. The contractor shall not stage equipment within the navigation channel nor interfere with or interrupt vessel navigation.

8. The contractor shall request a notice to mariners from the U.S. Coast Guard prior to commencing construction activities.

9. The contractor shall remove any encountered debris and dispose of in accordance with local, state and federal regulations.

10. The locations of existing utilities and substructures shown herein have been taken from available records. The port authority does not warrant the completeness or correctness of the locations of utilities and substructures. It shall be the contractor’s responsibility to identify and protect existing utilities and substructures. Should utilities, pipelines, cables or other substructures be encountered that are not identified and indicated on these plans, the port authority shall be notified immediately.

11. Attention is directed to the specifications where bidors are required to examine and judge as their own responsibility the location, physical conditions, and provisions of the proposed work.

12. The contractor shall schedule and coordinate with the various companies and agencies who may be affected by this project. The contractor shall obtain the required permits as may be required beyond the authorization provided herein for the work.

13. The contractor shall adhere to all safety codes, regulations and specifications for the duration of this contract.

14. The contractor shall complete all work shown on the drawings and in the specifications, unless indicated as not in package (n.p.).
NOTE:
The historical borings shown are approximate. Refer to boring logs for further information.
EXISTING UTILITIES CROSSINGS - PLAN VIEW 3 - HSC SEGMENT 1 - HSC STA 50+000 TO HSC STA 24+000 & SEGMENT 2 - PORTION OF BAYPORT SHIP CHANNEL

SCALE: 1" = 1500'

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

SCALE: 1" = 1500'

NOTES:
1. PIPELINE DATA WAS OBTAINED FROM THE TEXAS RAILROAD COMMISSION ONLINE DATA BASE DURING MARCH 2020. PIPELINE LOCATIONS SHOWN ON THIS MAP MAY NOT BE AN ACCURATE REPRESENTATION OF THE CURRENT PIPELINE LOCATIONS. DRAWING PROVIDED FOR INFORMATION ONLY. PIPELINE LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
2. MAGNETOMETER SURVEY DATA ACQUIRED DURING FEBRUARY TO APRIL 2020 PERFORMED BY GBA AND RECEIVED 5-5-2020.
3. PIPELINE AND OBJECTS PRELIMINARILY IDENTIFIED FROM MAGNETOMETER SURVEY CADD FILE "HTI-HSC Mag review.dwg" PROVIDED BY GBA AND RECEIVED 5-5-2020.
EXISTING UTILITIES CROSSINGS - PLAN VIEW 5 - BAYPORT SHIP CHANNEL

SCALE: 1" = 800'

EXISTING UTILITIES CROSSINGS - PLAN VIEW 6 - BARBOURS CUT SHIP CHANNEL

SCALE: 1" = 500'

LEGEND:

EXISTING UTILITY LINE CROSSING PER TEXAS RAILROAD COMMISSION DATA.

HISTORICAL PIPELINE DATA - ACTIVE, ABANDONED OR REMOVAL UNCONFIRMED.

LARGE OBJECT PER MAGNETOMETER SURVEY.

AREA OF POTENTIAL UTILITY PIPELINE PER MAGNETOMETER SURVEY.

AREAS FOR FURTHER POTENTIAL INVESTIGATION.

NOTES:

1. PIPELINE DATA WAS OBTAINED FROM THE TEXAS RAILROAD COMMISSION ONLINE DATA BASE DURING MARCH 2020. PIPELINE LOCATION SHOWN ON THIS MAP MAY NOT BE AN ACCURATE REPRESENTATION OF THE CURRENT PIPELINE LOCATION. DRAWING PROVIDED FOR INFORMATION ONLY. PIPELINE LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.


3. PIPELINE AND OBJECTS PRELIMINARY IDENTIFIED FROM MAGNETOMETER SURVEY CAD FILE "HTI-HSC_Mag review.dwg" PROVIDED BY GBA AND RECEIVED 5-5-2020.
FID NO 429
HANNAH ISLAND GATHERING SYSTEM

NOTE:
1. PIPELINE DATA WAS OBTAINED FROM THE TEXAS RAILROAD COMMISSION ONLINE DATA Base during March 2020. PIPELINE LOCATIONS SHOWN ON THIS MAP MAY NOT BE AN ACCURATE REPRESENTATION OF THE CURRENT PIPELINE LOCATIONS. DRAWING PROVIDED FOR INFORMATION ONLY. PIPELINE LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

SCALE: 1" = 1000'

LEGEND:

EXISTING UTILITY LINE

MAGNETOMETER HIT

65% DRAFT
NOTE:
1. PIPELINE DATA WAS OBTAINED FROM THE TEXAS RAIL ROAD COMMISSION ONLINE DATA BASE DURING MARCH 2020. PIPELINE LOCATIONS SHOWN ON THIS MAP MAY NOT BE AN ACCURATE REPRESENTATION OF THE CURRENT PIPELINE LOCATIONS. DRAWING PROVIDED FOR INFORMATION ONLY. PIPELINE LOCATIONS SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

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LEGEND:
- EXISTING UTILITY LINE
- MAGNETOMETER HIT
- 65% DRAFT
HSC PROJECT 11: BOLIVAR ROADS TO REDFISH - HSC STA 138+369 TO HSC STA 98+000 - EXISTING SITE CONDITIONS AND CONSTRAINTS PLAN

NOTES:
1. HORIZONTAL COORDINATES SHOWN ARE REFERENCED TO HAD 82, TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE, 42DA;
2. VERTICAL DATUM IS MLLW;
3. HOUSTON SHIP CHANNEL (HSC) STATIONING REFERS TO CHANNEL CENTERLINE.
4. EXISTING CONTOUR INTERVAL IS 10 FEET;
5. CONTOURS PER HYDROGRAPHIC SURVEY DATA SOURCES:
   a. HSC, Lower Bay, 2019-2020, MLLW ft;
   b. HSC, Middle Bay, 2019-2020, MLLW ft;
   c. HSC, Upper Bay, 2019-2020, MLLW ft;

CONTOURS TO BE FINALIZED

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

EXISTING NAVIGATION CHANNEL - BOLIVAR ROADS CHANNEL
EXISTING NAVIGATION CHANNEL - GIWW
EXISTING NAVIGATION CHANNEL - TEXAS CITY CHANNEL

BOLIVAR PENINSULA

PORT OF HOUSTON EXPANSION PROJECT (CIP)

HOUSTON SHIP CHANNEL (HSC) CHANNEL CENTERLINE

CONSTRUCTION KEY NOTES:

EXISTING NAVIGATION CHANNEL - BOLIVAR ROADS CHANNEL
1. Horizontal coordinates shown are referenced to NAD 83, Texas State Plane Coordinate System, South Central Zone, 4204.

2. Houston Ship Channel (HSC) stationing refers to channel centerline.
NOTE:
1. CONTOURS DEPICTED ON THIS MAP REPRESENT THE RESULTS OF SURVEYS MADE IN OCTOBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.

2. ALL ELEVATIONS ARE REFERENCED TO MLLW AND ARE BELOW THE REFERENCE PLANE UNLESS PRECEDED BY A PLUS (+) SIGN.

LEGEND:
- BORING

PORT OF HOUSTON AUTHORITY

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

PROJECT 11: BOLIVAR ROADS TO REDFISH BRC STA 138+369 TO HSC STA 98+000
PLACEMENT AREA PLAN - NEW EVA II

BORING COORDINATES

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APPROX. 4.8-AC BEACH AT +10.7’ MLLW

APPROX. 1-AC BEACH

APPROX. 60-FT DIAMETER CROWN AT +11.7’ MLLW

ROCK SHORE PROTECTION

BORING

CE301

CE301

CE301

CE301

CE301

CE301

CE301
OYSTER REEF/WAVE TRIP
APPROX. 3.0 ACRES
DIKE WITH RIP RAP
APPROX. 2,050' LF
LONG BIRD ISLAND
APPROX. 4.0 ACRES

A1 PLACEMENT AREA PLAN  - NEW 8-AC BIRD ISLAND

SCALE: 1" = 200'

NOTES:
1. CONTOURS DEPICTED ON THIS MAP REPRESENT THE RESULTS OF SURVEYS MADE IN OCTOBER 2019 AND CAN ONLY INDICATE THE GENERAL CONDITIONS EXISTING AT THAT TIME.
2. ALL ELEVATIONS ARE REFERENCED TO MLLW AND ARE BELOW THE REFERENCE PLANE UNLESS PRECEDED BY A PLUS (+) SIGN.

PROJECT 11:
BOLIVAR ROADS TO REDFISH
BRC STA138+369 TO HSC STA 98+000
PLACEMENT AREA PLAN - NEW LONG BIRD ISLAND

LEGEND:
BORING

BORING COORDINATES

PORT ID NO. NORTHING EASTING
ECP-1004A 13,731,463.45 3,301,359.25
ECP-1005A 13,731,846.02 3,301,354.65
ECP-1006A 13,732,062.51 3,301,728.51
ECP-1007A 13,732,302.23 3,302,003.76
ECP-1008A 13,734,478.14 3,302,999.20
NOTES:

1. SHORE PROTECTION DESIGN, LENGTHS, AND ELEVATIONS ARE APPROXIMATE AND WILL BE DEPENDENT ON FINAL PROJECT LOCATION.

2. ALL ELEVATIONS ARE REFERENCED TO MLLW.
NOTES:

1. SHORE PROTECTION DESIGN, LENGTHS, AND ELEVATIONS ARE APPROXIMATE AND WILL BE DEPENDENT ON FINAL PROJECT LOCATION.

2. ALL ELEVATIONS ARE REFERENCED TO MLW AND ROUNDED TO THE NEAREST TENTH AND ARE BELOW THE REFERENCE PLANE UNLESS PRECEDED BY A PLUS (+) SIGN.

PORT OF HOUSTON AUTHORITY

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

PROJECT 11: BOLIVAR ROADS TO REDFISH BRC STA138+369 TO HSC STA 98+000

PLACEMENT AREA PLAN - NEW LONG BIRD ISLAND SECTIONS & DETAILS - 1

LONG BIRD ISLAND TYPICAL CROSS SECTION

LONG BIRD ISLAND TYPICAL CROSS SECTION
TECHNICAL SPECIFICATIONS
FOR
HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT

PROJECT 11: BOLIVAR ROADS TO REDFISH
SEGMENT 1A: HSC STA 138+369 to STA 98+000

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

65% PRELIMINARY
This document is released for the purpose of interim review and is not intended to be used for construction, bidding, or permitting purposes.

Engineer: Ashley P. Judith
License No: TX# 112988
Date: August 03, 2020

Engineer: Chester Hedderman
License No: TX# 100209
TABLE OF CONTENTS

1 GENERAL INFORMATION ........................................................................................................ 1
  1.1 GENERAL .......................................................................................................................... 1
  1.2 PROJECT DESCRIPTION ..................................................................................................... 1
    1.2.1 HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT .......... 1
  1.3 DREDGE PLANT .................................................................................................................. 2
  1.4 REFERENCES ..................................................................................................................... 2
  1.5 TECHNICAL DEFINITIONS ............................................................................................... 3
  1.6 EQUIPMENT DEFINITIONS .............................................................................................. 5
  1.7 SPECIAL SCHEDULING REQUIREMENTS ......................................................................... 6
    1.7.1 ORDER OF WORK .................................................................................................... 6
  1.8 PERMITS .............................................................................................................................. 6
    1.8.1 CONTRACTOR OBTAINED PERMITS ....................................................................... 6
  1.9 WORK ACCORDANCE ......................................................................................................... 6
  1.10 LOCAL CONDITIONS AND SITE PHYSICAL DATA .......................................................... 6
    1.10.1 SUBSURFACE MATERIAL AND GENERAL SITE CONDITIONS .............................. 6
    1.10.2 DEBRIS .................................................................................................................... 7
    1.10.3 TIDAL CONDITIONS .................................................................................................. 7
    1.10.4 MARINE CONDITIONS ............................................................................................ 7
    1.10.5 SHIP WAKE ............................................................................................................. 7
    1.10.6 WEATHER CONDITIONS ......................................................................................... 8
  1.11 PRESERVATION OF PUBLIC AND PRIVATE PROPERTY .................................................. 8
  1.12 UTILITY PIPELINES .......................................................................................................... 8
    1.12.1 PROTECTION OF EXISTING SERVICE LINES AND UTILITY LINES ..................... 9
  1.13 NAVIGATION .................................................................................................................... 9
    1.13.1 OBSTRUCTION OF CHANNEL ................................................................................. 9
    1.13.2 TEMPORARY REMOVAL OF AIDS TO NAVIGATION ............................................. 9
    1.13.3 BRIDGE-TO-BRIDGE RADIOTELEPHONE EQUIPMENT ....................................... 10
    1.13.4 LOOKOUTS AND RADIO COMMUNICATIONS ......................................................... 10
    1.13.5 SIGNAL LIGHTS ....................................................................................................... 10
    1.13.6 RANGES, GAGES, AND LINES ............................................................................... 11
    1.13.7 HOUSTON-GALVESTON VESSEL TRAFFIC SERVICE AREA ................................ 11
    1.13.8 DREDGE TRACKING ............................................................................................... 12
    1.13.9 AUTOMATIC IDENTIFICATION SYSTEM (AIS) ......................................................... 12
  1.14 VARIATIONS IN ESTIMATED QUANTITIES ...................................................................... 12
  1.15 UNAUTHORIZED PLACEMENT OF MATERIAL ............................................................... 12
    1.15.1 MISPLACED MATERIAL ............................................................................................ 12
    1.15.2 DEBRIS DISPOSAL ................................................................................................... 13
  1.16 HOLD HARMLESS AND INDEMNIFICATION ................................................................... 13
  1.17 USE OF PORT AUTHORITY PREMISES AND WORK AREA CONDITIONS .................... 13
    1.17.1 CONTRACTOR FACILITIES ................................................................................... 13
    1.17.2 SANITARY FACILITIES .......................................................................................... 13
    1.17.3 SITE MAINTENANCE ................................................................................................ 13
    1.17.4 EXCLUSION OF THE PUBLIC ................................................................................. 14
### Table of Contents

1.18 FIRE PROTECTION ................................................................. 14
1.19 STANDBY TIME PROVISIONS ................................................. 14
1.20 ACCESS AND STAGING .......................................................... 14
  1.20.1 CONSTRUCTION OFFICE ...................................................... 14
  1.20.2 CONSTRUCTION SITE TRANSPORTATION .............................. 15
1.21 PROTECTION OF EXISTING WATERWAYS ................................. 15
1.22 ADJACENT PROPERTY AND STRUCTURES ................................. 16
1.23 SURFACE AND SUBSURFACE STRUCTURES AND UTILITIES WITHIN THE SITE 16
1.24 WEEKLY PROGRESS MEETINGS AND MINUTES ............................ 17
1.25 QUALITY CONTROL INSPECTIONS ............................................ 17

2 SUBMITTALS AND SUBMITTAL REQUIREMENTS .................................. 18
  2.1 GENERAL ............................................................................ 18
  2.2 SUBMITTAL PROCEDURES ...................................................... 18
  2.3 SUBMITTALS AFTER AWARD .................................................. 18
    2.3.1 SCHEDULE OF VALUES ................................................... 19
    2.3.2 SAFETY PLAN ................................................................... 19
    2.3.3 ACCIDENT PREVENTION PLAN ......................................... 19
    2.3.4 QUALITY CONTROL PLAN ................................................ 20
  2.4 PRECONSTRUCTION CONFERENCE SUBMITTALS ............................ 21
    2.4.1 CONTACTS AND QUALIFICATIONS .................................. 21
    2.4.2 WORK PLAN AND SCHEDULE OF WORK ............................ 21
    2.4.3 CULTCH WORK PLAN AND SCHEDULE ............................... 24
    2.4.4 SHELL HASH WORK PLAN AND SCHEDULE .......................... 24
    2.4.5 ENVIRONMENTAL PROTECTION PLAN ............................... 25
    2.4.6 SPILL CONTINGENCY PLAN .............................................. 25
    2.4.7 VOLATILE ORGANIC COMPOUNDS (VOC) COMPLIANCE PLAN ................................................................................ 26
  2.5 PRECONSTRUCTION SUBMITTALS ............................................ 26
    2.5.1 SURVEY CONTROL CHECKS .............................................. 27
    2.5.2 CONSTRUCTION MATERIALS ............................................. 27
  2.6 CONSTRUCTION SUBMITTALS AND NOTICES ................................ 27
    2.6.1 NOTIFICATION OF INTENTION TO DREDGE ......................... 27
    2.6.2 NOTIFICATION PRIOR TO COMMENCEMENT OF SURVEYING FOR MEASUREMENT AND PAYMENT AND FINAL ACCEPTANCE ............... 29
    2.6.3 PRE-DREDGE HAZARD AND PIPELINE SURVEY .................... 29
    2.6.4 DAILY QUALITY CONTROL REPORTS ................................ 30
    2.6.5 SURVEY SUBMITTALS ..................................................... 33
  2.7 POST CONSTRUCTION SUBMITTALS AND NOTICES ....................... 34
    2.7.1 RECORD DRAWINGS ....................................................... 34
    2.7.2 POST-DREDGE PIPELINE SURVEY ................................... 34
    2.7.3 FINAL SUBMITTALS ......................................................... 35
    2.7.4 APPLICATION FOR FINAL PAYMENT ................................ 36

3 MEASUREMENT AND PAYMENT ..................................................... 37
  3.1 LUMP SUM PAYMENT ITEMS .................................................. 37
    3.1.1 MOBILIZATION AND DEMOBILIZATION ................................ 37
3.1.2 EVIA II ISLAND BEACH CONSTRUCTION ................................................................. 37
3.2 UNIT PRICE PAYMENT ITEMS ........................................................................................................ 38
  3.2.1 NEW WORK HYDRAULIC DREDGING - TO EVIA II ISLAND .............................................. 38
  3.2.2 NEW WORK HYDRAULIC DREDGING - TO LONG BIRD ISLAND ......................................... 38
  3.2.3 FINAL SHAPING AND GRADING - EVIA II ISLAND HYDRAULIC FILL ...................................... 39
  3.2.4 FINAL SHAPING AND GRADING - LONG BIRD ISLAND HYDRAULIC FILL ................................. 39
  3.2.5 LONG BIRD ISLAND OYSTER REEF WAVE TRIP ........................................................................ 40
  3.2.6 FINAL SHAPING AND GRADING – LONG BIRD ISLAND DIKE HYDRAULIC FILL ....................... 40
  3.2.7 SHORE PROTECTION - EVIA II ISLAND PERIMETER ............................................................. 41
  3.2.8 SHORE PROTECTION - LONG BIRD ISLAND PERIMETER ......................................................... 41
  3.2.9 SHELL HASH – LONG BIRD ISLAND CRUSHED LIMESTONE VENEER ....................................... 42
  3.2.10 DREDGING STANDBY TIME ................................................................................................. 42
3.3 STONE, SHELL HASH AND CULTCH MEASUREMENT .............................................................. 43
  3.3.1 TRUCK WEIGHT TICKET METHOD .................................................................................. 43
  3.3.2 BARGE DISPLACEMENT METHOD .................................................................................... 43
3.4 SITE EROSION PROTECTION, DRAINAGE AND SURVEYS .............................................................. 44
4 SURVEYING .................................................................................................................................. 45
  4.1 SCOPE OF WORK ......................................................................................................................... 45
  4.2 REFERENCES ............................................................................................................................... 45
  4.3 QUALITY ASSURANCE/QUALITY CONTROL STANDARDS ...................................................... 46
    4.3.1 TEXAS LICENSED REGISTERED PROFESSIONAL LAND SURVEYOR OR ENGINEER ............... 46
    4.3.2 REAL TIME KINEMATIC GLOBAL POSITIONING SYSTEMS ..................................................... 46
  4.4 PROJECT DATUM ....................................................................................................................... 46
  4.5 SURVEY CONTROL ..................................................................................................................... 46
  4.6 SURVEY ACCURACY .................................................................................................................... 46
  4.7 LAYOUT OF WORK ....................................................................................................................... 47
  4.8 PRE-DREDGE HAZARD AND PIPELINE SURVEYS ..................................................................... 47
  4.9 POST-DREDGE PIPELINE SURVEYS ......................................................................................... 48
  4.10 CHANNEL HYDROGRAPHIC SURVEYS ...................................................................................... 48
    4.10.1 BD SURVEYS ................................................................................................................ 49
    4.10.2 INTERIM SURVEYS ....................................................................................................... 49
    4.10.3 INTERIM AD SURVEYS ................................................................................................... 49
    4.10.4 FINAL ACCEPTANCE SURVEYS .................................................................................... 50
  4.11 PLACEMENT AREA SURVEYS ...................................................................................................... 50
    4.11.1 PRECONSTRUCTION SURVEYS .................................................................................... 51
    4.11.2 INTERIM CONSTRUCTION SURVEYS ............................................................................. 51
    4.11.3 FINAL SHAPING AND GRADING SURVEYS .................................................................. 51
    4.11.4 FINAL ACCEPTANCE SURVEY ..................................................................................... 52
  4.12 SHORE PROTECTION SURVEYS ................................................................................................. 52
    4.12.1 POST-DREDGING SHORELINE SURVEY ....................................................................... 53
    4.12.2 POST-EXCAVATION AND GRADING SURVEY ................................................................ 53
    4.12.3 INTERIM CONSTRUCTION SURVEYS .............................................................................. 53
    4.12.4 FINAL ACCEPTANCE SURVEY ..................................................................................... 54
  4.13 CULTCH THICKNESS TESTING ................................................................................................. 54
  4.14 SHELL HASH – LONG BIRD ISLAND CRUSHED LIMESTONE VENEER SURVEYS ......................... 55
4.14.1 POST-EXCAVATION AND GRADING SURVEY .......................................................... 56
4.14.2 INTERIM CONSTRUCTION SURVEYS ................................................................. 56
4.14.3 FINAL ACCEPTANCE SURVEY ............................................................................. 56

5 ENVIRONMENTAL PROTECTION .............................................................................. 58
5.1 GENERAL REQUIREMENTS .................................................................................... 58
  5.1.1 CONSTRUCTION AUTHORITY .......................................................................... 58
  5.1.2 PROTECTION OF LAND RESOURCES ............................................................... 58
  5.1.3 LOCATION OF FIELD OFFICES, STORAGE, AND OTHER CONTRACTOR FACILITIES ........................................................................................................ 58
  5.1.4 TEMPORARY EXCAVATIONS AND EMBANKMENTS ........................................ 59
  5.1.5 PLACEMENT OF SOLID WASTES ........................................................................ 59
  5.1.6 PLACEMENT OF SOLID WASTE BY REMOVAL FROM PORT AUTHORITY PROPERTY ........................................................................................................ 59
  5.1.7 PLACEMENT OF DISCARDED MATERIALS ........................................................... 59
  5.1.8 SANITATION FACILITIES .................................................................................. 59
  5.1.9 MAINTENANCE OF POLLUTION CONTROL FACILITIES .................................... 59
5.2 TURBIDITY AND WATER QUALITY .......................................................................... 59
5.3 AIR QUALITY ........................................................................................................... 59
  5.3.1 GENERAL REQUIREMENTS ............................................................................... 59
  5.3.2 COMMITMENTS FOR GENERAL CONFORMITY .................................................... 60
5.4 FISH AND WILDLIFE RESOURCES ...................................................................... 62
  5.4.1 MIGRATORY BIRD TREATY ACT (MBTA) ............................................................. 62
  5.4.2 ENDANGERED SPECIES ACT (ESA) ................................................................. 62
  5.4.3 OYSTER REEFS .................................................................................................. 62
5.5 CULTURAL RESOURCES .......................................................................................... 63

6 HOUSTON SHIP CHANNEL DREDGING AND PLACEMENT ................................... 64
6.1 SCOPE OF WORK .................................................................................................... 64
6.2 HYDRAULIC DREDGING AND PLACEMENT ......................................................... 65
  6.2.1 ORDER OF WORK FOR DREDGING ................................................................. 65
  6.2.2 ESTIMATED QUANTITIES BY STATION .............................................................. 66
  6.2.3 ANTICIPATED WORK BY OTHERS ...................................................................... 67
  6.2.4 SHOALING ......................................................................................................... 67
  6.2.5 REAL TIME KINEMATIC (RTK) GPS FOR DREDGING AND PLACEMENT OPERATIONS ..................................................................................................... 67
  6.2.6 PIPELINES ......................................................................................................... 68
  6.2.7 HYDRAULIC DREDGING OPERATIONS .............................................................. 70
  6.2.8 MONITORING .................................................................................................... 71
  6.2.9 PROTECTION OF THE PLACEMENT AREA ......................................................... 71
  6.2.10 PLANT ............................................................................................................... 71
  6.2.11 REMOVAL OF PLANT AND CLEANUP .............................................................. 71
  6.2.12 MEASUREMENT AND PAYMENT .................................................................... 71

7 HYDRAULIC FILL CONSTRUCTION ............................................................................ 73
7.1 SCOPE OF WORK .................................................................................................... 73
7.2 REFERENCES .......................................................................................................... 73
7.3 MATERIALS ............................................................................................................. 73
  7.3.1 SATISFACTORY MATERIALS .............................................................................. 74
  7.3.2 UNSATISFACTORY MATERIALS ......................................................................... 74
7.4 GENERAL PROVISIONS ........................................................................................................ 74
  7.4.1 CHANGES IN HYDRAULIC FILL TEMPLATE OR ALIGNMENT .................................................. 74
  7.4.2 PROTECTION ..................................................................................................................... 74
  7.4.3 SITE PREPARATION AND EARTHWORK ............................................................................. 75
7.5 PLACEMENT OF HYDRAULIC FILL ....................................................................................... 75
  7.5.1 CONTROL OF DISCHARGE ................................................................................................. 75
  7.5.2 FINAL SHAPING AND GRADING ....................................................................................... 76
  7.5.3 DAMAGES OR FAILURES ................................................................................................. 77
  7.5.4 EVIA II ISLAND CONSTRUCTION ..................................................................................... 77
  7.5.5 LONG BIRD ISLAND CONSTRUCTION .............................................................................. 78
8  EVIA II ISLAND BEACH CONSTRUCTION ................................................................................. 80
  8.1 SCOPE OF WORK .................................................................................................................... 80
  8.2 REFERENCES ......................................................................................................................... 80
  8.3 HANDLING AND STORAGE .................................................................................................... 80
  8.4 MATERIALS ............................................................................................................................. 80
     8.4.1 SUITABLE MATERIALS FOR BEACH FOUNDATION .............................................................. 80
     8.4.2 SUITABLE MATERIALS FOR EVIA II ISLAND BEACH ........................................................ 80
  8.5 QUALITY COMPLIANCE TESTING ......................................................................................... 81
     8.5.1 SAMPLING ....................................................................................................................... 81
     8.5.2 REQUIRED TESTING ....................................................................................................... 81
     8.5.3 INSPECTION .................................................................................................................... 82
     8.5.4 ACCEPTANCE .................................................................................................................. 82
  8.6 EXECUTION .............................................................................................................................. 82
     8.6.1 BEACH FOUNDATION CONSTRUCTION ........................................................................... 82
     8.6.2 BEACH CONSTRUCTION ................................................................................................... 82
     8.6.3 CHANGES IN DESIGN TEMPLATE OR ALIGNMENT ............................................................. 82
     8.6.4 PROTECTION ................................................................................................................... 82
     8.6.5 REQUIREMENTS OF CONSTRUCTION ............................................................................. 83
     8.6.6 FINAL SHAPING AND GRADING ..................................................................................... 83
     8.6.7 DAMAGES OR FAILURES ............................................................................................... 84
9  SHORE PROTECTION .................................................................................................................. 85
  9.1 SCOPE OF WORK .................................................................................................................... 85
  9.2 REFERENCES .......................................................................................................................... 85
  9.3 HANDLING AND STORAGE .................................................................................................... 86
  9.4 MATERIALS ............................................................................................................................. 86
     9.4.1 STONE ............................................................................................................................... 86
     9.4.2 GEOTEXTILE ..................................................................................................................... 89
  9.5 EXECUTION .............................................................................................................................. 90
     9.5.1 SLOPE PREPARATION ....................................................................................................... 90
     9.5.2 INSTALLATION OF GEOTEXTILES .................................................................................... 90
     9.5.3 INSTALLATION OF BLANKET STONE ............................................................................... 91
     9.5.4 INSTALLATION OF STONE ................................................................................................ 91
     9.5.5 COMPLIANCE INSPECTION ............................................................................................. 91
     9.5.6 TOLERANCES .................................................................................................................... 92
9.5.7 MISPLACED MATERIAL ................................................................. 92
9.5.8 MISPLACED EQUIPMENT ................................................................. 92
9.6 ACCEPTANCE ................................................................................. 92

10 LONG BIRD ISLAND CULTCH PLACEMENT .................................................. 94
10.1 SCOPE OF WORK ........................................................................... 94
10.2 REFERENCES .................................................................................. 94
10.3 HANDLING AND STORAGE ............................................................... 94
10.4 MATERIALS .................................................................................... 94
  10.4.1 Cultch Material ........................................................................ 94
10.5 QUALITY COMPLIANCE TESTING ...................................................... 95
  10.5.1 SAMPLING ................................................................................ 95
  10.5.2 REQUIRED TESTING ............................................................... 95
  10.5.3 INSPECTION ............................................................................ 96
  10.5.4 ACCEPTANCE ......................................................................... 96
10.6 EXECUTION ................................................................................... 96
  10.6.1 SURFACE PREPARATION ......................................................... 96
  10.6.2 INSTALLATION OF CULTCH ..................................................... 96
  10.6.3 REQUIREMENTS OF CONSTRUCTION ....................................... 96
  10.6.4 QUALITY ASSURANCE ............................................................ 98
  10.6.5 CORRECTIVE ACTIONS ........................................................... 98
10.7 ACCEPTANCE ............................................................................. 99

11 LONG BIRD ISLAND SHELL HASH PLACEMENT ......................................... 11-1
11.1 SCOPE OF WORK .......................................................................... 11-1
11.2 REFERENCES ................................................................................. 11-1
11.3 HANDLING AND STORAGE .............................................................. 11-1
11.4 MATERIALS .................................................................................. 11-1
  11.4.1 SHELL HASH .......................................................................... 11-1
11.5 QUALITY COMPLIANCE TESTING .................................................... 11-2
  11.5.1 SAMPLING ............................................................................. 11-2
  11.5.2 REQUIRED TESTING ............................................................. 11-2
  11.5.3 INSPECTION .......................................................................... 11-3
  11.5.4 ACCEPTANCE ....................................................................... 11-3
11.6 EXECUTION ................................................................................ 11-3
  11.6.1 SURFACE PREPARATION ......................................................... 11-3
  11.6.2 INSTALLATION OF SHELL HASH ............................................. 11-3
  11.6.3 REQUIREMENTS OF CONSTRUCTION ....................................... 11-3
  11.6.4 QUALITY ASSURANCE ............................................................ 11-5
  11.6.5 CORRECTIVE ACTIONS ........................................................... 11-5
11.7 ACCEPTANCE ............................................................................. 11-6
LIST OF TABLES

Table 2-1: Pipelines Near the Project Area ................................................................. 28
Table 4-1: Survey Accuracies .................................................................................... 47
Table 4-2: Summary of Channel Surveys ................................................................. 49
Table 4-3: Summary of Placement Area Surveys .................................................... 51
Table 4-4: Summary of Shore Protection Surveys .................................................. 52
Table 6-1: Summary of Required Grades and Side Slopes for the HSC ECIP .......... 65
Table 6-2: HSC Acceptance Sections ..................................................................... 65
Table 6-3: Estimated Dredge Quantities for the HSC ECIP .................................. 66
Table 7-1: Neatline Quantities for Construction at Evia II Island ......................... 77
Table 7-2: Neatline Quantities for Construction at Long Bird Island ................... 78
Table 8-1: D-F Blend Gradation ............................................................................. 81
Table 8-2: Neatline Quantities for Evia II Island Beach ....................................... 83
Table 9-1: Test Requirements for Stone Quality..................................................... 87
Table 9-2: Stone Dimensions for Shore Protection at Evia II Island .................... 88
Table 9-3: Stone Dimensions for Shore Protection at Long Bird Island ............... 89
Table 9-4: Physical Requirements for Woven Geotextiles .................................... 89
Table 10-1: Estimated Material Rates to Achieve Required Elevation .................. 97
Table 11-1 Estimated Material Rates to Achieve Target Relief ................................. 11-4

LIST OF APPENDICES TO THE TECHNICAL SPECIFICATIONS

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


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

Appendix D: Required Relocation of Navigation Aides Plan
1 GENERAL INFORMATION

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

1.2 PROJECT DESCRIPTION
This project consists of new work dredging of the Houston Ship Channel with new work dredge materials to be used to construct Evia II Island and Long Bird Island. The project is described further in this section.

1.2.1 HOUSTON SHIP CHANNEL EXPANSION CHANNEL IMPROVEMENT PROJECT
The Houston Ship Channel Expansion Channel Improvement Project encompasses dredging of the Bolivar Roads Channel (BRC) from approximate Station 02+607.32 to Station 00+000 and dredging of the Houston Ship Channel (HSC) from approximate Station 138+369 at the southern end of the HSC to approximate Station 98+000. New work dredging will widen the existing 530-foot wide channel equally on each side to a new 700-foot wide channel as shown on the Plans. Additional new work dredging includes bend easings at Station 138+369 and Station 128+731. Barge lanes will be replaced in-kind to their existing dimensions to the outside of the channel widening as shown on the Plans.

New work dredging of the HSC and BRC shall be dredged within the limits shown on the Plans. The existing 530-foot wide template was created with a 3H:1V slope (maintained at 2.5H:1V) beginning at the authorized elevation of minus 46 feet with a box cut down to the allowable overdepth. The new work template shall have a 3H:1V slope beginning at the required elevation of minus 48 feet, with 2 feet of required overdepth plus 1 foot of allowable overdepth. New work materials from BRC Station 02+607.32 to Station 00+000 and HSC Station 138+369 to Station 98+000 include the channel widening, bend easings, and offset of the barge lanes as shown on the Plans. New work materials are expected to be predominantly virgin materials and may consist of: soft silts and muds; soft, firm, stiff, very stiff, hard, lean and fat clays; fine to coarse and loose to very dense sands; silty sands; calcareous nodules; rock; and shell as shown on the Plans and in Appendix A.

New work materials removed shall be used to construct Evia II Island and Long Bird Island. Both Evia II Island and Long Bird Island features must be constructed in their entirety. Evia II Island is an approximate 4.8-acre beneficial use island located in lower Galveston Bay, east of the HSC. Construction includes hydraulic placement of dredged material to provide for the minimum lines and grades shown on the Plans to construct an approximate 4.8-acre bird island and placement of imported crushed stone to build a beach on the southeast end of the island. Rock shore protection shall be placed along the perimeter of the island and beach to minimize wave impacts.
Long Bird Island is an approximate 3.9-acre proposed beneficial use island located in lower Galveston Bay, east of the HSC, and north of the proposed Evia II Island. Construction includes hydraulic placement of dredged material to provide for the minimum lines and grades shown on the Plans to construct Long Bird Island, a perimeter dike along the west side and an elevated foundation pad for an oyster reef wave trip on the east side. A 30-inch culch layer shall be placed over the oyster reef wave trip to provide 100% coverage of the reef pad. Rip rap shall be placed along the perimeter of the west side dike to minimize wave impacts. Shell hash, or a similar blend of materials approved by the Engineer, shall be placed to create a final 6-inch veneer layer on top of the island that creates a natural nesting habitat for shorebirds.

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

1.3 DREDGE PLANT

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

In addition, at the Port’s discretion, the bidder may be required to show to the satisfaction of the Port of Houston Authority that the bidder has the necessary experience, ability, and financial resources to perform the work in a satisfactory manner and within the time stipulated, and has had experience in marine construction works with dredging of hard new work materials of the same type, or of a more complex nature as to be dredged under this contract, in excess of $100 million. Maintenance dredging contracts do not constitute projects similar in nature or complexity.

1.4 REFERENCES

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


1.5 TECHNICAL DEFINITIONS

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

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

Demobilization: The term demobilization shall include the work in connection with demobilization of the plant and equipment utilized to perform work under the various bid items and include the cost to remove pipelines to and at the placement area(s). The Contract price shall include transportation and other costs incidental for the removal of the plant and equipment from the work sites.

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

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

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

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

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

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

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

D-F Blend: D-F blend is a crushed limestone product that generally matches the gradation of existing shell hash common in the Galveston Bay region.
**Dike:** This term shall mean the earth fill portions of the new dike structure and all other fills within the limits of the dike system, including rock armor and geotechnical/geotextile membranes.

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

**Mechanical Fill:** Mechanical fill shall mean any material excavated from borrow areas within or adjacent to the existing placement areas, and placed using mechanical means and methods including, but not limited to, drag lines, dozers, loaders, dump trucks, or other non-waterborne machinery.

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

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

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

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

**Oyster Reef Wave Trip:** This term is used in this Contract to refer to the individual structure shown, which is defined by area, length, width, minimum required quantity of hydraulic fill and cultch, and minimum required elevations and thickness of cultch.

**Permit:** The term permit shall mean all permits obtained by the Port Authority and shall include the USACE permit and any other permits required for work, whether obtained by the Port Authority or the Contractor.

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

**Port Authority:** The Port of Houston Authority of Harris County, Texas is a political subdivision of the State of Texas. The terms “Port,” “Port Houston”, “Port of Houston Authority”, “PHA” and “Port Authority” are synonymous with the Port of Houston Authority of Harris County, Texas. The Port Authority is independent and not a part of the government of Harris County, Texas or the City of Houston.
Retention Dike: The term retention dike shall mean a ridge of mechanically constructed material to control the flow of hydraulically placed material.

Shoaled Materials: The term shoaled materials shall mean the material that accumulates over time above the previously dredged surface, consisting of mostly silts, clays, sands, and shells.

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

1.6 EQUIPMENT DEFINITIONS
Crawler-Type Tractors: Crawler-type tractors used for spreading and compacting shall weigh not less than 30,000 pounds, shall exert a unit tread pressure of not less than 7 pounds per square inch, and shall not be operated at a speed to exceed 5 miles per hour.

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

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

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

Spillbarge: The Contractor must also have, as part of the dredging plant, a “controllable spill barge” to disperse the dredged material in the open water placement areas. The Contractor must have the mechanism built into the spill barge to allow full control of the barge’s movements, side to side, and forward/backward. The Contractor must have an electronic tracking system onboard this spillbarge, with which the operator will know where the barge is at all times and be able to make controlled movements.
1.7 SPECIAL SCHEDULING REQUIREMENTS

1.7.1 ORDER OF WORK
In general, the order of work shall be performed as follows:

1. NW Dredging HSC to Evia II Island
2. NW Dredging HSC to Long Bird Island.

The order of work shall be in accordance with Technical Specifications Part 6. Construction shall be continuous from start to finish with no appreciable shut down periods.

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

1.8.1 CONTRACTOR OBTAINED PERMITS
Any necessary permits not provided by the Port Authority shall be the responsibility of the Contractor as described in Part 5. The Contractor shall make application for and pay for any necessary permit fees, temporary or permanent utility interruption(s) and/or relocation fees, transportation, and temporary staging areas.

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

1.10 LOCAL CONDITIONS AND SITE PHYSICAL DATA
Information furnished herein is for the Contractor’s review. However, it is expressly understood that the Engineer is not responsible for any interpretation or conclusion drawn by the Contractor. The Port Authority and Engineer are also not responsible for any lack of information herein pertaining to physical conditions at the site. Likewise, the Port Authority and Engineer will not be responsible for any information provided to the Contractor by any information agency or other party other than the Engineer. The Contractor shall make every effort possible to familiarize itself with and research the conditions to be expected at the site.

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

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

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

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

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

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

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

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

1.11 PRESERVATION OF PUBLIC AND PRIVATE PROPERTY
The Contractor shall preserve and protect the existing informational and directional signs, facilities, station markers, mile markers, mooring piles and other items which have been established along either bank of the channel within the reaches of the dredging operations specified herein except as described in Subpart 1.13.2.

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

1.12 UTILITY PIPELINES
Every effort has been made to give pertinent details on the location of utility pipelines and other facilities which may be encountered in trenching, jacking, dredging, or earthwork operations. The data
shown are substantially correct. However, the Contractor shall investigate existing conditions and satisfy itself as to the existence of additional construction which may interfere with pipelines lying herein. THE CONTRACTOR SHALL CALL THE TEXAS ONE CALL SYSTEM (811) A MINIMUM OF 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION (DIGGING, DREDGING, JETTING, ETC.) OR ANY DEMOLITION ACTIVITY. PIPELINE SAFETY, AND THE PROTECTION OF PIPELINES OR OTHER UTILITIES, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

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

1.13 NAVIGATION

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

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

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

1.13.4 LOOKOUTS AND RADIO COMMUNICATIONS
When working in a federal channel, the Contractor shall have a dedicated lookout person posted in the dredge control room at all times to visually monitor the movement of vessels around the dredge plant and to perform radio communications with company workboats and to deliver passing arrangements with other commercial, fishing, and recreational vessels. The lookout shall be competent in the English language, the U.S. Coast Guard and Federal Communications Commission radio communications procedures and requirements and trained in the Vessel Bridge to Bridge Radiotelephone Act. The lookout shall maintain up to the minute information on the status of each company workboat as well as approaching vessels and will communicate this information as required to prevent collisions and shall comply with all requirements of the Houston-Galveston Vessel Traffic Service (VTS) area as outlined in Part 1 Subsection 1.13.7. Each company workboat shall check in with the lookout when arriving at the dredge and shall receive radio clearance from the lookout before departing the dredge. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL BE CONSIDERED A VIOLATION OF THE SAFETY PROTOCOL ESTABLISHED HEREIN. PURSUANT TO THE DIRECTION OF THE PORT AUTHORITY, THE CONTRACTOR MAY BE REQUIRED TO CEASE OPERATIONS UNTIL THIS PROVISION IS COMPLIED WITH. ANY SUSPENSION, DELAY OR INTERRUPTION OF WORK ARISING FROM NON-COMPLIANCE OF THIS PROVISION SHALL NOT CONSTITUTE A BREACH OF THIS CONTRACT AND SHALL NOT ENTITLE THE CONTRACTOR TO ANY PRICE ADJUSTMENT UNDER THE CONTRACT CLAUSE ENTITLED TERMINATION AND SUSPENSION OR ANY OTHER MANNER UNDER THIS CONTRACT.

1.13.5 SIGNAL LIGHTS
The Contractor shall display signal lights and conduct its operations in accordance with the general regulations of the Department of the Army and the U.S. Coast Guard. These general regulations govern lights and day signals on towing vessels with tows, vessels working on wrecks, dredges, vessels engaged in laying cables or pipe, dredge pipelines, vessels of more than 65 feet in length moored or anchored in a fairway or channel, and floating plants working in navigable channels, as set forth in Commandant U.S. Coast Guard Instruction M16672.2, Navigation Rules: International – Inland (COMDTINST M16672.2), or 33 Code of Federal Regulations 81 Appendix A (International) and 33 Code of Federal Regulations 84 through 89 (inland) as applicable.
1.13.6 RANGES, GAGES, AND LINES
Ranges, buoys, and other markers needed to define the work and facilitate inspection shall be provided, set, and maintained in good order. Gages shall be established and maintained in locations observable from all dredge areas so the depth may always be determined.

1.13.7 HOUSTON-GALVESTON VESSEL TRAFFIC SERVICE AREA
The Contractor shall comply with the following requirements while operating within the Houston-Galveston Vessel Traffic Service (VTS) area.

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

- Location of intended operation
- Description of intended operation including channel obstructions
- Configuration of pipelines, if any, crossing the channel
- Termination point of pipelines, if any, crossing the channel
- Time required to re-open channel or move for vessel traffic
- Operating impairments, including VHF-FM radios

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

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

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

1.13.7.5 OPERATIONS
The master of a dredge or floating plant shall be aware of and comply with the provisions of the Order Relating to Lightering and Bunkering Operations and Multiple Vessel Moorings and will notify the Houston-Galveston VTS when refueling operations are to be conducted.
1.13.8 DREDGE TRACKING
The Port Authority may elect to install GPS tracking units and/or cameras onboard the dredge(s). Units will be installed and maintained by the Port Authority GPS contractor. Access to the vessel shall be provided by the Dredging Contractor to allow installation, maintenance, and removal of the tracking units by the Port Authority GPS contractor. The GPS tracking units are the property of the Port Authority and will be removed by the Port Authority GPS contractor prior to dredge demobilization.

1.13.9 AUTOMATIC IDENTIFICATION SYSTEM (AIS)
A Class “A” Automatic Identification System (AIS) in accordance with the Code of Federal Regulations (CFR) title 33, CFR 164.46, as amended, is required for all dredges used on this contract.

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

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

Prior to performing work where a quantity variation above 115% or below 85% is determined to exist, the Contractor shall notify the Engineer in writing within three days of discovering or anticipating such condition. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request in writing, an extension of time, to be received by the Engineer within ten (10) days from the beginning of the delay, or within such further period as may be granted by the Port Authority before the date of final settlement of the Contract. Upon receipt of a written request for an extension, the Engineer shall ascertain the facts and make an adjustment for extending the Contract time as is justified.

1.15 UNAUTHORIZED PLACEMENT OF MATERIAL
1.15.1 MISPLACED MATERIAL
Excavated material that is deposited elsewhere than in places designated or approved will not be paid for, and the Contractor may be required to remove the misplaced excavated material and deposit it where directed by the Engineer at no cost to the Port Authority.
1.15.2 DEBRIS DISPOSAL
During the progress of the work, the Contractor shall not deposit worn out discharge pipe, wire rope, scrap metal, timbers, or other rubbish or obstructive material into the placement areas or within or along the banks of the navigable waters. This material, together with scrap, rope, wire cable, piles, pipe, or other obstructive material which may be encountered during the dredging operations, shall be disposed of by the Contractor at locations in accordance with any and all applicable Federal, State, or local requirements.

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

1.17 USE OF PORT AUTHORITY PREMISES AND WORK AREA CONDITIONS

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

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

1.17.3 SITE MAINTENANCE
Trash or debris shall not be allowed to accumulate on the site. The Contractor shall clean the entire area of any litter resulting from the Contractor's operations on a daily basis. The Contractor shall maintain the premises as clean and presentable, as good construction practices will allow, at all times.
1.17.4 EXCLUSION OF THE PUBLIC
The Contractor will be permitted to exclude the public from the work areas in the immediate vicinity of its dredging, transporting, and disposal operations. Enforcement shall be the Contractor’s responsibility at no additional cost to the Port Authority. Should enforcement be required, it shall be coordinated with local enforcement agencies, and notification shall be provided to the Port Authority in the event of such occurrence.

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

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

1.20 ACCESS AND STAGING
The work site is accessible by waterborne transportation only. All staging areas are to be provided by the Contractor but shall at all times provide safe access and staging for all work including, but not limited to, surveying, dredging, and the transportation and disposal of dredged materials. The Contractor shall be responsible for maintaining staging and access necessary for its equipment and plant to and from the site, mooring area, and placement area. The Contractor shall ascertain the environmental conditions that can affect the access such as climate, winds, current, waves, depths, shoaling, and scouring tendencies. The Contractor shall be responsible for providing access to the site for their employees as well as the Port Authority and/or the Engineer and other Port Authority authorized representative(s) when requested, to include daily inspection of the dredge area and placement sites, at no additional cost to the Port Authority. The Contractor shall be responsible for obtaining all necessary permissions for use of landing areas to load and offload its crews. The Contractor shall be responsible for following any and all permit requirements or conditions regarding pipelines and pipeline routes, as well as any other permit or regulatory requirements regarding material transport or personnel transport. No separate payment shall be made for site access or staging areas.

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

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

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

1.21 PROTECTION OF EXISTING WATERWAYS
The Contractor shall conduct its operations in such a manner that material or other debris are not deposited in existing channels or other areas adjacent to the site. Should the Contractor, during the progress of the construction, lose, dump, throw overboard, sink, or misplace any material, plant, machinery or appliance, the Contractor shall recover and remove the same with the utmost dispatch. The Contractor shall give immediate notice to the Port Authority, with description and location of such obstructions, until the same are removed. Should the Contractor refuse, neglect, or delay compliance with the above requirements, such obstructions may be removed by the Port Authority, and the cost of such removal may be deducted from any money due or to become due to the Contractor, or may be recovered under its bond. The liability of the Contractor for the removal of a vessel wrecked or sunk
without fault or negligence shall be limited to that provided in Sections 15, 19, and 20 of the Rivers and Harbors Act of March 3, 1899 (33 U.S.C 410 et seq).

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

1.23 SURFACE AND SUBSURFACE STRUCTURES AND UTILITIES WITHIN THE SITE
The Plans show the locations of all known structures pertinent to the work. The locations of surface and subsurface features shown on the Plans are not exact. Locations of underground utilities have not been field verified. The Contractor is notified that uncharted and/or incorrectly chartered pipelines and/or underwater obstructions may be present within the site. Prior to commencement of work, the Contractor shall verify in the field with a pre-dredge hazard survey the location of any known, unknown, or suspected underground utilities or other obstructions to the satisfaction of the Contractor.

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

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

The Engineer and Port Authority assumes no responsibility or liability for failure to show any or all of these utilities, structures or other obstructions on the Plans or to show them in their exact location. Failure to show and/or show correctly will not be considered sufficient basis for claims or for additional compensation for extra work in any manner whatsoever, unless the obstruction encountered is such as to necessitate substantial changes in the lines or grades, or requires the building of special work for which no provision is made. It is assumed that the Contractor has thoroughly inspected the site, is
informed as to the correct location of surface and subsurface structures, and has considered and allowed for all foreseeable incidental work due to variable subsurface conditions, whether such conditions and such work are fully and properly described in the Contract Documents or not. Minor changes and variations of the work specified and shown on the drawings shall be expected by the Contractor and allowed for as incidental to the satisfactory completion of a whole and functioning work or improvement.

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

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

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

END OF SECTION
2   SUBMITTALS AND SUBMITTAL REQUIREMENTS

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

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

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

2.3   SUBMITTALS AFTER AWARD
The items listed below are required within fourteen (14) days of Contract award.
2.3.1 SCHEDULE OF VALUES
Submit no later than fourteen (14) days within award of the Contract a schedule of values (Contract price breakdown), itemizing material and labor for each classification of work. The schedules of values shall be in accordance with the Contract Documents.

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


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

2.3.3 ACCIDENT PREVENTION PLAN
The Contractor shall comply with the provisions of EM 385-1-1. If the Contractor is a currently accepted participant in the Dredging Contractors of America (DCA) and United States Army Corps of Engineers (USACE) Dredging Safety Management Program (DSMP), as determined by the DCA and USACE Joint Committee, and holds a current valid Certificate of Compliance for both the Contractor Program and the Dredger(s) to be used to perform the work required under this contract, the Contractor may, in lieu of the submission of an Accident Prevention Plan (APP):
• Make available for review, upon request, the Contractor’s current Safety Management System (SMS) documentation

• Submit to the Engineer the current valid Company Certificate of Compliance for its SMS

• Submit the current dredge(s) Certificate of Compliance based on third party audit

• Submit for review and acceptance, site specific addenda to the SMS as specified in the solicitation

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

• A description of the quality control organization, including a chart showing lines of authority and acknowledgment

• The names, responsibilities, and authorities of each person on the quality control organization chart

• Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors

• Reporting procedures, including quality control report forms and a retention rate spreadsheet for approval

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

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

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

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

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

2.4.2 WORK PLAN AND SCHEDULE OF WORK
Fourteen (14) days prior to the preconstruction conference, the Contractor shall provide separate detailed work plans for NW Dredging HSC to Evia II Island and NW Dredging HSC to Long Bird Island, including lists of equipment to be utilized, name(s) of dredge(s) to be used, estimated quantities and Schedules of Work. Equipment shall include, but not be limited to, all plant(s), vessels, vessel-tracking systems, and other equipment for each phase of work. Each schedule of work shall indicate, at a minimum, the start of work, start of excavation and placement, construction period, and completion of all work. The schedules shall be in bar-chart form that indicates all work tasks, differentiates critical path work tasks from non-critical path tasks, and shows the beginning and ending dates for each critical and non-critical path work task.

The Contractor shall comply with the provisions described in the Technical Specifications Part 6 pertaining to the order of work, including the anticipated progression of each component within the site.
The Project construction time is as outlined in Special Condition Part 10. The Contractor shall inform the Engineer if additional time is required. The work plan and schedule of work shall become part of the Contract and shall be incorporated into the Contract Documents.

2.4.2.1 PIPELINE ROUTE PLAN
For each work plan and schedule of work, the Contractor shall include for approval a pipeline route plan, detailing the locations and method of placement of all dredge discharge pipelines. The project configurations may require the discharge pipelines to cross navigable waters; therefore, the plans shall include the method by which the pipelines will be placed to avoid impedance of commercial and recreational marine traffic. Pipeline routes shall be chosen in a manner that provides minimal impact to the environment. The Contractor shall prepare the pipeline route plans in accordance with the order of work to ensure that the new work materials can be utilized to complete the hydraulic fill construction in accordance with Part 6 of the Technical Specifications.

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

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

2.4.2.3 **SHORE PROTECTION SUBMITTALS**
For each work plan and schedule of work, the Contractor shall submit the following for review:

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

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

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

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

2.4.2.6.1 **BEACH WORK PLAN AND SCHEDULE**
The Contractor shall submit a beach construction work plan and schedule that describes the equipment, stockpiling, loading and unloading, transportation, placement methods, and sequences planned to be used in Beach Foundation construction and beach fill placement. The plan shall clearly state the proposed material source for the beach fill materials. This plan shall also include quality control procedures and a list of the major pieces of equipment that are to be used for performing the beach fill work. This plan and schedule shall be submitted for review prior to shipment of material to be used for beach construction. The Contractor shall not commence beach work until the plan and schedule have been reviewed and incorporated into the overall construction and progress schedule.

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

The Contractor shall comply with the provisions described in the Technical Specifications Part 8 subsection 8.4 pertaining to suitable materials.

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

2.4.4 **SHELL HASH WORK PLAN AND SCHEDULE**
The Contractor shall submit a shell hash work plan and schedule that describes the equipment, stockpiling, loading and unloading, transportation, placement methods to achieve the required thickness of 6-inches, and sequences planned to be used for shell hash placement. This plan shall also include quality control procedures and a list of the major pieces of equipment that are to be used for performing the work. This plan and schedule shall be submitted for review prior to shipments of shell
hash. The Contractor shall not commence shell hash work until the plan and schedule have been reviewed and incorporated into the overall construction and progress schedule.

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

- Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection (i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historic, archeological, and cultural resources).

- Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall provide written assurance that immediate corrective action will be taken to prevent pollution of the environment due to accident, natural causes, or failure to follow the procedures set out in accordance with the environmental protection plan.

- Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossing, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.

- Methods of protecting surface and ground water during construction activities.

- Descriptions of the methods and measures for the prevention of oil spills (i.e., ground cover, containment, absorbent, etc.)

- Work area plans showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The plan should include measures for marking the limit.

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

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

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

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

2.5 PRECONSTRUCTION SUBMITTALS
This section applies to the submittals required prior to commencement of the work.
2.5.1 **SURVEY CONTROL CHECKS**
Project control monumentation has been provided by the Engineer. The Contractor shall perform preconstruction survey control checks on the provided project control monumentation and provide the results to the Engineer. Any discrepancy from the published values shall be immediately brought to the attention of the Engineer, prior to use of the project control monumentation for work.

2.5.2 **CONSTRUCTION MATERIALS**

2.5.2.1 *Materials Sampling and Testing Reports*
Sampling and testing reports shall be submitted for the beach fill, cultch, and shell hash materials and as specified in these Technical Specifications. This submittal requires PHA approval.

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

2.5.2.3 *Materials Samples*
A sample of 150 pounds of cultch material shall be submitted 7 days prior to commencement of oyster reef wave trip construction. An additional sample of cultch material shall be submitted after placement of the first 1,000 tons of material. This submittal requires PHA approval.

A sample of 150 pounds of shell hash material shall be submitted 7 days prior to commencement of shell hash placement on Long Bird Island. An additional sample of shell hash material shall be submitted after placement of the first 1,000 tons of material. This submittal requires PHA approval.

Samples of beach material shall be submitted per 1,000 tons of material placed. This submittal requires PHA approval.

For each material sample supplied, the Contractor shall notify the Engineer at least 7 days prior to sample collection in order to allow the Engineer to be present at the time of sample collection.

2.6 **CONSTRUCTION SUBMITTALS AND NOTICES**
This section applies to the submittals required immediately before and during construction.

2.6.1 **NOTIFICATION OF INTENTION TO DREDGE**

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

The Contractor shall notify and coordinate work with pipeline companies at least ten (10) days before performing any portion of the work near the pipelines in the vicinity of the site as shown. At the Contractor’s expense, necessary protective measures shall be provided as required by the pipeline company when crossing utility pipelines with a dredge submerged pipeline. Possible protective measures include but are not limited to, floating the dredge pipeline over 100 feet each side of the utility pipeline or installing a protective padding between the submerged pipeline and utility pipeline.

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

Table 2-1: Pipelines Near the Project Area

<table>
<thead>
<tr>
<th>OWNER</th>
<th>SIZE (IN)</th>
<th>CONTENTS</th>
<th>APPROX. CL STATION</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL PASO SERVICES, L.P.</td>
<td>24</td>
<td>CRUDE OIL</td>
<td>124+246.26</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>HOUSTON OIL &amp; MINERALS CORP.</td>
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<td>NATURAL GAS</td>
<td>114+761.52</td>
<td>IN SERVICE</td>
</tr>
<tr>
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<td>NATURAL GAS</td>
<td>114+554.11</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>HOUSTON PIPELINE COMPANY L.P.</td>
<td>16</td>
<td>NATURAL GAS</td>
<td>112+113.76</td>
<td>ABANDONED</td>
</tr>
<tr>
<td>WILLIAMS FIELD SERVICES CO., LLC</td>
<td>16</td>
<td>NATURAL GAS</td>
<td>112+128.37</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>KINDER MORGAN TEJAS PIPELINE, L.P.</td>
<td>18</td>
<td>NATURAL GAS</td>
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<td>IN SERVICE</td>
</tr>
<tr>
<td>FLORIDA GAS TRANSMISSION COMPANY, LLC</td>
<td>24</td>
<td>NATURAL GAS</td>
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<td>IN SERVICE</td>
</tr>
<tr>
<td>DAVIS PETROLEUM PIPELINE LLC</td>
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<td>ABANDONED</td>
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<tr>
<td>DAVIS PETROLEUM PIPELINE LLC</td>
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</tr>
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<td>LAYTON ENERGY, INC.</td>
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<td>NATURAL GAS</td>
<td>55+128.76</td>
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<tr>
<td>DAVIS PETROLEUM PIPELINE LLC</td>
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</tr>
<tr>
<td>ENTERPRISE PRODUCTS OPERATING LLC</td>
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<td>ETHANE</td>
<td>01+691.07</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>PRAXAIR INC.</td>
<td>10.75</td>
<td>HYDROGEN</td>
<td>120+76.63</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>EVIA II ISLAND</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOUSTON OIL &amp; MINERALS CORP.</td>
<td>6.63</td>
<td>NATURAL GAS</td>
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<td>ABANDONED</td>
</tr>
<tr>
<td>WILLIAMS FIELD SERVICES CO., LLC</td>
<td>16</td>
<td>NATURAL GAS</td>
<td>N/A</td>
<td>IN SERVICE</td>
</tr>
<tr>
<td>GENESIS OFFSHORE HOLDINGS, LLC</td>
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<td>CRUDE OIL</td>
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<td>IN SERVICE</td>
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<tr>
<td>AZIMUTH ENERGY, LLC</td>
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<td>ABANDONED</td>
</tr>
<tr>
<td>LONG BIRD ISLAND</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANNAH ISLAND GATHERING SYSTEM</td>
<td>4.5</td>
<td>CRUDE OIL</td>
<td>N/A</td>
<td>ABANDONED</td>
</tr>
</tbody>
</table>

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

  Texas811 1-800-344-8377

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

The Port Authority shall conduct all BD, interim AD surveys, and final acceptance surveys for measurement and payment and acceptance within the dredge areas. The Port Authority shall also conduct final acceptance surveys for Evia II Island and Long Bird Island upon completion of final shaping and grading. The Contractor shall provide five days’ (5 days’) advance notice of its intent to request a final acceptance survey.

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

2.6.3 PRE-DREDGE HAZARD AND PIPELINE SURVEY

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

All survey data shall be referenced to the project datum as shown in the Technical Specifications and Plans. The pre-dredge hazard and pipeline survey plots shall be signed and sealed by a qualified Texas licensed RPLS or PE and shall legibly and clearly display the following information:

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

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

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

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

The daily quality control report shall be in the approved format (see Technical Specifications Part 2 Subpart 2.3.4.1) and shall include the approved retention rate spreadsheet for reporting hydraulic fill progress (see Technical Specifications Part 2 Subpart 2.3.4.2).

Failure to provide daily quality control reports to the Engineer shall result in delay of payments to the Contractor until the daily quality control reports are received.
2.6.4.1 REPORT OF ENVIRONMENTAL ISSUES
The Contractor shall submit, as specified, logs and final summary report of sightings and incidents with endangered species and other environmental issues. Environmental issues shall be submitted with the daily quality control report.

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

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

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

The Contractor shall use the approved retention rate spreadsheet to report hydraulic fill progress (see Technical Specifications Part 2 Subsection 2.3.4.2).

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

2.6.4.5 EVIA II ISLAND BEACH CONSTRUCTION PROGRESS
A copy of the records of daily inspections, tests, surveys, and corrective actions taken shall be submitted as part of the daily quality control report. The report shall include a description of the material placement and a discussion of prior and ongoing placement activities during the previous 24 hours including the gross and credited quantity of material placed to date.

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

2.6.4.7 CULTCH INSTALLATION PROGRESS
A copy of the records of daily inspections, tests, surveys, and corrective action taken shall be submitted as part of the daily quality control report. The report shall include a description of the cultch placement and a discussion of prior and ongoing placement activities during the previous 24 hours including the quantity of cultch material placed to date for the oyster reef wave trip at Long Bird Island. Cultch material shall be weighed as described in Part 3 Subpart 3.3 and recorded on the daily inspection form at the sole cost and responsibility of the Contractor.

2.6.4.8 SHELL HASH INSTALLATION PROGRESS
A copy of the records of daily inspections, tests, surveys, and corrective action taken shall be submitted as part of the daily quality control report. The report shall include a description of the shell hash placement and a discussion of prior and ongoing placement activities during the previous 24 hours including the quantity of shell hash material placed to date for Long Bird Island.

2.6.4.9 SUBMITTAL OF REPORTS
Daily quality control reports shall be submitted in both hard copy and electronic form as directed. A copy of the completed retention rate spreadsheet shall be attached to the daily quality control report on the Thursday of each week, or as directed. Additionally, on the Thursday of each week or as often as directed, the Contractor shall send the retention rate spreadsheet to an email distribution list that will be provided at the preconstruction conference.
2.6.5 SURVEY SUBMITTALS
The Contractor shall provide daily to the Engineer, all survey data collected by the Contractor during its performance of the work including daily dredging and topographic surveys, volumes placed and retained (as part of the daily quality control report), quantity of geotextile, cultch material, shell hash and riprap installed, and survey plots. Surveys shall be conducted in accordance with Part 4 of the Technical Specifications. In addition, the Contractor shall furnish the copies of all field notes and all other records relating to the survey or to the layout of the work to the Engineer. The Contractor shall retain copies of all such material furnished to the Engineer. Survey submittals shall be submitted electronically in accordance with these Technical Specifications.

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

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

All survey plots shall comprise a well-organized, stand-alone set of drawings that do not include any outdated or superseded information that may have been previously submitted. Plots for the dredge, fill, cultch, shell hash and shore protection installation areas shall include the following:
• Plan sheets clearly documenting locations, limits, and dimensions of completed work and locations where cross sections were taken.

• Cross-sections providing an overlay of initial and final survey transects superimposed with specified templates and tolerances. Drawing scales shall be such that the cross sections and templates are clearly discernible.

• As work progresses, plots documenting completed work shall be submitted with requests for progress payments. In addition, upon completion of all work, a final, complete set of survey plots shall be submitted to document “as-built” conditions of the work. This final submittal shall be a comprehensive, stand-alone set of drawings, not an assembly of individual drawings that were previously submitted with progress pay requests.

2.6.5.2 ELECTRONIC SURVEY SUBMITTALS ON CD OR DVD
In addition to plots, all survey transmittals shall include digital data on labeled CD or DVD. Electronic submittal via email shall be allowed subject to approval by the Engineer. Digital data shall include the following:

• A submittal log documenting surveys submitted to date with descriptors for survey dates and locations

• Survey plots in AutoCAD format

• Survey plots in PDF format

• ASCII files containing northing, easting, elevation, and descriptor for each survey point both raw and corrected data points

• All survey field notes

2.7 POST CONSTRUCTION SUBMITTALS AND NOTICES

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

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

All survey data shall be referenced to the project datum as shown in the Technical Specifications and Plans. The post-dredge hazard survey plots shall be signed and sealed by a qualified Texas licensed RPLS or PE and shall legibly and clearly display the following information:

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

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

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

- Final “as-built” construction drawings showing the constructed hydraulic fill Evia II Island and Long Bird Island, construction AD surveys of the channels, and magnetometer surveys of the submerged pipeline corridors.
- One set of all Project submittals and all equipment and material warranties/guarantees as provided by all appropriate suppliers or manufacturers.
- One set of “Record Drawings” showing all revisions to the original Contract Documents. Drawings shall also show routing of underground outside utilities and conduits with actual dimensions from buildings or other known landmarks where applicable.
• Any and all other documents, keys, manuals, etc. required by the Contract Documents.

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

END OF SECTION
3 MEASUREMENT AND PAYMENT
The following sections encompass the bid items required for the work covered by the Contract price.

3.1 LUMP SUM PAYMENT ITEMS

3.1.1 MOBILIZATION AND DEMOBILIZATION

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

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

3.1.1.2 MEASUREMENT
This shall not be measured for payment.

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

3.1.2 EVIA II ISLAND BEACH CONSTRUCTION

3.1.2.1 GENERAL
The Contract unit price for construction of Evia II Island Beach shall include costs associated with furnishing and transporting beach materials, constructing and maintaining fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing Evia II Island Beach as specified in Part 8 of the Technical Specifications. The cost for sampling and testing of beach material shall be included in the applicable contract price for Evia II Island Beach Construction.

3.1.2.2 MEASUREMENT
This shall be measured by Lump Sum.

3.1.2.3 PAYMENT
Payment for Evia II Island Beach shall be made at the contract lump sum price for “Evia II Island Beach Construction”. No progress payments shall be made for the Evia II Island Beach.
No payment will be made for the construction of the Bird Island Beach Foundation. This work is considered incidental to the beach construction.

3.2 UNIT PRICE PAYMENT ITEMS

3.2.1 NEW WORK HYDRAULIC DREDGING - TO EVIA II ISLAND

3.2.1.1 GENERAL
This item shall mean the Contract unit price for new work dredging and replacement of the existing barge lanes outside the channel as shown on the Plans, with materials used to construct Evia II Island as specified in Part 6 of the Technical Specifications.

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

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

3.2.2 NEW WORK HYDRAULIC DREDGING - TO LONG BIRD ISLAND

3.2.2.1 GENERAL
This item shall mean the Contract unit price for new work dredging and replacement of the existing barge lanes outside the channel as shown on the Plans, with materials used to construct Long Bird Island as specified in Part 6 of the Technical Specifications.

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

3.2.2.3 PAYMENT
Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.
3.2.3  **FINAL SHAPING AND GRADING - EVIA II ISLAND HYDRAULIC FILL**

### 3.2.3.1 GENERAL

The Contract price per acre of final shaping and grading of Evia II Island shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing Evia II Island as specified in Part 6 of the Technical Specifications.

### 3.2.3.2 MEASUREMENT

Final shaping and grading shall be measured for payment at the Contract unit price per acre for “Final Shaping and Grading - Evia II Island Hydraulic Fill” meeting the required lines and grades shown on the Plans. Material placed will be measured by acres in place, by means of topographic and hydrographic surveys taken before and after placement. Acreage placed outside of the limits and tolerances of the specified design template shall not be included in pay quantities.

### 3.2.3.3 PAYMENT

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

3.2.4  **FINAL SHAPING AND GRADING - LONG BIRD ISLAND HYDRAULIC FILL**

### 3.2.4.1 GENERAL

The Contract price per acre of final shaping and grading of Long Bird Island shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing Long Bird Island as specified in Part 6 of the Technical Specifications.

### 3.2.4.2 MEASUREMENT

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

### 3.2.4.3 PAYMENT

Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.
3.2.5  LONG BIRD ISLAND OYSTER REEF WAVE TRIP

3.2.5.1  GENERAL
The Contract price per each completed oyster reef wave trip at Long Bird Island shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of hydraulic fill, placement of cultch and any other related work for constructing Long Bird Island oyster reef wave trip as specified in Parts 6 and 10 of the Technical Specifications. The costs for sampling and testing of cultch material shall be included in the applicable Contract unit price for “Long Bird Island Oyster Reef Wave Trip”.

3.2.5.2  MEASUREMENT
Measurement for Long Bird Island oyster reef wave trip shall be made per the completed wave trip meeting the minimum lines and grades shown on the Plans.

3.2.5.3  PAYMENT
Payment shall be made at the Contract unit price. No progress payments shall be made for Long Bird Island oyster reef wave trip.

3.2.6  FINAL SHAPING AND GRADING – LONG BIRD ISLAND DIKE HYDRAULIC FILL

3.2.6.1  GENERAL
The Contract price per linear foot of final shaping and grading of Long Bird Island dike shall include constructing and maintaining hydraulic fill, including placing and compacting fill material, erosion control, final shaping and grading of material and any other related work for constructing Long Bird Island dike as specified in Part 6 of the Technical Specifications.

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

3.2.6.3  PAYMENT
Payment shall be made at the Contract unit price. Progress payments shall be made in accordance with the Special Conditions based upon actual quantity of work performed less 5% retainage by the Port Authority per monthly estimate for Contract payment until final acceptance.
3.2.7 SHORE PROTECTION - EVIA II ISLAND PERIMETER

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

3.2.7.2 MEASUREMENT
Shore protection as shown shall be measured by the short ton placed for payment by truck weight tickets or the barge displacement method, see Section 3.3 "Stone, Shell Hash and Cultch Measurement". Where a loss of material due to removing, stockpiling, relocating, re-installing or hauling is possible, the Engineer shall have the discretion to require re-measurement prior to placement. Each truck or barge load shall only be comprised of one type of stone gradation.

Measurement specifications for shore protection only provide the process for measuring the stone for pay purposes and are not a representation of accessibility of the site.

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

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

3.2.8 SHORE PROTECTION - LONG BIRD ISLAND PERIMETER

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

3.2.8.2 MEASUREMENT
Shore protection as shown shall be measured by the short ton placed for payment by truck weight tickets or the barge displacement method, see Section 3.3 "Stone, Shell Hash and Cultch Measurement". Where a loss of material due to removing, stockpiling, relocating, re-installing or hauling is possible, the Engineer shall have the discretion to require re-measurement prior to placement. Each truck or barge load shall only be comprised of one type of stone gradation.

Measurement specifications for shore protection only provide the process for measuring the stone for pay purposes and are not a representation of accessibility of the site.
Geotextiles will not be measured for payment but shall be considered incidental to the cost per ton of stone.

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

3.2.9 **SHELL HASH – LONG BIRD ISLAND CRUSHED LIMESTONE VENEER**

3.2.9.1 **GENERAL**
The Contract unit price per ton of shell hash placed shall include placement of shell hash in the designated area at Long Bird Island. The costs for sampling and testing of shell hash shall be included in the applicable contract unit price for Shell Hash – Long Bird Island Crushed Limestone Veneer.

3.2.9.2 **MEASUREMENT**
Shell hash as shown shall be measured by the short ton placed for payment by truck weight tickets or the barge displacement method, see Section 3.3 “Stone, Shell Hash and Cultch Measurement”. Where a loss of material due to removing, stockpiling, relocating, re-installing or hauling is possible, the Engineer shall have the discretion to require re-measurement prior to placement.

Measurement specifications for shell hash only provide the process for measuring the shell hash for pay purposes and are not a representation of accessibility of the site.

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

3.2.10 **DREDGING STANDBY TIME**

3.2.10.1 **GENERAL**
The Contract unit price per hour for dredging standby time shall include the costs due to waiting as directed by the Port Authority.

During the standby period, the Contractor shall man the total dredge plant with necessary crew to return to productive dredging upon authorization from the Port Authority, as well as to ascertain the security of the plant and to maintain the operations of those systems of the plant that are essentially required to be operated. During periods of standby, the Contractor shall maintain lookouts and radio communications as required in Technical Specifications Part 1 Section 1.13.4. When in standby status, the total dredge plant or portion thereof will not be moved from the approved location of standby unless directed. Standby time shall be monitored closely and entered separately on the daily dredge
reports which are part of the quality control system. The report shall indicate chargeable standby time for the day and cumulative standby time.

3.2.10.2 MEASUREMENT
Standby Time will be measured and paid for to the nearest 0.1 hour at the rate specified for this bid item. The total amount of chargeable standby incurred for each day will be annotated on the Contractor’s daily report and is subject to verification by the Port Authority and/or Engineer.

3.2.10.3 PAYMENT
Payment for standby time will be made at the Contract unit price per hour for Dredging Standby Time, which will include the standby hours required per the direction of the Port Authority. No separate payment will be made for standby or down time incurred while dredging without authorization from the Port Authority including, but not necessarily limited to, lost time due to vessel traffic, mechanical failures, weather, removing trash/debris in the cutterhead or pump(s), adding/removing/repairing pipeline or moving swing anchors.

3.3 STONE, SHELL HASH AND CULTCH MEASUREMENT

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

3.3.2 BARGE DISPLACEMENT METHOD
Stone, shell hash and cultch material shall be measured in short tons of 2,000 pounds each. Barge displacement measurements will be accepted for determination of the weight of material placed in the finished section. The barge shall be gauged at a protected location near the site as approved. Each barge shall be fitted by the Contractor, at Contractor’s expense, with gages graduated either to inches or tenths of a foot, located either inside or outside of the hull, as directed, and attached solidly to the hull. These gages shall be located near each end of the vessel on opposite sides with two (2) additional gages amid ship. If located inside the hull, provision shall be made for the free passage of the outside water to a transparent tube placed, or capable of being placed, in contact with the gage. If located outside upon wooden hulls, the gages shall be protected by solid fenders or recessed into the planking, or if upon steel hulls, the gage marks may be placed directly on the plates and identified by punch marks. Gages shall be placed so that their zeros are below water when the vessel is in its normal trim, light, and free from water. In lieu of the gages in the interior of the barge, the Contractor may, at Contractor’s discretion, provide an equal number of wells for determining the amount of the load. Wells shall be located as specified for interior gages and shall be constructed as approved.
Forward and Aft Displacements due to load, shall not differ more than 10% from their mean for the determination of tonnage of each barge load of stone ready for placement. In determining the tonnage of a cargo, the change in gage readings due to discharge of the cargo will be used.

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

Repairs or additions made to the barges during the progress of the work shall be promptly reported to the Engineer. During the progress of the work, when the Engineer deems it advisable or necessary, each barge shall be re-measured at the expense of the Contractor and under the supervision of the Engineer. No barge shall be used that is not in a seaworthy condition or that leaks excessively. The barges used shall be so constructed that when loaded they do not bend or warp, making the gages unreliable.

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

### 3.4 SITE EROSION PROTECTION, DRAINAGE AND SURVEYS

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

**END OF SECTION**
4 SURVEYING

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

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

The Contractor shall conduct all preconstruction, interim construction, and final shaping and grading surveys for Evia II Island and Long Bird Island, including stone, shell hash, cultch material and beach placement. In addition, the Contractor shall conduct its own daily construction surveying required in conjunction with the work. The Contractor shall notify the Engineer a minimum of three (3) days prior to performing surveys for interim measurement and payment so that the Engineer may be present during surveys. Surveys for interim measurement and payment shall be conducted in the presence of the Engineer. Promptly upon completing a survey, the Contractor shall furnish copies of all field notes and all other records relating to the survey or to the layout of the work to the Engineer. The Contractor shall retain copies of all such material furnished to the Engineer.

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

U.S. Army Corps of Engineers Publications:

- EM 1110-2-1003 Hydrographic Surveying
- EM 1110-1-1003 NAVSTAR Global Positioning System Surveys
- EM 1110-1-1005 Engineering and Design: Control and Topographic Surveying
4.3 QUALITY ASSURANCE/QUALITY CONTROL STANDARDS
Surveys shall follow the quality assurance/quality control standards and methods set forth in EM 1110-2-1003, EM 1110-1-1003, EM 1110-1-1005, and these Technical Specifications.

4.3.1 TEXAS LICENSED REGISTERED PROFESSIONAL LAND SURVEYOR OR ENGINEER
Preconstruction survey plots for hydraulic fill areas as well as final acceptance survey plots for the constructed islands and beach, including shoreline protection, shell hash and culch placement areas shall be signed and sealed by a qualified Texas licensed Registered Professional Land Surveyor (RPLS) or Professional Engineer (PE). The pre-dredge hazard and pipeline survey and post-dredge hazard survey shall also be signed and sealed by a qualified Texas licensed RPLS or PE. Any additional surveys provided and conducted by the Contractor for consideration of acceptance or payment shall be signed and sealed by a qualified Texas licensed RPLS or PE and provided in the format specified in Part 2 Subpart 2.6.5.

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

4.3.2 REAL TIME KINEMATIC GLOBAL POSITIONING SYSTEMS
Topographic and hydrographic surveys shall be conducted using RTK GPS and the horizontal and vertical control shown on the Plans.

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

4.5 SURVEY CONTROL
The Contractor shall use the survey control shown on the Plans.

4.6 SURVEY ACCURACY
GPS-based systems shall not be applied without establishing a local RTK GPS base station using the project control monumentation. Project control monumentation and vertical datum conversions are shown on the Plans in the Contract Documents. Required survey accuracies are provided below. The Contractor is responsible for providing all applicable RTK equipment for surveying and dredging operations.
The Contractor’s RTK GPS base station shall be located less than 10 kilometers from the location(s) of work. The Port Authority shall have the option to utilize the Contractor’s RTK GPS base station for all channel hydrographic surveys and other surveys in relation to the work, as applicable.

Table 4-1: Survey Accuracies

<table>
<thead>
<tr>
<th>Type of Survey</th>
<th>Minimum Horizontal Accuracy for All Survey Equipment</th>
<th>Minimum Vertical Accuracy for All Survey Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Survey</td>
<td>&lt; 0.2 foot</td>
<td>&lt; 0.1 foot</td>
</tr>
<tr>
<td>Topographic</td>
<td>Within (+/-) 1 Foot</td>
<td>Within (+/-) 0.2 feet</td>
</tr>
<tr>
<td>Hydrographic</td>
<td>Within (+/-) 1 Foot</td>
<td>Within (+/-) 0.2 feet</td>
</tr>
</tbody>
</table>

4.7 LAYOUT OF WORK

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

Temporary benchmarks and controls established by the Contractor to layout the work and to perform the surveys shall be verified by Real Time Kinematic Global Positioning Systems on a weekly basis, at a minimum. Ground control and temporary benchmarks established by the Contractor shall be in conformance with Corps of Engineers EM 1110-1-1002.

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

4.8 PRE-DREDGE HAZARD AND PIPELINE SURVEYS

Prior to commencing dredging, staging of equipment or laying of submerged pipelines, the Contractor shall conduct a magnetometer and sidescan survey over the entire area to be dredged, Contractor proposed equipment staging and laydown areas and pipeline routes to the placement area(s). The survey shall extend a minimum of 125 feet to either side of the proposed pipeline route(s). Pre-dredge
hazard and pipeline surveys shall be at the Contractor’s expense. Changes to pipeline routes submitted in the Contractor’s Pipeline Route Plan shall require additional magnetometer and sidescan surveys at no additional cost to the Port Authority. Planned scope of the pre-dredge hazard and pipeline survey shall be included in the Survey Plan.

The Contractor shall issue copies of the pre-dredge hazard and pipeline surveys to the Engineer in accordance with Part 2 Subsection 2.6.3 of these Technical Specifications.

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

4.9 POST-DREDGE PIPELINE SURVEYS
After demobilization, the Contractor shall conduct magnetometer and sidescan surveys of all pipeline routes to confirm the removal of submerged pipelines. Post-dredge pipeline surveys will be at the Contractor’s expense. Pipelines that are detected shall be removed by the Contractor.

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

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

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

Hydrographic surveys to determine acceptance and to calculate the quantity of material removed under this Contract will be accomplished with the use of a survey vessel having an automated acquisition system. Horizontal positions and vertical elevations will be determined by the use of an inertially-aided RTK Global Positioning System providing accurate attitude, heading, heave, position, and velocity data and which is referenced to project control. Soundings will be obtained by using a multibeam echosounder system operating nominally at 240 kHz. In order to ensure ensonification of all bottom features, 200% bottom coverage will be obtained during all surveys conducted on behalf of the Port Authority. Position and depth data will be collected using Hypack Hysweep software, stored digitally, and subsequently processed for map preparation and quantity computations. Multibeam survey data will be binned to a 3 by 3 foot cell using the “average depth” of all depths within the cell as the representative cell depth. The horizontal location of the representative cell depth will be the cell center or centroid. Surveys will be performed in accordance with these Technical Specifications and EM 1110-2-1003.
Table 4-2: Summary of Channel Surveys

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

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

4.10.2 INTERIM SURVEYS
Interim surveys shall be performed periodically by the Contractor to monitor dredging progress and compliance. Interim surveys shall be used by the Contractor to assist in the required daily reports in accordance with Part 2 Subpart 2.6.4.

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

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

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

4.11 **PLACEMENT AREA SURVEYS**

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

Cross-sections shall be taken at 50-foot intervals along the design template alignment. The distance between elevation readings shall be not more than 10 feet, with additional readings at breakpoints or abrupt changes in grade. Cross-sections shall extend a minimum of 20 feet beyond the intersection of the outer limits of fill and the preconstruction bottom. Cross-sections for Long Bird Island dike shall extend continuously with cross-sections across the island, and 20 feet beyond the intersection of hydraulic fill and the preconstruction bottom on the outside toe.

Refer to the table below for a general summary of the surveys.
Table 4-3: Summary of Placement Area Surveys

<table>
<thead>
<tr>
<th>Survey</th>
<th>Intended Purpose</th>
<th>Survey Schedule</th>
<th>Conducted By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preconstruction Survey*</td>
<td>To verify the existing condition prior to commencement of earthwork and site preparation</td>
<td>Prior to commencement of earthwork and site preparation</td>
<td>Contractor</td>
</tr>
<tr>
<td>Interim Construction Surveys</td>
<td>To determine in-place fill quantities, retention rates, etc. for construction</td>
<td>Daily upon filling sections</td>
<td>Contractor</td>
</tr>
<tr>
<td>Final Shaping and Grading Surveys</td>
<td>To ensure the fill meets the required lines and grades for interim measurement and payment</td>
<td>Upon completion of 50 foot sections and per acre of fill</td>
<td>Contractor</td>
</tr>
<tr>
<td>Final Acceptance Survey</td>
<td>To provide for final acceptance of the work</td>
<td>Upon completion of final shaping and grading</td>
<td>Port Authority</td>
</tr>
</tbody>
</table>

* Survey deliverables for the preconstruction survey must be signed and sealed by a RPLS or PE licensed in the State of Texas

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

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

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

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

4.11.3 FINAL SHAPING AND GRADING SURVEYS
The surveys will be used to determine the acceptance of final shaping and grading of the completed design templates. Surveys of the final shaping and grading shall be performed by the Contractor. Surveys
will be performed on 50-foot sections. Promptly upon completion of the survey, the Contractor shall provide all required survey submittals to the Engineer. Final shaping and grading surveys shall be used by the Port Authority to determine interim measurement and payment.

4.11.4 FINAL ACCEPTANCE SURVEY
The Port Authority shall conduct the survey for final acceptance of the completed work at the placement areas. The limits of the survey shall cover the entire limits of work.

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

If any slumps, slides, scarpes, mounds, failures, or other features not in conformance to the lines and grades shown on the Plans be disclosed by this examination, the Contractor will be required to repair the deficiencies as mutually agreeable to the Engineer and Contractor. The repair of any deficiencies may be waived at the discretion of the Port Authority. The Contractor or its authorized representative will be notified when surveys are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted. The Engineer reserves the right to check surveys during any phase of embankment construction. If discrepancies are found between the Contractor’s surveys and surveys performed by the Engineer, the surveys performed by the Engineer shall govern.

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

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

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

<table>
<thead>
<tr>
<th>Survey</th>
<th>Intended Purpose</th>
<th>Survey Schedule</th>
<th>Conducted By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Dredge Shoreline Survey</td>
<td>To verify the existing conditions of the shoreline upon completion of channel dredging</td>
<td>After completion of dredging and prior to excavation and grading for shoreline protection installation</td>
<td>Contractor</td>
</tr>
</tbody>
</table>
### 4.12.1 POST-DREDGING SHORELINE SURVEY

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

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

### 4.12.2 POST-EXCAVATION AND GRADING SURVEY

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

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

### 4.12.3 INTERIM CONSTRUCTION SURVEYS

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

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

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

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

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

If any features not in conformance to the lines and grades shown on the Plans be disclosed by this examination, the Contractor will be required to repair the deficiencies as mutually agreeable to the Engineer and Contractor. The repair of any deficiencies may be waived at the discretion of the Port Authority. The Contractor or its authorized representative will be notified when surveys are to be made. When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted. The Engineer reserves the right to check surveys during any phase of construction. If discrepancies are found between the Contractor's surveys and surveys performed by the Engineer, the surveys performed by the Engineer shall govern.

4.13 CULTCH THICKNESS TESTING
Measurement of culch thickness shall be conducted throughout the placement process at all locations within the placement limits. The thickness measurements shall be determined using a graduated pole or other device which can determine the elevation to the nearest inch, of the top of the placed material and can then be pushed or otherwise forced through the material to locate the elevation of the bottom of the material. Alternative methods of determining thickness measurements may be used if approved. Prior to final acceptance, the Contractor shall perform required thickness testing as specified below.
After completing placement of cultch, the Contractor shall conduct thickness testing for quality assurance, prior to acceptance. This is being done to help verify uniformity of placement, aid as-built information, and as information for future restoration projects in the area. Thickness testing shall be conducted by the Contractor in the presence of the Engineer, at spot locations on a 100-foot by 100-foot grid over the completed oyster reef wave trip. The Contractor shall determine the coordinates of the test site using suitable Geodetic Positioning System equipment, conventional surveying or other approved methods to ensure accuracy to within 5 feet. The testing site location coordinates, water depth (if applicable), tide reading, and the measured thickness, in inches, of cultch shall be recorded at each location.

The Contractor shall be required to determine the average thickness for cultch placement. The average thickness, in inches, of cultch shall be determined by computing the sum of the thickness measurements of the material at the testing site divided by the number of measurements taken at Long Bird Island oyster reef wave trip.

**4.14 SHELL HASH – LONG BIRD ISLAND CRUSHED LIMESTONE VENEER SURVEYS**

The Contractor shall conduct the post excavation and grading survey, interim construction surveys and a final acceptance survey for shell hash placement at Long Bird Island. Additionally, the Contractor shall provide its own construction surveys as necessary to complete the work of the Contract.

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

**Table 4-6: Summary of Shell Hash Placement Surveys**

<table>
<thead>
<tr>
<th>Survey</th>
<th>Intended Purpose</th>
<th>Survey Schedule</th>
<th>Conducted By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Excavation and Grading Survey*</td>
<td>To verify existing conditions upon completion of excavation and grading for shell hash placement</td>
<td>After completion of excavation and grading and prior to shell hash placement</td>
<td>Contractor</td>
</tr>
<tr>
<td>Interim Construction Surveys</td>
<td>To ensure the shell hash placement meets the requirements of these Technical Specifications</td>
<td>Daily during shell hash placement</td>
<td>Contractor</td>
</tr>
<tr>
<td>Final Acceptance Survey*</td>
<td>To provide for final acceptance of the work</td>
<td>Upon Completion of final shell hash placement</td>
<td>Contractor</td>
</tr>
</tbody>
</table>
4.14.1 POST-EXCAVATION AND GRADING SURVEY
The post-excavation and grading survey shall be performed by the Contractor and shall be taken after excavation and grading but prior to placement of shell hash. The post-excavation and grading survey shall be taken over the same stationing as the Long Bird Island final acceptance survey. Cross-sections shall be taken at 50-foot intervals along the design template alignment shown in the Plans and shall extend a minimum of 20 feet from the outside toe of the shell hash. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade.

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

4.14.2 INTERIM CONSTRUCTION SURVEYS
Interim construction surveys shall be performed by the Contractor and shall be taken during placement of shell hash. Cross-sections shall be taken at 50-foot intervals along the design template alignment shown in the Plans and shall extend a minimum of 20 feet from the outside toe of the shell hash. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade. The surveys shall encompass the previous day’s construction to the maximum extent practicable.

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

4.14.3 FINAL ACCEPTANCE SURVEY
The final acceptance survey shall be performed by the Contractor and shall be taken after shell hash placement is complete. The final acceptance survey shall be taken over the same stationing as the post-excavation and grading survey. Cross-sections shall be taken at 50-foot intervals along the design template alignment shown in the Plans and shall extend a minimum of 20 feet from the outside toe of the shell hash. The distance between elevation readings shall be not more than 10 feet, with additional readings at break points or abrupt changes in grade.

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

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

If any features not in conformance to the lines and grades shown on the Plans be disclosed by this
examination, the Contractor will be required to repair the deficiencies as mutually agreeable to the
Engineer and Contractor. The repair of any deficiencies may be waived at the discretion of the Port
Authority. The Contractor or its authorized representative will be notified when surveys are to be made.
When the area is found to be in a satisfactory condition by the Port Authority, it will be finally accepted.
The Engineer reserves the right to check surveys during any phase of construction. If discrepancies are
found between the Contractor’s surveys and surveys performed by the Engineer, the surveys performed
by the Engineer shall govern.

END OF SECTION
5 ENVIRONMENTAL PROTECTION

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

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

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

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

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

5.1.3 LOCATION OF FIELD OFFICES, STORAGE, AND OTHER CONTRACTOR FACILITIES
The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in approved areas. Temporary movement or relocation of Contractor facilities shall be made only on approval.
5.1.4 TEMPORARY EXCAVATIONS AND EMBANKMENTS
Temporary excavations and embankments for plant or work areas shall be controlled to protect adjacent areas from despoilment.

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

5.1.6 PLACEMENT OF SOLID WASTE BY REMOVAL FROM PORT AUTHORITY PROPERTY
The Contractor shall transport solid waste off Port Authority property and dispose it in compliance with federal, state, and local requirements for solid waste placement.

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

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

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

5.2 TURBIDITY AND WATER QUALITY
The Contractor shall conduct its dredging and disposal operations in a manner to minimize turbidity and shall conform to all water sampling and water quality standards prescribed herein and by the permit requirements. Plant downtime to meet the water quality standards or to make hydraulic fill or pipeline repairs will be at no added cost to the Port Authority or a basis for time extension.

5.3 AIR QUALITY
5.3.1 GENERAL REQUIREMENTS
The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. Activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the State of Texas Clean Air Act implemented in 1967, and the Federal emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for the construction operations and activities specified herein. The measures below shall be implemented to control air pollution by the construction activities included in the contract.
5.3.1.1 PARTICULATES
Dust particles, aerosols, and gaseous byproducts from construction activities, processing and preparation of materials, such as from asphaltic batch plants, shall be constantly controlled, including weekends, holidays, and hours when work is not in progress.

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

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

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

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

  o If no equipment is identified as potentially eligible, describe reasons why, such as equipment is too new or already meets highest current emissions standards, all equipment is sub-contracted or rented etc.

• The Contractor shall exercise air quality best management practices as much as is practicable, including the following:
  o Coordinate and stage support and auxiliary equipment (tugs, tenders, shoreside earthmoving equipment) that will work alongside dredges to minimize idling
  o Inspect and maintain seals to hatches, filling ports, etc. used for fuel storage and refueling.
  o Ensure engine turbochargers are properly maintained to prevent fouling, speed drop, and temperature drops
  o Conduct any soot blowing necessary to prevent exhaust stack buildup away from shore if possible.
  o Consider the use of lower engine speeds or “slow steaming” if feasible to reduce fuel consumption
  o Conduct any required clearing, grubbing, cutting of vegetation under moist or wet conditions to minimize particulate and dust generation.

• The Contractor shall use ultra-low-sulfur diesel (ULSD) fuel in marine vessels where technically and logistically feasible. Marine diesel fuel already must meet the ULSD fuel standard of 15 parts-per-million (ppm) sulfur content and is being phased in within the region. The Contractor shall locate vendors and determine whether ULSD is available and logistically feasible to use for its vessels, whether owned or rented. The Contractor shall identify whether vessels proposed for work under this solicitation can use ULSD fuel. To demonstrate consideration of ULSD use and feasibility, the Contractor shall provide a statement in one page or less describing whether vessels proposed for work under this solicitation can use ULSD fuel, and if so, the potential vendors it has located.

• The Contractor shall disclose to the Port Authority whether any of the marine vessels being used for work under this contract has been inspected by the U.S. Coast Guard (USCG), and whether that inspection covered the protocols for Annex VI of the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978, known as Marine
Pollution (MARPOL) 73/78, regarding the proper maintenance and operation of engines and their emissions controls. If so, the Contractor shall provide proof of the appropriate USCG inspection certification for compliance with MARPOL 73/78 Annex VI. Inspected vessels that did not receive certification may not be used for work under this contract until deficiencies that prevented certification are corrected.

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

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

5.4.2  ENDANGERED SPECIES ACT (ESA)
The Contractor should be aware of the potential for the presence of federally listed species in the project area, and precautions and notifications to make, in case they are encountered. Five species of sea turtles that frequent the Gulf of Mexico may use inland bays such as Galveston Bay for foraging, with Kemp’s Ridley sea turtle, loggerhead sea turtle, and green sea turtle, most likely to use Galveston Bay waters. Piping plover (Charadrius melodus), occasionally has been known to utilize mud flats found adjacent to or within HSC placement areas. Though preferred habitat for the West Indian manatee (Trichechus manatus) is not present in the project area, it has wandered into Galveston Bay on rare occasions. Should contact with any of these species occur within the project area, the Contractor should contact the U.S. Fish and Wildlife Service’s Houston Coastal Ecological Services Field Office immediately at (281)-286-8282; or in the case of a turtle or manatee, please contact the Marine Mammal Stranding Network at (409)-740-2200. As the National Oceanic and Atmospheric Administration (NOAA) has sole responsibility over sea turtles in a marine environment including bays and estuaries, they should be contacted at (727) 824-5312 for such sightings. The Contractor shall also notify the Port Authority of these sightings and notifications made to the aforementioned agencies.

5.4.3  OYSTER REEFS
The Contractor shall not anchor or spud outside of the project footprint to avoid impacting any reef outside of the project footprint. Any mitigation required as a result of impacting reef outside of the proposed channel improvement footprint will be the responsibility of the Contractor.
5.5 CULTURAL RESOURCES

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

END OF SECTION
6 HOUSTON SHIP CHANNEL DREDGING AND PLACEMENT

6.1 SCOPE OF WORK

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

The work encompasses dredging Bolivar Roads Channel (BRC) from approximate Station 02+607.32 to 00+000 and the HSC between approximate HSC Station 138+369 to 98+000. A hydrographic survey was conducted in February – March 2020 to determine existing grade elevations of the dredge locations. The results of the survey are shown on the Plans. However, it should be noted that the HSC and BRC will be maintenance dredged by others from [fill in contract dates].

New work materials from BRC Station 02+607.32 to 00+000 and HSC Station 138+369 to 98+000 include the 170-foot channel widening (85-feet to either side), bend easings at Stations 138+369 and 128+731, required side slopes and the replacement of the barge lanes to their existing dimensions outside of the channel widening as shown on the Plans. Debris may be encountered in the excavation areas. Soft shoaled materials encountered near the toe of the existing Federal channel limits shall be considered incidental to the work. No measurement or payment shall be made for soft shoaled materials or debris removed as part of the Work.

New work materials shall be used to hydraulically construct Evia II Island and Long Bird Island.

New work dredging of the HSC and BRC shall be within the horizontal limits shown on the Plans to a required elevation of minus 48 feet MLLW with 2 feet of required overdepth and 1 foot of allowable overdepth. Required side slopes shall be 3H:1V. The existing 530-foot wide template was created with a 3H:1V slope (maintained at 2.5H:1V) beginning at the authorized elevation of minus 46 feet MLLW plus 2 feet of advance maintenance plus 2 feet of allowable overdepth.
Table 6-1: Summary of Required Grades and Side Slopes for the HSC ECIP

<table>
<thead>
<tr>
<th>Description</th>
<th>Required Elevation (Feet Below MLLW)</th>
<th>Required Overdepth (Feet Below Required Depth)</th>
<th>Allowable Overdepth (Feet Below Required Overdepth)</th>
<th>Final Side Slope (1)</th>
<th>From Station</th>
<th>To Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW Dredging HSC to Evia II Island and Long Bird Island</td>
<td>-48.0</td>
<td>2.0</td>
<td>1.0</td>
<td>1</td>
<td>BRC 02+607.32</td>
<td>BRC 00+000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HSC 138+369</td>
<td>HSC 98+000</td>
</tr>
</tbody>
</table>

(1) Slopes indicated are design values perpendicular to channel toes. Where cross sections are not perpendicular to channel toes, a skewed slope will result.

6.2 HYDRAULIC DREDGING AND PLACEMENT

6.2.1 ORDER OF WORK FOR DREDGING
The Contractor shall perform the dredging work in the following order:

1. NW Dredging HSC to Evia II Island
2. NW Dredging HSC to Long Bird Island

The Contractor shall begin dredging new work materials at approximate BRC Station 02+607.32 and proceed inbound to approximate HSC Station 98+000, with placement of new work materials to first hydraulically construct Evia II Island as indicated on the Plans. Following sufficient initial hydraulic fill placement at Evia II Island, the Contractor shall continue dredging new work materials, with placement to hydraulically construct Long Bird Island as indicated on the Plans.

For the purposes of channel acceptance, the dredging work items in the Bidding Schedule are further divided into Sections as follows:

Table 6-2: HSC Acceptance Sections

<table>
<thead>
<tr>
<th>Section No.</th>
<th>From Station</th>
<th>To Station</th>
<th>Length of Section (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>02+607.32</td>
<td>136+000</td>
<td>4,976.32</td>
</tr>
<tr>
<td>2</td>
<td>136+000</td>
<td>132+000</td>
<td>4,000</td>
</tr>
</tbody>
</table>
### 6.2.2 ESTIMATED QUANTITIES BY STATION

The estimated quantities shown below are based on surveys conducted at the times shown and can only be considered indicative of the conditions at that time. The quantities shown were used to prepare the total estimated quantity of material to be removed shown in the Request for Competitive Sealed Bid/Proposal, and do not include effects of anticipated dredging events or shoaling that may occur prior to commencement of this Contract. Please refer to Technical Specifications Part 6 Subsections 6.2.3 and 6.2.4 for descriptions of anticipated work and shoaling estimates for the project area.

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

<table>
<thead>
<tr>
<th>Section No.</th>
<th>From Station</th>
<th>To Station</th>
<th>Required Elevation (CY)</th>
<th>Required Overdepth (CY)</th>
<th>Allowable Overdepth (CY)</th>
<th>Total Estimated (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>02+607.32</td>
<td>136+000</td>
<td>38,000</td>
<td>52,000</td>
<td>46,000</td>
<td>136,000</td>
</tr>
<tr>
<td>2</td>
<td>136+000</td>
<td>132+000</td>
<td>3,000</td>
<td>10,000</td>
<td>11,000</td>
<td>24,000</td>
</tr>
<tr>
<td>3</td>
<td>132+000</td>
<td>128+000</td>
<td>167,000</td>
<td>44,000</td>
<td>27,000</td>
<td>238,000</td>
</tr>
<tr>
<td>4</td>
<td>128+000</td>
<td>124+000</td>
<td>152,000</td>
<td>39,000</td>
<td>23,000</td>
<td>214,000</td>
</tr>
<tr>
<td>5</td>
<td>124+000</td>
<td>120+000</td>
<td>55,000</td>
<td>25,000</td>
<td>16,000</td>
<td>96,000</td>
</tr>
<tr>
<td>6</td>
<td>120+000</td>
<td>116+000</td>
<td>68,000</td>
<td>26,000</td>
<td>17,000</td>
<td>111,000</td>
</tr>
</tbody>
</table>
### 6.2.3 Anticipated Work by Others

Since the last hydrographic survey of the HSC, the USACE has maintained the HSC from Stations 138+369 to 98+000. Dredging is anticipated to be completed [insert date].

### 6.2.4 Shoaling

The volume of natural shoaling that may occur in an acceptance section during the period of Work is considered incidental to the estimated gross quantity of material to be removed.

### 6.2.5 Real Time Kinematic (RTK) GPS for Dredging and Placement Operations

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

#### 6.2.5.1 RTK GPS Standards

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

#### 6.2.5.2 RTK GPS Data Requirements and Submissions

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

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**Technical Specifications**

67
All data shall be collected and stored digitally in ASCII format and shall be readable by MS Windows compatible software. Each day’s worth of RTK data shall be a separate and distinct ASCII file, labeled by the date.

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

- Date
- Time
- Vessel ID
- Vessel Captain
- State Plane X Coordinate - in accordance with Section 4.4 above
- State Plane Y Coordinate - in accordance with Section 4.4 above
- Z coordinate in project datum
- Dredge location defined by:
  - Dredge cutterhead location in the X,Y,Z directions on 10-second intervals
- Vessel Draft
- RTK Tides

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

6.2.6 PIPELINES

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

- Floating or submerged dredge pipeline shall be located so as not to interfere with navigation or safety.
- Should the Contractor elect to use a pipeline material, which is buoyant or semi-buoyant, such as HDPE pipe, or similar materials, the Contractor shall securely anchor the pipeline to prevent the pipeline from lifting off the bottom under any conditions. The Contractor shall remove all
anchors when the submerged pipeline is removed. The location of the entire length of submerged pipeline shall be marked with signs, buoys, and lights, conforming to U.S. Coast Guard regulations.

- The Contractor shall plainly mark the pipeline access routes with conspicuous stakes, targets, and/or buoys to be maintained throughout the Contract operations.
- A tight dredge discharge pipeline shall be maintained to prevent spilling of dredged material or dredged water outside of the placement area.

### 6.2.6.1 FLOATING DREDGE PIPELINE

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

### 6.2.6.2 SUBMERGED DREDGE PIPELINE

In the event the Contractor elects to submerge its pipeline, the pipeline shall rest securely on the bottom. In no case will the Contractor’s pipeline be allowed to fluctuate between the surface and the bottom or lie partly submerged. If the Contractor elects to use a submerged section in the dredge discharge pipeline for crossing a navigable channel it may do so without the formality of obtaining a Department of the Army permit for work or structures in navigable waters. Channel crossing locations shall be within previously mined sections of the HSC in the approved locations. The Contractor shall coordinate the submerged pipeline crossings with the U.S. Coast Guard Marine Safety Office (MSO), U.S. Coast Guard Vessel Traffic Service (VTS), and the Houston Pilots Association (HPA). At least five (5) days shall be allowed for comments and their comments shall be coordinated with the Engineer. Concerns regarding impact of navigation will be considered and final resolution will be made by the Contractor, Engineer, MSO, VTS, and HPA. However, three (3) copies of detailed plans of the submerged section shall be submitted and approved prior to use of the submerged section. The plans shall indicate clearly the width and depth of the navigation opening and the method used to mark it by day and by night for the safety of navigation. The minimum bottom width of the submerged section shall not be less than the width of the authorized federal channel being crossed. The highest point on the pipe or ball connection occurring across the bottom width of a submerged section and any anchor securing the submerged pipeline shall not be higher than two (2) feet below the required elevation within the horizontal limits of the authorized federal channel being crossed. Lighted buoys, meeting the requirements of the U.S. Coast Guard Regulation 33 CFR 62.25, shall be provided by the Contractor to mark the navigation
opening. A red buoy exhibiting a quick flashing red light shall be used to mark the right side of the opening and a black buoy exhibiting a quick flashing green light shall be used to mark the left side of the opening. The frequency of the flashes shall be not less than 60 per minute. "Right side" and "left side" of the opening shall be in conformance with the lateral system of buoyage established by the U.S. Coast Guard. Requirements for the lighted buoys and description of the lateral system of buoyage will be found in the U.S. Coast Guard Publication CG 208 entitled "Aids to Navigation." Lights to be displayed on pipelines shall be in accordance with the U.S. Coast Guard Regulation 33 CFR 80.23.

6.2.7 HYDRAULIC DREDGING OPERATIONS

- The dredging templates shall be dredged to the lines and grades indicated on the Plans.

- Holes dug on the banks for deadmen or anchorage shall be filled and repaired to the previous existing lines and grades.

- The Contractor shall conduct a minimum of two inspections per day of the discharge pipeline.

- Dredging shall be immediately suspended in the event of pipeline leakage, which could or does allow dredged water or material to escape from the placement area or pipeline. Dredging shall not be resumed until the necessary pipeline repairs have been completed.

- All manned equipment shall be supplied with two-way radio communication, fixed or portable, capable of transmitting and receiving on both, marine hailing and emergency Channels 13 and 16 as well as two additional Contractor-designated working channels.

- The Contractor will provide constant radio contact between personnel on the dredge and at the placement area and pipeline. The Contractor’s placement area and pipeline personnel are to immediately notify the dredge should pipeline leakage occur. The Contractor shall inform the Port Authority at what time the problems were found and time when action was taken to correct the problems.

- All equipment shall have installed and utilize day shapes and lights as required by the latest version of United States Coast Guard regulations.

- Discharge control measures including, but not limited to, spillbarge, Y Valves, spreaders, spoons, or baffles shall be used at the pipeline discharges to disperse dredge water and materials. At no time shall open direct pipeline discharge be allowed for new work materials. Discharge control shall be used at all times when placing new work materials. The dredged material shall be discharged in the placement area in such a manner as to maximize the use of the material and minimize waste of satisfactory material.

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

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

6.2.9 PROTECTION OF THE PLACEMENT AREA
The Contractor shall maintain and protect the placement area in satisfactory condition until completion and acceptance of all work required by this Contract.

The Contractor shall adequately inspect its placement operations daily to reduce the possibility of accidental spillage or wasting of dredged materials outside of the defined placement area(s) to be constructed. If failures occur, dredging operations shall be stopped immediately, and the deposit of material at the placement area shall not be resumed until approved to do so by the Engineer and at no additional cost to the Port Authority.

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

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

6.2.12 MEASUREMENT AND PAYMENT
Measurement and payment shall be in accordance with Part 3 of these Technical Specifications.
6.2.12.1 REQUIRED ELEVATION
Required elevation areas shall be measured within the horizontal limits for material removed lying above the elevation of Required Elevation shown on the Plans, including material removed above the side slopes extending therefrom, as measured between BD and AD surveys.

6.2.12.2 OVERDEPTH
Limits of allowable overdepth dredging will be as shown in Table 6-1 and on the Plans. Required overdepth area shall be measured between the elevations and horizontal limits of Required Elevation and Required Overdepth as shown on the Plans. Allowable overdepth area shall be measured between the elevations and horizontal limits of Required Overdepth and Allowable Overdepth as shown on the Plans.

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

6.2.12.3 SIDE AND END SLOPES
The Contractor shall remove sufficient material to provide the limiting side and end slopes specified in this Section. Material actually removed, within the limits shown on the Plans to provide for final side slopes not flatter than one (1) vertical on three (3) horizontal, but not in excess of the amount originally lying above this limiting side slope will be measured and paid for, whether dredged in original position or by dredging space below the pay slope plane at the bottom of the slope for upslope material capable of falling into the cut. There will be no payment for end slope material that falls into the required cut and is subsequently removed. This Section for compensating side slopes will not apply to areas where dredging is limited due to the proximity of terminal structures or as otherwise indicated in the Plans.

6.2.12.4 EXCESSIVE DREDGING
Material taken from beyond the limits as shown in the Plans will be deducted from the gross amount dredged as excessive required grade or overdepth dredging or excessive side or end slope dredging, for which payment will not be made, except as specified in Technical Specifications Part 6 Subsections 6.2.12.2 and 6.2.12.3.
7 HYDRAULIC FILL CONSTRUCTION

7.1 SCOPE OF WORK
The work in this Section consists of furnishing all plant, labor, equipment, supplies, and material for performing the operations necessary to construct Evia II Island, Long Bird Island, a perimeter dike at Long Bird Island, an oyster reef wave trip at Long Bird Island, and all excavations incidental to the construction of the above as specified and shown on the drawings to the lines and grades shown; and other incidental earthwork as may be necessary to complete the work as specified herein and as shown on the Plans. The work covered in this section includes:

1. Construction of Evia II Island.
2. Construction of Long Bird Island.
3. Construction of an approximate 2,150 linear foot dike along the west end of Long Bird Island.

The design of the hydraulically constructed islands, dike and oyster reef wave trip anticipates the displacement of soft bay bottom within the placement area will occur.

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

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

7.3 MATERIALS
Satisfactory materials used for hydraulically constructed Evia II Island and Long Bird Island shall be obtained from the BRC and HSC new work dredge limits. The Contractor shall evenly distribute hydraulic fill material within the placement area footprint(s) so that the final new hydraulic fill sections can be constructed to the minimum lines and grades. Deposits of soft mud from the backwash that may accumulate in low areas of the fill shall be immediately drained and the area dried prior to final shaping and grading. New work materials shall not be wasted or used for any other purposes other than construction of the placement area(s). Over-placement of materials, as determined by the Engineer, shall not be wasted but shall be relocated by the Contractor and used for placement area construction where needed or as determined by the Engineer and at no additional cost to the Port Authority. Under-placement of materials, as determined by the Engineer, shall have additional materials placed by the Contractor either hydraulically or mechanically until sufficient materials are in place with which to complete construction of the template at no additional cost to the Port Authority.
7.3.1 Satisfactory Materials

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

7.3.2 Unsatisfactory Materials

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

7.4 General Provisions

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

7.4.1 Changes in Hydraulic Fill Template or Alignment

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

7.4.2 Protection

The location of work is in Lower Galveston Bay and is subject to ship wakes from the Houston Ship Channel, GLWW and significant fetch length and storm influences on wave height. The Contractor shall expect erosion of unprotected hydraulic fill construction. The Contractor shall stage the installation of shore protection with its construction progress in order to protect the dikes from erosion. The Contractor shall be responsible for protecting the work site and for repair of eroded or otherwise damaged portions of hydraulic fill at no additional cost to the Port Authority.
7.4.3 SITE PREPARATION AND EARTHWORK
Foundation preparation will not be required for Evia II Island or Long Bird Island construction. Foundation preparation for Evia II Island Beach shall be constructed during the hydraulic filling of Evia II Island.

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

7.5 PLACEMENT OF HYDRAULIC FILL
The initial placement of material shall consist of controlled discharge of the dredged material within the limits of placement area construction, as shown on the Plans. The initial placement quantity shall provide sufficient material within the design template to accomplish final shaping and grading to final grade. The Contractor shall take measures to maximize retention of satisfactory materials placed during the hydraulic fill including, but not necessarily limited to, control of discharge actions and discharge elevations, end treatments of discharge pipe and use of retention dikes. The Contractor shall evenly distribute sufficient hydraulic fill material at all locations within the construction template so that the final new hydraulic fill section can be constructed to the minimum lines and grades before any materials are stockpiled. Details of initial placement shall be included in the Contractor’s work plan. Over-placed material as determined by the Engineer, shall be relocated where directed by the Engineer at no additional cost to the Port Authority. Conversely, areas of under-placement of material as determined by the Engineer, shall have additional materials placed, whether hydraulically or mechanically, until sufficient material has been placed to complete construction of the template at no additional cost to the Port Authority.

If Evia II Island has been fully constructed, to the lines and grades shown on the Plans, prior to the completion of new work dredging, excess satisfactory material shall not be wasted. It shall be placed to begin constructing Long Bird Island as outlined in Subpart 7.5.1.

7.5.1 CONTROL OF DISCHARGE
The Contractor shall use frequent movement of the discharge point during the initial placement, along with an effective directing of the discharge flow to retain the maximum quantity of material possible within the hydraulic fill template. Direction of the discharge flow, when discharging clay materials, shall be accomplished using marsh excavating equipment, or suitable alternative equipment, to provide for
continuous removal of material mounding in front of the pipe or other locations that can result in lateral-direction wash of material from the limits of the template.

The Contractor must use a floating spillbarge or similar technique to control placement of the hydraulically transported material. The spillbarge should be equipped with spuds and/or anchor systems that will allow the barge to be moved both perpendicular and parallel to the design template as the material is discharged. In this manner, the material can be spread and brought up evenly to an elevation above the water surface. Additionally, the spillbarge shall be capable of varying the discharge elevation from an elevation of 3 feet below the water surface to a sufficient height above the specified construction template so that material may be hydraulically placed to the minimum lines and grades shown. The spillbarge should be fitted with a spreader, diffuser, or other effective means that will promote the displacement of soft materials. Where practical, the initial discharge shall be beneath the water surface, and the discharge point shall be raised vertically as the material increases in elevation. The location of the discharge point of the spillbarge system shall be continuously monitored by electronic survey techniques and recorded at five-minute intervals while the spillbarge is at the work site. The data will be submitted on digital media in X, Y, Z, Time, Date ASCII format.

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

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

### 7.5.2 FINAL SHAPING AND GRADING

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

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

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

7.5.3 DAMAGES OR FAILURES

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

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

7.5.4 EVIA II ISLAND CONSTRUCTION

7.5.4.1 ORDER OF WORK FOR EVIA II ISLAND CONSTRUCTION
The sequence of construction shall be determined by the Contractor, unless otherwise restricted by the Contract documents. The Contractor shall determine its means and methods for conducting the work associated with Evia II Island hydraulic fill construction.

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

Table 7-1: Neatline Quantities for Construction at Evia II Island

<table>
<thead>
<tr>
<th>EVIA II ISLAND VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A: HSC STA. 138+369 TO STA. 98+000</td>
</tr>
<tr>
<td>August 03, 2020</td>
</tr>
</tbody>
</table>
7.5.4.3 **GRADE TOLERANCE**
Tolerances shall include -0.5 to +0.5 feet on the crown height and -0.5 to +0.5 feet on the crown width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Slope of the hydraulic fill shall be at the angle of repose.

7.5.5 **LONG BIRD ISLAND CONSTRUCTION**

7.5.5.1 **ORDER OF WORK FOR LONG BIRD ISLAND CONSTRUCTION**
The sequence of construction shall be determined by the Contractor, unless otherwise restricted by the Contract documents. The Contractor shall determine its means and methods for conducting the work associated with Long Bird Island hydraulic fill construction.

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

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>NEATLINE QUANTITY (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evia II Island</td>
<td>222,000</td>
</tr>
</tbody>
</table>

*Note: Quantities are based on hydrographic surveys from the JV dated February - March 2020.*

Table 7-2: Neatline Quantities for Construction at Long Bird Island

<table>
<thead>
<tr>
<th>LONG BIRD ISLAND VOLUMES</th>
<th>NEATLINE QUANTITY (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Bird Island</td>
<td>229,000</td>
</tr>
<tr>
<td>Long Bird Island Oyster Reef Wave Trip</td>
<td>33,000</td>
</tr>
<tr>
<td>Long Bird Island Dike</td>
<td>96,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>358,000</strong></td>
</tr>
</tbody>
</table>

*Note: Quantities are based on hydrographic surveys from the JV dated February - March 2020.*

7.5.5.3 **GRADE TOLERANCES**
For acceptance, hydraulic fill Long Bird Island construction shall be constructed, as a minimum, to the grades and elevations shown on the Plans.

7.5.5.3.1 **BIRD ISLAND AND DIKES**
Tolerances shall include -0.5 to +0.5 feet on the crown height, crown width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.
7.5.5.3.2 OYSTER REEF WAVE TRIPS
Tolerances shall include 0.0 to +0.5 feet on the crown height and -0.5 to +0.5 feet on the crown width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.

END OF SECTION
8 EVIA II ISLAND BEACH CONSTRUCTION

8.1 SCOPE OF WORK
The work in this Section consists of furnishing all labor, materials, tools, equipment, plant and supplies for furnishing, hauling, handling and placing suitable material to construct a Beach Foundation and a Beach located on the southeast side of Evia II Island as indicated on the drawings.

8.2 REFERENCES
- ASTM D2487-17e1 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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

8.4 MATERIALS

8.4.1 SUITABLE MATERIALS FOR BEACH FOUNDATION
Suitable materials for Beach Foundation construction are considered to be clays with strengths ranging from medium to hard and sands as shown on the boring logs in Appendix A.

8.4.2 SUITABLE MATERIALS FOR EVIA II ISLAND BEACH

[Further define by 95%]

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

D-F Blend is a crushed limestone product readily available and preapproved as suitable for beach construction. The gradation of D-F Blend is provided in Table 8-1 [Error! Reference source not found.] below. The Contractor may propose an alternative material subject to approval by the Port Authority.
Table 8-1: D-F Blend Gradation

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>100</td>
</tr>
<tr>
<td>3/8”</td>
<td>80 – 100</td>
</tr>
<tr>
<td>#4</td>
<td>30 – 50</td>
</tr>
<tr>
<td>#10</td>
<td>0 – 10</td>
</tr>
</tbody>
</table>

8.5 QUALITY COMPLIANCE TESTING

The Contractor shall, at no additional cost to the PHA, engage an approved commercial testing laboratory to obtain and test samples of beach material required by the Contract Documents to be tested. The commercial laboratory shall be subject to the approval of the Engineer. The PHA reserves the right to perform inspections of the laboratory facilities, test equipment, test procedures, and laboratory personnel qualifications to ensure that the equipment is in proper working order and correctly calibrated and that the specified test procedures are followed. The PHA also reserves the right to conduct tests that the Engineer deems necessary to ensure compliance with the Contract Documents.

8.5.1 SAMPLING

Beach samples for laboratory tests shall be taken in accordance with ASTM D 6913, under the supervision of the Engineer. The method and location of sampling shall be subject to approval. The Contractor shall notify the Engineer one day in advance of each planned sampling for laboratory testing. Sand or other material approved for use as satisfactory beach material shall be sampled for testing at a rate of one sample per 1,000 tons of material.

8.5.2 REQUIRED TESTING

The collected fill sediments shall be analyzed for grain size distribution, Munsell color, carbonate content, and percent visual shell by a laboratory approved by the Engineer. Gradation analysis shall be performed according to ASTM 6913 and a USCS classification assigned to the sample according to ASTM D2487. U.S. Standard sieve sizes shall include ¾ inch, 3/8 inch, and numbers 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200 and 230. No hydrometer testing is required, but the percentage of sample finer than the #200 sieve shall be specified. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site.
until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

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

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

8.6 EXECUTION

8.6.1 BEACH FOUNDATION CONSTRUCTION
The Foundation for the Beach and associated shore protection will be constructed to the lines, grades and tolerances shown, using suitable construction material either dredged from the new work limits of the Houston Ship Channel or imported from a source approved by the Engineer. The Foundation may be constructed by mechanical or hydraulic methods. The Foundation shall be constructed so that to the maximum extent practicable very soft clays or other undesirable Foundation material are displaced from the template. The Foundation shall be accepted as complete by the Contracting Officer prior to installation of erosion protection materials.

8.6.2 BEACH CONSTRUCTION
The Beach shall be constructed to the lines and grades shown, using suitable materials as specified in subparagraph 8.4.2 above. The Beach may be constructed by hydraulic or mechanical methods. Beach fill shall be clean and free of debris, stumps, logs, wire, rope, cable, pipe and other objectionable debris. Beach fill shall not be placed until the Beach Foundation and shore protection have been accepted as complete by the Engineer.

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

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

8.6.5 REQUIREMENTS OF CONSTRUCTION

8.6.5.1 TOLERANCES

Beach Foundation and beach work shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Tolerances shall include -0.5 to +0.5 feet on the Beach Foundation and Beach height, width and slopes. Final height, width, and alignment shall be within 1 foot horizontally of the baselines shown unless otherwise approved by the Engineer. Abrupt changes in alignment, as determined by the Engineer, will not be permitted and shall be corrected by the Contractor at no cost to the Port Authority.

8.6.5.2 MISPLACED MATERIAL

Material that escapes or is lost while loading, transporting or placing material, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at the Contractor’s expense.

8.6.5.3 ESTIMATED QUANTITIES

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

Table 8-2: Neatline Quantities for Evia II Island Beach

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>NEATLINE QUANTITY (CY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beach Foundation</td>
<td>(provide at 95%)</td>
</tr>
<tr>
<td>Evia II Island Beach</td>
<td>(provide at 95%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>(provide at 95%)</td>
</tr>
</tbody>
</table>

**Note:** Quantities are based on hydrographic surveys from the JV dated February - March 2020.

8.6.6 FINAL SHAPING AND GRADING

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

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

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

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

END OF SECTION
9 SHORE PROTECTION

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

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

American Society for Testing and Materials (ASTM) Publications:

- C97/C97M-18 Absorption and Bulk Specific Gravity of Dimension Stone
- C127-15 Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
- C131/C131M-20 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C295/C295M-19 Petrographic Examination of Aggregates for Concrete
- C535-16 Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C1141/C1141M-15 Admixtures for Shotcrete
- D5313/D5313M-12(2013) Evaluation of Durability of Rock for Erosion Control under Wetting and Drying Conditions
- D5519-15 Particle Size Analysis of Natural and Man-made Riprap Materials
- D123-19 - Standard Terminology Relating to Textiles
- D1683/D1683M-17(2018) - Failure in Sewn Seams of Woven Fabrics
- D3786/D3786M-18 - Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method
- D3884-09(2017) - Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
• D4355/D4355M-14(2018) - Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc-Type Apparatus
• D4491/D4491M – 17 - Water Permeability of Geotextiles by Permittivity
• D4533/D4533M-15 - Trapezoid Tearing Strength of Geotextiles
• D4632/D4632M-15a - Grab Breaking Load and Elongation of Geotextiles
• D4751-20 - Determining Apparent Opening Size of a Geotextile
• D4833/D4833M‐07(2013)e1 - Index Puncture Resistance of Geotextiles, Geomembranes and Related Products
• D4873/D4873M-17 - Identification, Storage, and Handling of Geosynthetic Rolls and Samples

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

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

9.4 MATERIALS

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

9.4.1.1 QUALITY COMPLIANCE TESTING

9.4.1.1.1 SAMPLES
If required, samples shall be submitted in advance of the time when the stone will be required in the work. Stone from a proposed source or sources shall be tested by the Contractor for quality compliance.
9.4.1.2 STONE QUALITY
Stone shall meet the following test requirements:

Table 9-1: Test Requirements for Stone Quality

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

(1) The testing procedure used in ASTM D 5313 shall include testing each sample in potable and in salt water prepared in accordance with ASTM C1141.
(2) Weakening and loss of individual surface particles is permissible unless bonding of the surface grains softens and causes general disintegration of the surface material.
(3) Stone which has a loss greater than the specified limit will be accepted if the Contractor demonstrates that the stone has a satisfactory service record that exceeds ten (10) years.

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

- A colored microscope photograph shall be made of each stone type, including igneous, sedimentary, or metamorphic and the individual minerals within the stone type shall be identified by labels and arrows upon the photograph.

- Detailed macroscopic and microscopic descriptions shall be made of the stone, to include the entire mineral constituents, individual sizes, their approximate percentages and mineralogical histories. A description of stone hardness, texture, weathering, and durability factors shall be discussed. Pictures of the source wall within the quarry to show any layering and lithology shall be included.

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

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

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

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

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

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

Table 9-2: Stone Dimensions for Shore Protection at Evia II Island

<table>
<thead>
<tr>
<th>Percent of Stone by Weight Less than Design Stone Size (%)</th>
<th>Weight of Design Stone Size (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>170 – 319</td>
</tr>
<tr>
<td>50</td>
<td>425 – 638</td>
</tr>
<tr>
<td>100</td>
<td>850 – 1,700</td>
</tr>
</tbody>
</table>
Table 9-3: Stone Dimensions for Shore Protection at Long Bird Island

<table>
<thead>
<tr>
<th>Percent of Stone by Weight Less than Design Stone Size (%)</th>
<th>Weight of Design Stone Size (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>170 – 319</td>
</tr>
<tr>
<td>50</td>
<td>425 – 638</td>
</tr>
<tr>
<td>100</td>
<td>850 – 1,700</td>
</tr>
</tbody>
</table>

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

9.4.2.1 SEAMS
The seams of the geotextile shall be sewn with thread of a material meeting the chemical requirements given above for geotextile yarn or shall be bonded by cementing or by heat. The sheets of geotextile shall be attached at the factory or other approved location, if necessary, to form sections not less than 18-feet-wide. Seams shall be tested in accordance with ASTM D 1683, using 1-inch square jaws and 12 inches per minute constant rate of traverse. The strengths shall not be less than 90% of the required tensile strength, listed in Table 9-4 below, of the unaged geotextile in any principal direction.

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

Table 9-4: Physical Requirements for Woven Geotextiles

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>PHYSICAL REQUIREMENTS FOR WOVEN GEOTEXTILE</th>
<th>UNIT</th>
<th>MINIMUM TEST VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent Opening</td>
<td>ASTM D 4751</td>
<td>U.S. Sieve</td>
<td>#70</td>
</tr>
<tr>
<td>Permittivity</td>
<td>ASTM D 4491</td>
<td>sec 1</td>
<td>0.25</td>
</tr>
<tr>
<td>Puncture</td>
<td>ASTM D 4833</td>
<td>lbs.</td>
<td>130</td>
</tr>
<tr>
<td>Grab Tensile – In any principal direction</td>
<td>ASTM D 4632</td>
<td>lbs. and %</td>
<td>250, 15% minimum</td>
</tr>
<tr>
<td>Burst Strength</td>
<td>ASTM D 3786</td>
<td>psi</td>
<td>480</td>
</tr>
<tr>
<td>Trapezoidal Tear</td>
<td>ASTM D 4533</td>
<td>lbs.</td>
<td>55</td>
</tr>
</tbody>
</table>
### 9.4.2.3 Determination of Percent of Open Area

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

### 9.5 Execution

#### 9.5.1 Slope Preparation

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

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

#### 9.5.2 Installation of Geotextiles

Before placement of stone, the Contractor shall demonstrate that the placement technique for each application shall prevent damage to the geotextile. The geotextile shall be placed at the locations as specified. At the time of installation, the geotextile shall be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, or storage. Geotextile shall be laid smooth and free of tension, stress, folds, wrinkles or creases. The strips shall be placed to provide a minimum width of 18 inches of overlap for each joint after stone is placed. The extension above and

<table>
<thead>
<tr>
<th>UV Degradation (percent Strength retained at 500 hours)</th>
<th>ASTM D 4355</th>
<th>%</th>
<th>70% strength retained for all classes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seam Strength</td>
<td>ASTM D 1683</td>
<td>lbs.</td>
<td>225 lbs.</td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>ASTM D 3884</td>
<td>lbs.</td>
<td>55% residual breaking load in any principal direction</td>
</tr>
<tr>
<td>Percent Open Area</td>
<td>See Section 9.4.2.3 below</td>
<td>%</td>
<td>4%</td>
</tr>
</tbody>
</table>
below the stone after the stone is placed as shown. Temporary pinning of the textile to help hold it in place until the stone is placed shall be allowed on soil slopes. Securing pins shall be inserted through both strips of overlapping geotextile along the line passing through midpoints of the overlap. The geotextile shall be protected during construction from contamination by surface runoff. If the geotextile becomes contaminated, it shall be removed and replaced with uncontaminated geotextile at no expense to the Port Authority. Geotextile damaged during its installation or during placement of the stone shall be replaced by the Contractor at no cost to the Port Authority. The slope shore protection work shall be scheduled so that covering the geotextile with a layer of the stone is accomplished within two (2) days after placement of the geotextile. Failure to comply shall require replacement of the geotextile at Contractor’s expense. The geotextile shall be protected from damage prior to and during the placement of stone. Equipment shall not be allowed on unprotected geotextile. The soil surface on the slopes to receive the geotextile shall be prepared to a relative smooth condition free of obstructions, depressions, debris, and soft or low-density pockets of material. Erosion features, including rills or gullies, shall be graded out of the surface before geotextile placement.

9.5.3 INSTALLATION OF BLANKET STONE

[maybe]

9.5.4 INSTALLATION OF STONE

The stone shall be placed so that a reasonably well-graded mass is produced with a minimum practicable percentage of voids. Stone shall be constructed to the lines and grades shown. Stone shall be placed evenly and to its full course thickness in one operation, using a method that shall avoid damage to the geotextile, when present. Stone shall be allowed to fall no more than 1-foot from the bottom of the clam or other bucket to the placement surface. For underwater work, where the work surface is more than 5 feet below the water level, the maximum drop shall be 5 feet. In no case shall the drop be greater than that which may cause damage to the geotextile when present. An otherwise allowable height, using the Contractor’s approved placement method, will not be permitted if it is shown to cause segregation of stone sizes, breakage of individual stone, or damage to the filter fabric when present. When allowable drop heights are developed on-site, between the Engineer and Contractor, these heights shall be based on actual performance. The Contractor shall maintain the stone layer until accepted and if material is displaced or the surface damaged, replacement shall be made to the indicated lines and grades, at the Contractor’s expense. Protruding rock shall be removed, and the void filled with smaller rock. The stone work shall be finished smooth.

9.5.5 COMPLIANCE INSPECTION

The Contractor shall inspect for compliance with the contract requirements and record the inspection of operations. The Contractor, at Contractor’s expense, shall perform inspections in accordance with the following schedule:

- Stone quality - one (1) set of quality tests, for each new stone type provided.
• Gradation - one (1) gradation test to be performed per stone type.
• Specific gravity - one (1) specific gravity test per stone type.
• Placement - continuous check of placement to ensure proper size and compliance with grade lines shown.
• Excavation and placement - Lines and grades, disposition of material.

9.5.6 TOLERANCES
Stone work for shore protection shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in slope shore protection thickness and elevation from the design value shall not be greater than +0.5 foot and -0.0-foot. The surface slope of the stone shall not deviate greater than or less than 8% from the slope(s) shown. Transitions in alignments shall be smooth and shall be no more than 1-foot Horizontal change in a 20-foot length unless otherwise approved.

The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surfaces shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place.

9.5.7 MISPLACED MATERIAL
Material that escapes or is lost while loading, transporting or placing stone, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at Contractor's expense.

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

9.6 ACCEPTANCE
Shore protection will be accepted for each completed 100-foot section. Acceptance will be based on the topographic surveys performed by the Contractor as specified in Technical Specifications Part 4. The Port Authority may perform field check surveys. The Engineer reserves the right to check surveys during
any phase of shore protection installation. If discrepancies be found between the Contractor’s survey and surveys performed by the Engineer, the survey performed by the Engineer shall govern.

The geotextile fabric will be accepted in-place and in conjunction with acceptance of the shore protection. Its presence and condition will be observed daily by the Engineer while being installed and covered. The Contractor shall refrain from covering the fabric without giving the Engineer sufficient opportunity for inspection.

END OF SECTION
10 LONG BIRD ISLAND CULTCH PLACEMENT

10.1 SCOPE OF WORK
The work in this Section consists of furnishing all labor, materials, tools, equipment, plant and supplies for furnishing, hauling, handling, placing and maintaining cultch material at Long Bird Island oyster reef wave trip until final acceptance by the Engineer.

10.2 REFERENCES
- ASTM Standard D75/D75M-19 Sampling Aggregates
- ASTM Standard E11-20 Woven Wire Test Sieve Cloth and Test Sieves

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

10.4 MATERIALS

10.4.1 Cultch Material
Cultch material shall consist of either limestone, crushed concrete or other material acceptable to Texas Parks and Wildlife Department (TPWD). Cultch material shall be durable and sound, free from lumps of clay, oil, grease, organic material, objectionable coatings, or other foreign material. Cultch material must be free of any hazardous substances. Only one type of cultch material may be used to construct the oyster reef wave trip at Long Bird Island.

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

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

10.4.1.2 CRUSHED CONCRETE
Crushed concrete shall consist of clean, crushed concrete, with no rebar, which conforms to a gradation as specified for crushed limestone. Recycled concrete shall be devoid of contaminants.
10.5 QUALITY COMPLIANCE TESTING
The Contractor shall, at no additional cost to the PHA, engage an approved commercial testing laboratory to obtain and test samples of cultch material required by the Contract Documents to be tested. The commercial laboratory shall be subject to the approval of the Engineer. The PHA reserves the right to perform inspections of the laboratory facilities, test equipment, test procedures, and laboratory personnel qualifications to ensure that the equipment is in proper working order and correctly calibrated and that the specified test procedures are followed. The PHA also reserves the right to conduct tests that the Engineer deems necessary to ensure compliance with the Contract Documents.

10.5.1 SAMPLING
Aggregate samples for laboratory tests shall be taken in accordance with ASTM D 75, under the supervision of the Engineer. The method and location of sampling shall be subject to approval. The Contractor shall notify the Engineer one day in advance of each planned sampling for laboratory testing. Crushed limestone, crushed concrete, or other material approved for use as cultch, shall be sampled for testing at a rate of one sample per 1,000 tons of material.

10.5.2 REQUIRED TESTING
Testing may be performed onsite or at an alternate, approved location which will allow test results to be obtained and recorded on the daily report within 24 hours of the time of sampling. Samples shall be tested for (1) Particle Size Distribution in accordance with ASTM C 136 and ASTM E 11 and (2) for In-place (Bulk) Unit Dry Weight in accordance with the procedures outlined below. A minimum of one (1) test of each type shall be performed on each sample. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

In-place (Bulk) Unit Dry Weight Testing: The testing shall be performed using a cylindrical test container of either circular or octagonal in cross section, having a minimum diameter of 20 inches, and an interior height of 16.5 inches. To perform this test, the test container shall be placed in a larger container, filled with enough water so that the water surface is a minimum of 2 feet above the top of the test container. The material to be tested shall then be dropped by hand through the water column into the test container ensuring that the particles fall individually and in even layers across the container until the container is filled to the top. Excess material particles, of which more than half of an individual particle extends above the top of the container, shall be removed by hand, exercising care not to bump or disturb the underlying particles or the container, which may cause the material to become dense. The filled container shall then be removed from the water and the material dumped onto a flat, slightly inclined surface, allowing the water to drain from the sample. The sample shall then be weighed on a scale having an accuracy to the nearest 0.1 pound (or 1 ounce). The weight, recorded to the nearest 0.1 pound shall be divided by the test container volume of 3.0 cubic feet to arrive at the In-place (Bulk) Unit Dry Weight, which shall be recorded to the nearest 0.1 pound per cubic foot (pcf) on the daily report.
Gradation analysis shall be performed according to ASTM 6913 and a USCS classification assigned to the sample according to ASTM D2487. U.S. Standard sieve sizes shall include ¾ inch, 3/8 inch, and numbers 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200 and 230. No hydrometer testing is required, but the percentage of sample finer than the #200 sieve shall be specified. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

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

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

10.6 EXECUTION
10.6.1 SURFACE PREPARATION
Surfaces to receive cultch shall be shaped and prepared as shown on the Plans. The hydraulic fill portion of the oyster reef wave trip to receive cultch shall be surveyed and accepted by the Engineer prior to placement of cultch.

10.6.2 INSTALLATION OF CULTCH
The Contractor shall determine its own means and methods to place material to meet the design templates shown in the Plans. Long Bird Island oyster reef wave trip shall be constructed to provide a 30-inch cultch layer that meets the required elevations as shown on the Plans. The minimum required quantity of cultch material shall be evenly distributed within the marked limits of the oyster reef wave trip. The Contractor shall maintain the cultch layer until accepted and if material is displaced, replacement shall be made to the indicated lines and grades, at the Contractor’s expense. The Contractor’s means and methods for placement shall be included in the Work Plan required in Part 2 and will achieve the required grades as shown on the Plans.

10.6.3 REQUIREMENTS OF CONSTRUCTION
10.6.3.1 TOLERANCES
Cultch work shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in cultch thickness and elevation from the design value shall not be greater than +0.5 foot more than or 0.0 feet less than the required minimum 30-inch thickness.
The intention is that the work shall be built generally to the required elevations, slope and grade and that the outer surface shall be even and present a neat appearance. Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place.

**10.6.3.2 MISPLACED MATERIAL**

Material that escapes or is lost while loading, transporting or placing material, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at the Contractor’s expense.

**10.6.3.3 ESTIMATED QUANTITIES**

Cultch material shall be placed to provide 100 percent coverage of Long Bird Island oyster reef wave trip, with a minimum 30-inch vertical relief above the foundation pad. The Contractor shall place a measured quantity of cultch material based on the In-Place (Bulk) Unit Dry Weight of the material proposed for use associated with these dimensional requirements. The Contractor shall detail the means, methods, and materials it proposes to use to support the cultch and provide the required vertical reliefs. Quantity of cultch to provide the target relief may be more or less than the estimated material rates determined. The table below shows the estimated range of material rates required to achieve the target relief. The estimate rates assume a neat-line volume template. The actual measured rates and total required material quantity to construct the required template may be more or less than these estimated values.

Table 10-1: Estimated Material Rates to Achieve Required Elevation

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Approximate Tons/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushed Limestone</td>
<td>3,210 – 6,420</td>
</tr>
<tr>
<td>Crushed Concrete</td>
<td>4,012 – 8,024</td>
</tr>
</tbody>
</table>

**10.6.3.4 MATERIAL PLACEMENT RATES**

The rates indicated in Table 10-1 above are provided for the two different types of materials, assuming typical values of In-Place (Bulk) Unit Dry Weights for each material type at the approximate range of estimated quantities to achieve the required elevation. The table is provided for information only and is meant to serve as an example of how the Contractor will be required to compute the actual placement rates and quantities for the material it intends to use. The rates shown in Table 10-1 are based on using In-Place (Bulk) Unit Dry Weights of 100.0 pounds per cubic foot (pcf) for Crushed Limestone, and 125 pcf for crushed concrete. These values on In-Place (Bulk) Unit Dry Weights were multiplied by the volume of material required for 1 acre of material placed for the range of estimated volumes of required material and divided by 2,000 (lbs./ton) to obtain the tabular values indicated.
10.6.3.5 **DETERMINATION of PLACEMENT per AREA**
The initial Placement per Area shall be based on the average of the five (5) unit dry weight values obtained from the In-Place (Bulk) Unit Dry Weight tests, performed as specified in Section 10.5, prior to commencement of material placement. The Contractor shall recalculate the actual Placement Rate in tons per acre based on the average of the measured In-Place (Bulk) Unit Dry Weight tests.

10.6.3.6 **ADJUSTMENT of the PLACEMENT RATE**
The Placement Rate will be adjusted for each 5,000 tons of material placed, based on the average value obtained from the In-Place (Bulk) Unit Dry Weight tests required in Section 10.5. Specifically, the average value of the three (3) In-Place (Bulk) Unit Dry Weight tests required for each 5,000 tons of material placed, shall be used to re-calculate the actual Placement Rate for the next 5,000 tons of material placed in tons per acre.

10.6.3.7 **DETERMINATION of the MINIMUM REQUIRED QUANTITY**
The Minimum Required Quantity of material shall be determined by the Contractor by multiplying the Minimum Placement Rate for each 5,000 tons placed, by the number of acres (or square feet) placed.

10.6.4 **QUALITY ASSURANCE**

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

10.6.4.2 **VERIFICATION of MATERIAL QUANTITY PLACED**
Placement of the Minimum Required Quantity shall be verified using truck weight tickets or the barge displacement measurements of material transported and placed at each placement area, as specified in Section 3.3.

10.6.4.3 **MEASUREMENT of MINIMUM REQUIRED QUANTITY**
Culch material shall be measured by truck weight or barge displacement, in short tons of 2,000 pounds each in accordance with Part 3.3.

10.6.4.4 **THICKNESS TESTING**
Thicknesstesting of culch material shall be conducted prior to acceptance, as specified in Section 4.13.

10.6.5 **CORRECTIVE ACTIONS**
Corrective actions will be required by the Contractor if the post-construction surveys result in any of the following conditions:

1. The constructed oyster reef wave trip doesn’t meet the minimum required elevations within the prescribed vertical tolerance after culch placement.
2. Thickness testing of oyster reef wave trip cultch material doesn’t meet the minimum required 30-inch thickness above the hydraulically constructed foundation pad.

10.6.5.1 OUT-OF-TOLERANCE
Corrective action within marked boundaries of areas determined to have a measured value greater than the required elevation tolerance shall consist of lightly raking material from high areas into adjacent lower areas to bring the relief into tolerance at all locations within the area receiving corrective action. Corrective action within marked boundaries of areas determined to have a measured value less than the minimum required elevation shall consist of placement of additional material within the area, as specified herein, until the entire area is brought up to within the required tolerance.

10.7 ACCEPTANCE
Acceptance will be based on surveys performed by the Contractor as specified in Section 4 of these Technical Specifications. If the final survey cross sections show that the acceptance template has been achieved, and the required Quality Assurance Thickness Testing and Verification of Placement of the Minimum Required Quantity has been performed and approved, the Work will be accepted as complete.

END OF SECTION
11 LONG BIRD ISLAND SHELL HASH PLACEMENT

11.1 SCOPE OF WORK
The work in this Section consists of furnishing all labor, materials, tools, equipment, plant and supplies for furnishing, hauling, handling, placing and maintaining a 6-inch veneer layer of shell hash on top of Long Bird Island that creates a natural nesting habitat for shorebirds.

11.2 REFERENCES
- ASTM Standard D75/D75M-19 Sampling Aggregates
- ASTM Standard E11-20 Woven Wire Test Sieve Cloth and Test Sieves

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

11.4 MATERIALS

11.4.1 SHELL HASH
Shell hash shall be a crushed limestone or oyster shell product that generally matches the gradation of existing shell hash common in the region. D-F blend is a readily available product previously used within the region exhibiting successful results. [further define by 95%]

Shell Hash shall conform to the following table:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>80 – 100</td>
</tr>
<tr>
<td>#4</td>
<td>30 – 50</td>
</tr>
<tr>
<td>#10</td>
<td>0 – 10</td>
</tr>
</tbody>
</table>
11.5 QUALITY COMPLIANCE TESTING

The Contractor shall, at no additional cost to the PHA, engage an approved commercial testing laboratory to obtain and test samples of shell hash material required by the Contract Documents to be tested. The commercial laboratory shall be subject to the approval of the Engineer. The PHA reserves the right to perform inspections of the laboratory facilities, test equipment, test procedures, and laboratory personnel qualifications to ensure that the equipment is in proper working order and correctly calibrated and that the specified test procedures are followed. The PHA also reserves the right to conduct tests that the Engineer deems necessary to ensure compliance with the Contract Documents.

11.5.1 SAMPLING

Aggregate samples for laboratory tests shall be taken in accordance with ASTM D 75, under the supervision of the Engineer. The method and location of sampling shall be subject to approval. The Contractor shall notify the Engineer one day in advance of each planned sampling for laboratory testing. Crushed limestone, crushed concrete, or other material approved for use as shell hash, shall be sampled for testing at a rate of one sample per 1,000 tons of material.

11.5.2 REQUIRED TESTING

Testing may be performed onsite or at an alternate, approved location which will allow test results to be obtained and recorded on the daily report within 24 hours of the time of sampling. Samples shall be tested for (1) Particle Size Distribution in accordance with ASTM C 136 and ASTM E 11 and (2) for In-place (Bulk) Unit Dry Weight in accordance with the procedures outlined below. A minimum of one (1) test of each type shall be performed on each sample. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

In-place (Bulk) Unit Dry Weight Testing: The testing shall be performed using a cylindrical test container of either circular or octagonal in cross section, having a minimum diameter of 20 inches, and an interior height of 16.5 inches. To perform this test, the test container shall be placed in a larger container, filled with enough water so that the water surface is a minimum of 2 feet above the top of the test container. The material to be tested shall then be dropped by hand through the water column into the test container ensuring that the particles fall individually and in even layers across the container until the container is filled to the top. Excess material particles, of which more than half of an individual particle extends above the top of the container, shall be removed by hand, exercising care not to bump or disturb the underlying particles or the container, which may cause the material to become dense. The filled container shall then be removed from the water and the material dumped onto a flat, slightly inclined surface, allowing the water to drain from the sample. The sample shall then be weighed on a scale having an accuracy to the nearest 0.1 pound (or 1 ounce). The weight, recorded to the nearest 0.1 pound shall be divided by the test container volume of 3.0 cubic feet to arrive at the In-place (Bulk) Unit Dry Weight, which shall be recorded to the nearest 0.1 pound per cubic foot (pcf) on the daily report.
Gradation analysis shall be performed according to ASTM 6913 and a USCS classification assigned to the sample according to ASTM D2487. U.S. Standard sieve sizes shall include ⅛ inch, ⅜ inch, and numbers 4, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200 and 230. No hydrometer testing is required, but the percentage of sample finer than the #200 sieve shall be specified. After completion of testing, the samples shall be placed in bags, tagged with the date of testing, signed by the Quality Control supervisor and retained at the testing site until completion of the Contract. Additional Quality Assurance Testing of any of the retained samples shall be performed as directed.

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

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

11.6 EXECUTION

11.6.1 SURFACE PREPARATION
Surfaces to receive shell hash shall be shaped and prepared as shown on the Plans. The hydraulic fill portion of Long Bird Island to receive shell hash shall be surveyed and accepted by the Engineer prior to placement of shell hash.

11.6.2 INSTALLATION OF SHELL HASH
The Contractor shall determine its own means and methods to place material to meet the design templates shown in the Plans. Shell hash shall be placed atop Long Bird Island in a minimum 6-inch thick layer covering hydraulic fill as shown on the Plans. The minimum required quantity of shell hash material shall be evenly distributed within the marked limits of Long Bird Island. The Contractor shall maintain the shell hash layer until accepted and if material is displaced, replacement shall be made to the indicated lines and grades, at the Contractor’s expense. The Contractor’s means and methods for placement shall be included in the Work Plan required in Part 2 and will achieve the required grades as shown on the Plans.

11.6.3 REQUIREMENTS OF CONSTRUCTION

11.6.3.1 TOLERANCES
Shell hash work shall be carried to the lines and grades shown, the tolerances as specified herein, and as directed. Final surfaces of the finished course shall be reasonably even, uniform, and shall follow with reasonable variation the indicated lines and grades without continuous under or overbuilding. Deviations in shell hash thickness and elevation from the design value shall not be greater than +0.5 foot and -0.0 foot. The surface slope of the shell hash shall not deviate greater than or less than 8% from the slope shown.

Placed material not meeting these limits shall be removed or reworked as directed by the Engineer. Payment will not be made for excess material which the Engineer permits to remain in place.
11.6.3.2 MISPLACED MATERIAL
Material that escapes or is lost while loading, transporting or placing material, or which is deposited other than in the area shown or a change approved in writing, shall be removed and re-deposited where directed at the Contractor’s expense.

11.6.3.3 ESTIMATED QUANTITIES
The Contractor shall place shell hash to provide 100 percent coverage of Long Bird Island, with a minimum 6-inch vertical relief above the hydraulic fill. The Contractor shall place a measured quantity of shell hash material based on the In-Place (Bulk) Unit Dry Weight of the material proposed for use associated with these dimensional requirements. The Contractor shall detail the means, methods, and materials it proposes to use to support the shell hash and provide the required vertical reliefs. Quantity of shell hash to provide the target relief may be more or less than the estimated material rates determined. The table below shows the estimated range of material rates required to achieve the target relief. The estimate rates assume a neat-line volume template. The actual measured rates and total required material quantity to construct the required template may be more or less than these estimated values.

Table 11-1 Estimated Material Rates to Achieve Target Relief

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Approximate Tons/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell Hash</td>
<td>1,300</td>
</tr>
</tbody>
</table>

11.6.3.4 MATERIAL PLACEMENT RATES
The table is provided for information only and is meant to serve as an example of how the Contractor will be required to compute the actual placement rates and quantities for the material it intends to use. The rate shown in Table 11-1 is based on using In-Place (Bulk) Unit Dry Weights of 100.0 pounds per cubic foot (pcf) for Crushed Limestone, and 125 pcf for crushed concrete. These values on In-Place (Bulk) Unit Dry Weights were multiplied by the volume of material required for 1 acre of material placed for the range of estimated volumes of required material and divided by 2,000 (lbs./ton) to obtain the tabular values indicated.

11.6.3.5 DETERMINATION of PLACEMENT per AREA
The initial Placement per Area shall be based on the average of the five (5) unit dry weight values obtained from the In-Place (Bulk) Unit Dry Weight tests, performed as specified in Section 10.5, prior to commencement of material placement. The Contractor shall recalculate the actual Placement Rate in tons per acre based on the average of the measured In-Place (Bulk) Unit Dry Weight tests.

11.6.3.6 ADJUSTMENT of the PLACEMENT RATE
The Placement Rate will be adjusted for each 1,000 tons of material placed, based on the average value obtained from the In-Place (Bulk) Unit Dry Weight tests required in Section 10.5. Specifically, the average value of the three (3) In-Place (Bulk) Unit Dry Weight tests required for each 1,000 tons of
material placed, shall be used to re-calculate the actual Placement Rate for the next 1,000 tons of material placed in tons per acre.

11.6.3.7 DETERMINATION of the MINIMUM REQUIRED QUANTITY
The Minimum Required Quantity of material shall be determined by the Contractor by multiplying the Minimum Placement Rate for each 1,000 tons placed, by the number of acres (or square feet) placed.

11.6.4 QUALITY ASSURANCE

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

11.6.4.2 VERIFICATION of MATERIAL QUANTITY PLACED
Placement of the Minimum Required Quantity shall be verified using truck weight tickets or the barge displacement measurements of material transported and placed at each placement area, as specified in Section 3.3

11.6.4.3 MEASUREMENT of MINIMUM REQUIRED QUANTITY
Shell hash material shall be measured by truck weight or barge displacement, in short tons of 2,000 pounds each.

11.6.4.4 THICKNESS TESTING
Thickness testing of shell hash material shall be conducted prior to acceptance, as specified in Section 4.13.

11.6.5 CORRECTIVE ACTIONS
Corrective actions will be required by the Contractor if the post-construction surveys result in the following condition:

1. Thickness testing of shell hash on Long Bird Island doesn’t meet the minimum required 6-inch vertical relief above hydraulic fill or exceeds a maximum of 1-foot vertical relief above hydraulic fill.

11.6.5.1 OUT-OF-TOLERANCE
Corrective action within marked boundaries of areas determined to have a measured value greater than the Target Relief tolerance shall consist of lightly raking material from high areas into adjacent lower areas to bring the relief into tolerance at all locations within the area receiving corrective action.
Corrective action within marked boundaries of areas determined to have a measured value less than the minimum Target Relief shall consist of placement of additional material within the area, as specified herein, until the entire area is brought up to within the required tolerance.
11.7 ACCEPTANCE

Acceptance will be based on topographic surveys performed by the Contractor as specified in Section 4 of these Technical Specifications. If the final survey cross sections show that the acceptance template has been achieved, and the required Quality Assurance Thickness Testing and Verification of Placement of the Minimum Required Quantity has been performed and approved, the Work will be accepted as complete.

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