APPENDIX A

CWPPRA PPL 23 PROJECT FACT SHEET AND PROJECT MAP

February 2014
Cost figures as of: November 2015

Island Road Marsh Creation & Nourishment (TE-117)

Project Status

Approved Date: 2014 **Project Area:** 383 acres
Approved Funds: $3.72 M **Total Est. Cost:** $39.1 M
Net Benefit After 20 Years: 312 acres
Status: Engineering and Design
Project Type: Marsh Creation
PPL #: 23

Location

Region 3, Terrebonne Basin, Terrebonne Parish.

Problems

The Terrebonne Basin is an abandoned delta complex, characterized by a thick section of unconsolidated sediments that are undergoing dewatering and compaction, contributing to high subsidence, and a network of old distributary ridges extending southward from Houma. Historically, subsidence and numerous oil and gas canals and pipelines in the area have contributed significantly to wetland losses. Since 1932, the Terrebonne Basin has lost approximately 20% of its wetlands. One-third of the Terrebonne Basin's remaining wetlands are estimated to be lost to open water by the year 2040. There has been a significant reduction in the marsh platform in the vicinity of Island Road (1.60%/year based on USGS data from 1984 to 2011) that has provided some historical wave energy protection. Island Road is the only land access to the Isle of Jean Charles located west of Pointe Aux Chenes which serves unique Native American and minority communities that historically relied on fishing for their livelihood.

Restoration Strategy

The restoration concept provides for the creation and/or nourishment of approximately 383 acres of emergent saline marsh that will form a land bridge along portions of the perimeter of Cutoff Canal, Twin Pipelines Canals, and Island Road.

The proposed project's primary feature is to create 364 acres and nourish 19 acres of saline marsh. Sediment will be hydraulically pumped from a borrow source near Lake Felicity. Containment dikes will be constructed around the marsh creation area to retain sediment during pumping and will be degraded and/or gapped no later than three years post construction. Half of the newly constructed marsh (182 acres) will be planted following construction to stabilize the platform and reduce time for full vegetation.

The general project area viewed from Pointe aux Chene marina to Isle de Jean Charles.

Progress to Date

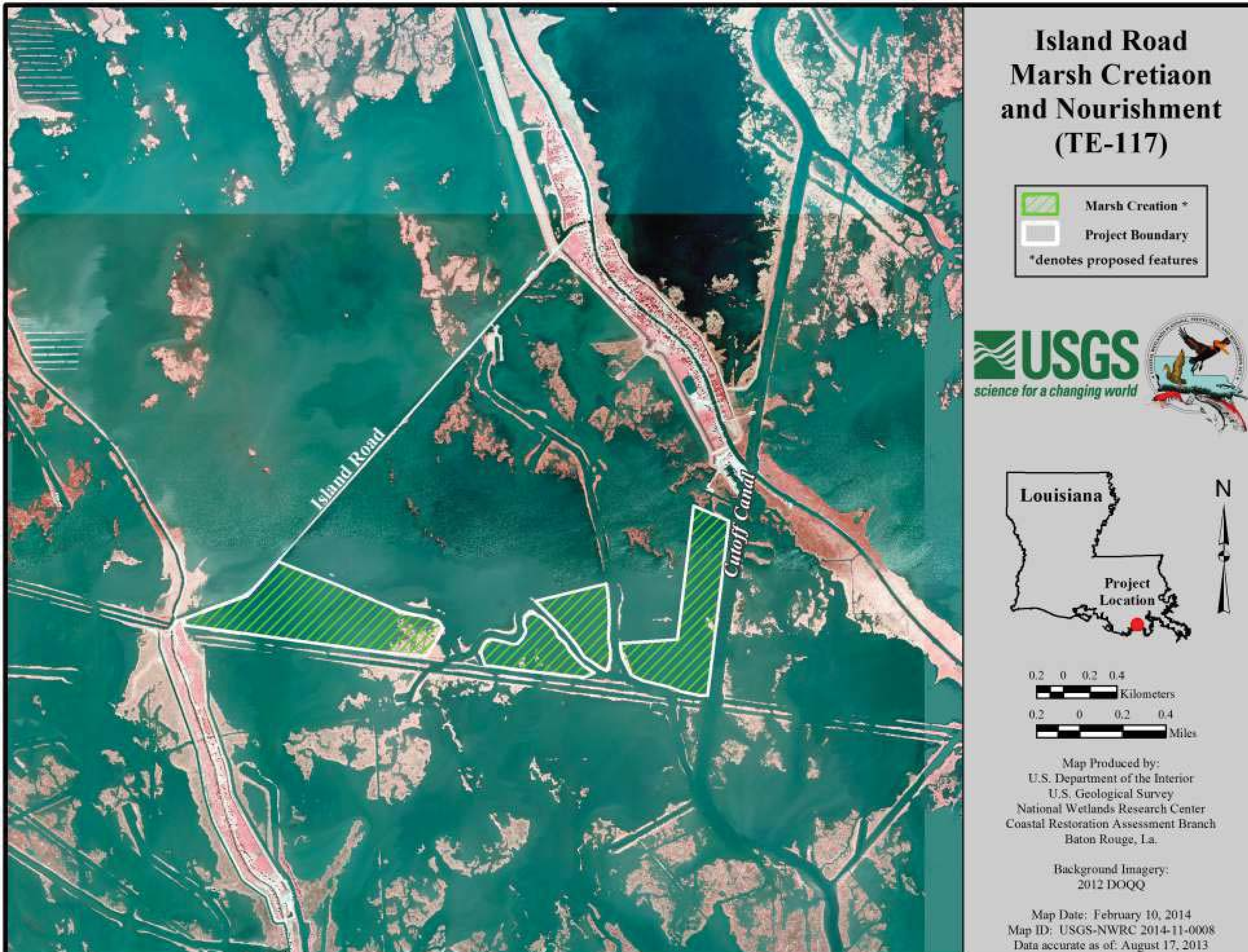
This project is on Priority Project List 23.

For more project information, please contact:

Federal Sponsor:
National Marine Fisheries Service
Baton Rouge, LA
(225) 389-0508

Local Sponsor:
Coastal Protection and Restoration Authority
Baton Rouge, LA
(225) 342-4736

Island Road Marsh Cretiaon and Nourishment (TE-117)



Map Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Assessment Branch
Baton Rouge, La.

Background Imagery:
2012 DOQQ

Map Date: February 10, 2014
Map ID: USGS-NWRC 2014-11-0008
Data accurate as of: August 17, 2013

APPENDIX B

ELECTRONIC INFRASTRUCTURE INVENTORY

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_B/ELECTRONIC_INFRASTRUCTURE_INVENTORY.ZIP>

APPENDIX C

ALTERNATIVES ANALYSIS DOCUMENTATION

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_C/ALT_ANALYSIS_FILES.ZIP>

APPENDIX D

CALCULATIONS PACKET

TE-0117 ISLAND ROAD MARSH CREATION AND NOURISHMENT

30% DESIGN CALCULATIONS PACKET

TE-0117 ISLAND ROAD MARSH CREATION AND NOURISHMENT
30% DESIGN CALCULATIONS PACKET

CONTENTS

LIST OF ABBREVIATIONS, VARIABLES, UNITS, AND OTHER TERMS

LIST OF ABBREVIATIONS, VARIABLES, UNITS, AND OTHER TERMS [C]

A	Area (i.e., as in spatial area or cross-sectional area)
$A_{ECD,ML}$	Cross-Sectional Area of ECD Under ML Conditions
$A_{ECD,SL}$	Cross-Sectional Area of ECD Under SL Conditions
A_{ECDBA}	Cross-Sectional Area of Borrow Pit/Channel (or Borrow Area) of ECDs
AC	Acre
BA	Borrow Area
[C]	Continued (i.e., as in "[Continued] … from the previous page")
c	Cohesion (i.e., cohesive strength or cohesive shear strength of cohesive soils)
C_C	Coefficient of Compression (as determined empirically from geotechnical laboratory tests)
C_V	Coefficient of Consolidation (as determined empirically from geotechnical laboratory tests)
C:F	Cut-to-fill Ratio
CAD	Computer-Aided Drafting
CC	Conveyance Corridor
CF	Cubic Foot
CHF	C. H. Fenstermaker & Associates, LLC
CL	Centerline
CMF	Constructed Marsh Fill
CMFE	Constructed Marsh Fill Elevation
CO-OPS	Center for Operational Oceanographic Products and Services (of NOAA)
CPRA	Coastal Protection and Restoration Authority of Louisiana
CPT	Cone Penetrometer Test
CRMS	Coastwide Reference Monitoring System
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
CY	Cubic Yard
DP	Design Profile (i.e., governing geotechnical soil conditions, as in "design profile 1")
e	Void Ratio
e_0	Void Ratio (or Initial Void Ratio of soils)
$e_{0,BA}$	Initial Void Ratio of Borrow Area Soils
$e_{0,MCNA,TY0}$	Initial Void Ratio of Marsh Creation and Nourishment Area Soils for TY0 Conditions
$e_{0,MCNA,TY20}$	Initial Void Ratio of Rest. Area Soils for TY20 Conditions
E&D	Engineering and Design
ECD(s)	Earthen Containment Dike(s)
EL	Elevation
$EL_{PI=20\%,TY(-4)}$	Elevation Corresponding to 20th Percentile of Percent Inundation for TY(-4) Conditions
$EL_{PI=20\%,TY0}$	Elevation Corresponding to 20th Percentile of Percent Inundation for TY0 Conditions
$EL_{PI=20\%,TY20}$	Elevation Corresponding to 20th Percentile of Percent Inundation for TY20 Conditions
$EL_{PI=80\%,TY(-4)}$	Elevation Corresponding to 80th Percentile of Percent Inundation for TY(-4) Conditions
$EL_{PI=20\%,TY0}$	Elevation Corresponding to 80th Percentile of Percent Inundation for TY0 Conditions
$EL_{PI=20\%,TY20}$	Elevation Corresponding to 80th Percentile of Percent Inundation for TY20 Conditions

LIST OF ABBREVIATIONS, VARIABLES, UNITS, AND OTHER TERMS [C]

$EL_{RM@50\%}$	Elevation of 50th Percentile of Reference Marsh Surveys
$EL_{RM@80\%}$	Elevation of 80th Percentile of Reference Marsh Surveys
ESLR	Eustatic Sea Level Rise
EQ	Equation (as defined in theoretical portions of calculations packet)
F_S	Factor of Safety
FT (or ft)	Foot
GEO	GeoEngineers, Inc.
GPS	Geographic Positioning System
H	Height
$H_{ECD,ML}$	Height of ECD for ML Construction Conditions
$H_{ECD,SL}$	Height of ECD for SL Construction Conditions
H_{ECDBA}	Height of Borrow Pit/Channel (or Borrow Area) of ECDs
H_{dr}	Drainage Height (of soil layer undergoing compression/consolidation)
L	Length
$L_{ECD,ML}$	Longitudinal Length of ECD for ML Construction Conditions
$L_{ECD,SL}$	Longitudinal Length of ECD for SL Construction Conditions
L_{ECDBA}	Longitudinal Length of Borrow Pit/Channel (or Borrow Area) of ECDs
$L_{CORR,MECH-D,CC}$	Length, Mechanical Dredging Required (i.e., CC lengh needing access dredging)
$L_{CORR,TOTAL,CC}$	Length (i.e., total length of CC needed for complete navigable marine access)
$L_{CORR,MECH-D,NAC}$	Length, Mechanical Dredging Required (i.e., NAC lengh needing access dredging)
$L_{CORR,TOTAL,NAC}$	Length (i.e., total length of NAC needed for complete navigable marine access)
$L_{CORR,MECH-D,SAC}$	Length, Mechanical Dredging Required (i.e., SAC lengh needing access dredging)
$L_{CORR,TOTAL,SAC}$	Length (i.e., total length of SAC needed for complete navigable marine access)
LCZ	Louisiana Coastal Zone
LF	Linear Foot
LLC	Limited Liability Company
MCNA	Marsh Creation and Nourishment Area
MCDG	Marsh Creation Design Guidelines
MHW	Mean High Water
MHW_{BA}	Mean High Water (as calculated for the TE-0117 Borrow Area)
$MHW_{CRMS0341}$	Mean High Water (as determined by CRMS0341 data during observation period)
$MHW_{CRMS3296}$	Mean High Water (as determined by CRMS3296 data during observation period)
MHW_{MCNA}	Mean High Water (as calculated for the TE-0017 Marsh Creation and Nourishment Area)
$MHW_{MCNA,TY(-4)}$	Mean High Water at MCNA for TY(-4) Conditions
$MHW_{MCNA,TY0}$	Mean High Water at MCNA for TY0 Conditions
$MHW_{MCNA,TY20}$	Mean High Water at MCNA for TY20 Conditions
$MHW_{TBS,TE-0117}$	Mean High Water Calculated by TBS (as applicable to MCNA)
MI	Mile
ML	Multiple Lift (i.e., as in multiple lift construction for ECDs)

LIST OF ABBREVIATIONS, VARIABLES, UNITS, AND OTHER TERMS [C]

MLG	Mean Low Gulf
MLW	Mean High Water
MLW_{BA}	Mean Low Water (as calculated for the TE-0117 Borrow Area)
$MLW_{CRMS0341}$	Mean Low Water (as determined by CRMS0341 data during observation period)
$MLW_{CRMS3296}$	Mean Low Water (as determined by CRMS3296 data during observation period)
MLW_{MCNA}	Mean Low Water (as calculated for the TE-0017 Marsh Creation and Nourishment Area)
$MLW_{MCNA,TY(-4)}$	Mean Low Water at MCNA for TY(-4) Conditions
$MLW_{MCNA,TY0}$	Mean Low Water at MCNA for TY0 Conditions
$MLW_{MCNA,TY20}$	Mean Low Water at MCNA for TY20 Conditions
$MLW_{TBS,TE-0117}$	Mean Low Water Calculated by TBS (as applicable to MCNA)
mm	Millimeter
MSL	Mean Sea Level
MTL	Mean Tide Level
MTL_{BA}	Mean Tide Level (as calculated for the TE-0117 Borrow Area)
$MTL_{CRMS0341}$	Mean Tide Level (as determined by CRMS0341 data during observation period)
$MTL_{CRMS3296}$	Mean Tide Level (as determined by CRMS3296 data during observation period)
MTL_{MCNA}	Mean Tide Level (as calculated for the TE-0117 Marsh Creation and Nourishment Area)
$MTL_{TBS,TE-0117}$	Mean Tide Level Calculated by TBS (as applicable to MCNA)
MTR	Mean Tide Range
MTR_{BA}	Mean Tide Range (as calculated for the TE-0117 Borrow Area)
$MTR_{CRMS0341}$	Mean Tide Range (as determined by CRMS0341 data during observation period)
$MTR_{CRMS3296}$	Mean Tide Range (as determined by CRMS3296 data during observation period)
$MTR_{TBS,TE-0117}$	Mean Tide Range Calculated by TBS (as applicable to MCNA)
MTR_{MCNA}	Mean Tide Range (as calculated for the TE-0117 Marsh Creation and Nourishment Area)
NAC	Northern Access Corridor
NAVD88	North American Vertical Datum of 1988
NMFS	National Marine Fisheries Service (of NOAA)
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service (of NOAA)
NTBMS	National Tidal Benchmark System
NTDE	National Tidal Datum Epoch
O&G	Oil & Gas
OM&M	Operations, Monitoring, & Maintenance
φ	Angle of Interal Friction (i.e., phi angle of granular soils)
PI	Percent Inundation
PInt	Point of Intersection
PL	Pipeline
POB	Point of Beginning
POE	Point of Ending

LIST OF ABBREVIATIONS, VARIABLES, UNITS, AND OTHER TERMS [C]

PSDDF	Primary Consolidation, Secondary Compression, and Desiccation of Dredge Fill (software)
R_{ESLR}	Rate of ESLR (as applied to PI calculations and CMFE determination)
RM	Reference Marsh (i.e., as in reference or "healthy" marsh elevation surveys)
RSLR	Relative Sea Level Rise
RTK	Real Time Kinematic (i.e., surveying)
S	Settlement
σ	Normal Stress (i.e., normal stress applied to soils)
σ'	Effective Stress (i.e., effective stress applied to soils)
σ'_f	Effective Stress (following compression/consolidation laboratory analysis)
σ'_p	Effective Stress (preceding compression/consolidation laboratory analysis)
SAC	Southern Access Corridor
SETANL	Settlement Analysis (software)
SF	Square Foot
SL	Multiple Lift (i.e., as in single lift construction for ECDs)
SS	Sideslopes
SS_{ECD}	Sideslopes (of ECD design)
SS_{ECDBA}	Sideslopes (of Borrow Pit/Channel for ECD design)
t	time
τ	Shear Stress (i.e., shear stress applied to soils)
T_V	Terzaghi Time Factor (as applied to consolidation laboratory analysis)
TBS	T. Baker Smith, LLC
TPCG	Terrebonne Parish Consolidated Government
TY	Target Year (i.e., design life, as in "target year 20")
USACE	United States Army Corps of Engineers
V	Volume
$V_{CORR,MECH-D,CC}$	Volume, Mechanical Dredging Req. (i.e., volume of access dredging required in CC)
$V_{CORR,MECH-D,NAC}$	Volume, Mechanical Dredging Req. (i.e., volume of access dredging required in NAC)
$V_{CORR,MECH-D,SAC}$	Volume, Mechanical Dredging Req. (i.e., volume of access dredging required in SAC)
$V_{ECD,ML}$	In-Place Volume of ECD Under ML Conditions
$V_{ECD,SL}$	In-Place Volume of ECD Under SL Conditions
V_{ECDBA}	Volume Required in Borrow Pit/Channel for ECD Construction
W	Width
W_{CR}	Crown Width (i.e., as in crown width of spoil/embankment/dike)
$W_{CR,ECD}$	Crown Width of ECD
$W_{CR,ECDBA}$	Crown Width of Borrow Pit/Channel for ECD
WVA	Wetland Value Assessment
YR (or yr)	Year

TIDAL DATUM DETERMINATION

TIDAL DATUM DETERMINATION

Identification of Engineering Problem

The purpose of this exercise is to compute statistical tidal variables (i.e., MHW/MLW, etc.) that are used in further E&D of CPRA coastal restoration projects.

Breakdown of Governing Assumptions and Calculation Methodology

1) As stated by NOAA <http://www.tidesandcurrents.noaa.gov/>, tidal datum determinations are performed utilizing datasets that span timescales of 19 years. NOAA refers to a timescale of said duration as the Nationa Tidal Datum Epoch (NTDE). Utilization of NTDE datasets in tidal variable calculations allow the following to be achieved for the determination of site-specific tidal datum determinations:
   i) include all significant tidal periods typically observed cyclically throughout the period of regression of lunar nodes (equal to 18.6 years);
   ii) account for local meteorological effects on sea level; and
   iii) establish a uniform approach that is applied to tidal datum calculations for all NOAA stations.

2) Also acknowledged by NOAA is the significance of the effect of RSLR, as it pertains to the determination of accurate statistical tidal variables. In certain locales, in order to offset some of the inaccuracies introduced by the older portions of NTDE datasets, NOAA advocates for the use of datasets with reduced timescales to reduce inaccuracies brought on by high rates of RLSR. For CWPPRA coastal restoration proejcts, datasets For CWPPRA coastal restoration projects, datasets with timescales spanning as little as 5 years have previously been utilized and deemed to be acceptable for use in performing tidal datum determinations. Based on all of this, the TE-0117 design team has opted to perform a tidal datum determination utilizing modified NTDE datasets of 5 years.

3) Existent within the relative vicinity of TE-0117 project features of interest are the following CRMS stations:
   - CRMS3296 (N 29° 23' 02.508", W 90° 28' 44.507") - near marsh creation and nourishment area
   - CRMS0341 (N 29° 18' 33.725", W 90° 30' 45.789") - near borrow area at southern access corridor approach

4) As defined by NOAA and other CPRA project literature, the following statistical tidal variables are continuously determined and published for public use by the NOAA gage station at Grand Isle, LA and were determined on each of the CRMS datasets obtained for this project.
   - **MHW**, or mean high water, is defined as the arithmetic mean of all of the high water elevations observed over the NTDE (or modified dataset).
   - **MLW**, or mean low water, is defined as the arithmetic mean of all of the low water elevations observed over the NTDE (or modified dataset).
   - **MTL**, or mean tide level, is defined as a tidal datum equivalent to the average of MHW and MLW observed over the NTDE (or modified dataset).

TIDAL DATUM DETERMINATION [C]

Breakdown of Governing Assumptions and Calculation Methodology [Continued]

4) [Continued]
   - **MHW**, or mean high water, is defined as the arithmetic mean of all of the high water elevations observed over the NTDE (or modified dataset).
   - **MLW**, or mean low water, is defined as the arithmetic mean of all of the low water elevations observed over the NTDE (or modified dataset).
   - **MTL**, or mean tide level, is defined as a tidal datum equivalent to the average of MHW and MLW observed over the NTDE (or modified dataset).
   - **MTR** is defined as the mean tidal range and is equivalent to the difference between MHW and MLW observed over the NTDE (or modified dataset).

5) While past CPRA convention has utilized the range-ratio method, the execution of statistical tidal variable calculations using CRMS water level datasets for design have been utilized for recent CPRA in-house design CWPPRA projects.

6) The following tidal variables were determined/calculated using water level data obtained from the CRMS stations referenced in item 4).
   - $\mathbf{MHW_{CRMS3296}}$ is defined as the MHW during the declared observation period near the marsh creation and nourishment area, as indicated from water level data obtained from CRMS3296.
   - $\mathbf{MLW_{CMRS3296}}$ is defined as the MLW during the declared observation period near the marsh creation and nourishment area, as indicated from water level data obtained from CRMS3296.
   - $\mathbf{MTL_{CRMS3296}}$ is defined as the MTL during the delcared observation period near the marsh creation and nourishment area, as indicated from water level data obtained from CRMS3296.
   - $\mathbf{MTR_{CRMS3296}}$ is defined as the MTR during the declared observation period near the marsh creation and nourishment area, as indicated from water level data obtained from CRMS3296.
   - $\mathbf{MHW_{CRMS0341}}$ is defined as the MHW during the declared observation period near the borrow area, as indicated from water level data obtained from CRMS0341.
   - $\mathbf{MLW_{CRMS0341}}$ is defined as the MLW during the declared observation period near the borrow area, as indicated from water level data obtained from CRMS0341.
   - $\mathbf{MTL_{CRMS0341}}$ is defined as the MTL during the declared observation period near the borrow area, as indicated from water level data obtained from CRMS0341.
   - $\mathbf{MTR_{CRMS0341}}$ is defined as the MTR during the declared observation period near the borrow area, as indicated from water level data obtained from CRMS0341.

7) With the above-stated statistical tidal variables calculated for each CRMS station, the statistical tidal variables calculated by TBS in support of the TE-0117 project were compared against both tidal variable distributions generated for the BA and MCNA project features. Note that the water surface elevations were obtained in areas near the restoration area features, which were in closer proximity to CRMS3296.

TIDAL DATUM DETERMINATION [C]

Breakdown of Governing Assumptions and Calculation Methodology [Continued]

8) Based on the results of the comparison, the following tidal variables were identified for project design.
   - $\mathbf{MHW_{MCNA}}$ is defined as the MHW calculated at the marsh creation and nourishment area.
   - $\mathbf{MLW_{MCNA}}$ is defined as the MLW calculated at the marsh creation and nourishment area.
   - $\mathbf{MTL_{MCNA}}$ is defined as the MTL calculated at the marsh creation and nourishment area.
   - $\mathbf{MTR_{MCNA}}$ is defined as the MTR calculated at the marsh creation and nourishment area.
   - $\mathbf{MHW_{BA}}$ is defined as the MHW calculated at the borrow area.
   - $\mathbf{MLW_{BA}}$ is defined as the MLW calculated at the borrow area.
   - $\mathbf{MTL_{BA}}$ is defined as the MTL calculated at the borrow area.
   - $\mathbf{MTR_{BA}}$ is defined as the MTR calculated at the borrow area.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

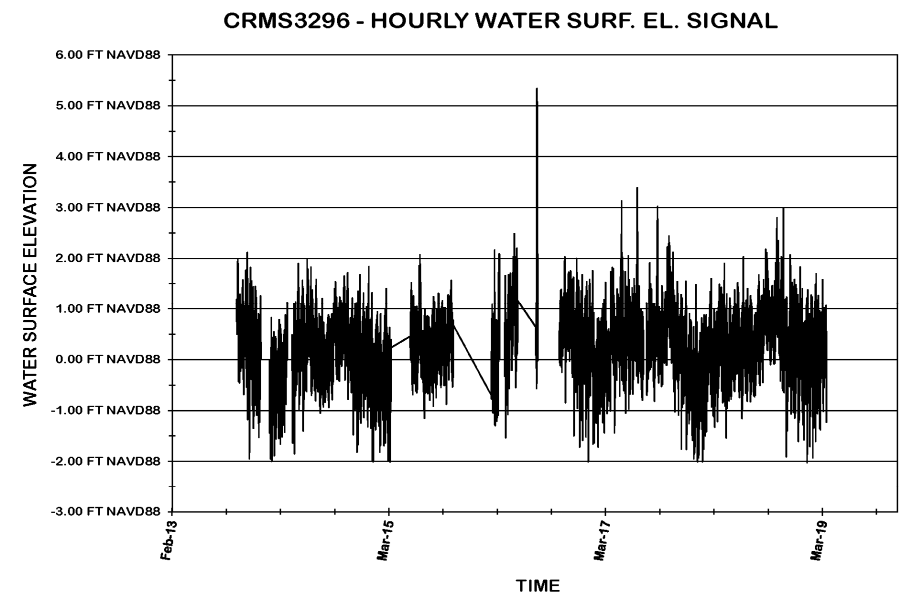


FIGURE R-1: CRMS3296 DATA

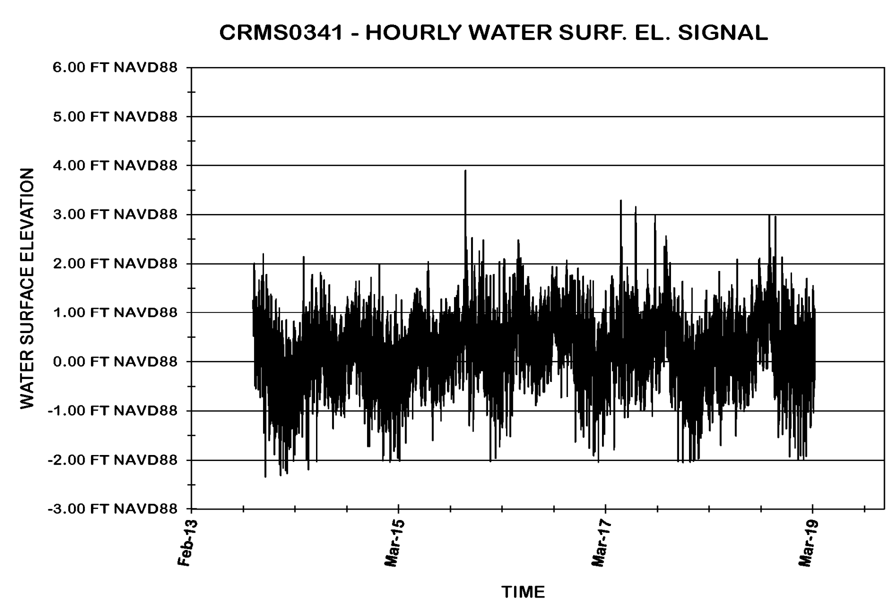


FIGURE R-2: CRMS0341 DATA

THEORY, EQUATIONS, AND METHODS

1) CRMS data was obtained.

2) Observation periods were defined, and raw data was organized to extract daily high water and daily low water surface elevations across the observation periods for each station. Figure R-1 and R-2 depict these raw water level datasets.

3) The following variables were calculated for each CRMS dataset.

- $MHW_{CRMS3296}$
- $MLW_{CRMS3296}$
- $MTL_{CRMS3296}$
- $MTR_{CRMS3296}$
- $MHW_{CRMS0341}$
- $MLW_{CRMS0341}$
- $MTL_{CRMS0341}$
- $MTR_{CRMS0341}$

Where:

$MHW_{CRMS3296}$ = arithmetic mean of all daily high water surface elevations observed at CMRS3296 [FT NAVD88 GEOID 12A]

$MLW_{CRMS3296}$ = arithmetic mean of all daily low water surface elevations observed at CRMS3296 [FT NAVD88 GEOID 12A]

$MTL_{CRMS3296}$ = arithmetic mean of $MHW_{CRMS3296}$ and $MLW_{CRMS3296}$ [FT NAVD88 GEOID 12A]

$MTR_{CRMS3296}$ = difference between $MHW_{CRMS3296}$ and $MLW_{CRMS3296}$ [FT]

$MHW_{CRMS0341}$ = arithmetic mean of all daily high water surface elevations observed at CMRS0341 [FT NAVD88 GEOID 12A]

$MLW_{CRMS0341}$ = arithmetic mean of all daily low water surface elevations observed at CRMS0341 [FT NAVD88 GEOID 12A]

$MTL_{CRMS0341}$ = arithmetic mean of $MHW_{CRMS0341}$ and $MLW_{CRMS0341}$ [FT NAVD88 GEOID 12A]

$MTR_{CRMS0341}$ = difference between $MHW_{CRMS0341}$ and $MLW_{CRMS0341}$ [FT]

Table R-1 and Table R-2 show the tidal datum calculations for CRMS3296 and CRMS0341, respectively.

4) The T. Baker Smith, LLC (TBS) calculated tidal variables are shown in Table R-3.

CALCULATED VALUES

1) No calculations of note.

2) No calculations of note.

3) The following tables contain the CRMS data statistical tidal variable calculations.

TABLE R-1: CRMS3296 CALCULATIONS

VARIABLE	VALUE [FT NAVD88]
$MHW_{CRMS3296}$	+0.8037
$MLW_{CRMS3296}$	-0.3586
$MTL_{CRMS3296}$	+0.2226
$MTR_{CRMS3296}$	1.1623*

*Denotes value in absolute FT not relative to elevation datum

TABLE R-2: CRMS0341 CALCULATIONS

VARIABLE	VALUE [FT NAVD88]
$MHW_{CRMS0341}$	+0.9048
$MLW_{CRMS0341}$	-0.449
$MTL_{CRMS0341}$	+0.2279
$MTR_{CRMS0341}$	1.3538*

*Denotes value in absolute FT not relative to elevation datum

4) The following table contains the TBS calculations.

TABLE R-3: TBS CALCULATIONS

VARIABLE	VALUE [FT NAVD88]
$MHW_{TBS,TE-0117}$	+1.09
$MLW_{TBS,TE-0117}$	-0.02
$MTL_{TBS,TE-01117}$	+0.55
$MTR_{TBS,TE-0117}$	1.11*

*Denotes value in absolute FT not relative to elevation datum

FIGURES AND GRAPHICS

THEORY, EQUATIONS, AND METHODS

5) The following variables were selected for use in design.

- $\mathbf{MHW_{MCNA}}$
- $\mathbf{MLW_{MCNA}}$
- $\mathbf{MHW_{BA}}$
- $\mathbf{MLW_{BA}}$

Where:

$\mathbf{MHW_{MCNA}} = \mathbf{MHW_{CRMS3296}}$
$\mathbf{MLW_{MCNA}} = \mathbf{MLW_{CRMS3296}}$
$\mathbf{MHW_{BA}} = \mathbf{MHW_{CRMS0341}}$
$\mathbf{MLW_{BA}} = \mathbf{MLW_{CRMS0341}}$

See Table R-4 for these values.

CALCULATED VALUES

5) The following table contains the final values for tidal variables that were selected for design.

TABLE R-4: TE-0117 TIDAL CALCULATIONS

VARIABLE	VALUE [FT NAVD88]
MHW_{MCNA}	+0.80
MLW_{MCNA}	-0.36
MHW_{BA}	0.90
MLW_{BA}	-0.45

PERCENT INUNDATION SELECTION AND REFERENCE MARSH ELEVATION COMPARISON

PERCENT INUNDATION SELECTION AND REFERENCE MARSH ELEVATION COMPARISON

Identification of Engineering Problem

The purpose of this exercise is to prescribe an appropriate selection of percent inundation, as compared to reference marsh elevation surveys and desired marsh restoration type, for marsh creation project design.

Breakdown of Governing Assumptions and Calculation Methodology

1) With the knowledge of rising sea levels and projected increases in RSLR becoming evermore critical in marsh creation project design, CPRA has developed guidance literature for the use of the percent inundation method for estimating a marsh creation project's constructed marsh fill elevation (CMFE), so as to meet project goals while maximing ecological benefits throughout the project design life (see CPRA MCDG, Appendix D).

2) As identified by Appendix D of the CPRA MCDG, the following items were determined for utilization in the percent inundation method.
   i) analysis of local water level data and site-specific tidal datum determination;
   ii) selection of optimal percent inundation, as determined by desired marsh restoration type;
   iii) calculation of elevation contours corresponding to upper and lower bounds of optimal water level range of selected percent inundation;
   iv) selection of appropriate RSLR rates, on a site-/basin-specific basis;
   v) projection of design water level elevations (i.e., MHW, MLW, upper/lower bounds of percent inundation, etc.) from present-day conditions throughout design life; and
   vi) generation of percent inundation plot, to be used in further E&D.

3) As reported in the TE-0117 T. Baker Smith, LLC survey report and survey drawings, reference (existing) marsh elevation surveys were performed, under the direction of CPRA field personnel, to ascertain elevation data in marsh micro-environments that were considered to be representative of suitable TY20 project conditions. This survey data was used in formulating a comparison between the projected upper/lower bounds of percent inundation range and the projected TY20 reference marsh elevations to assist in further E&D and the evaluation of success criteria.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

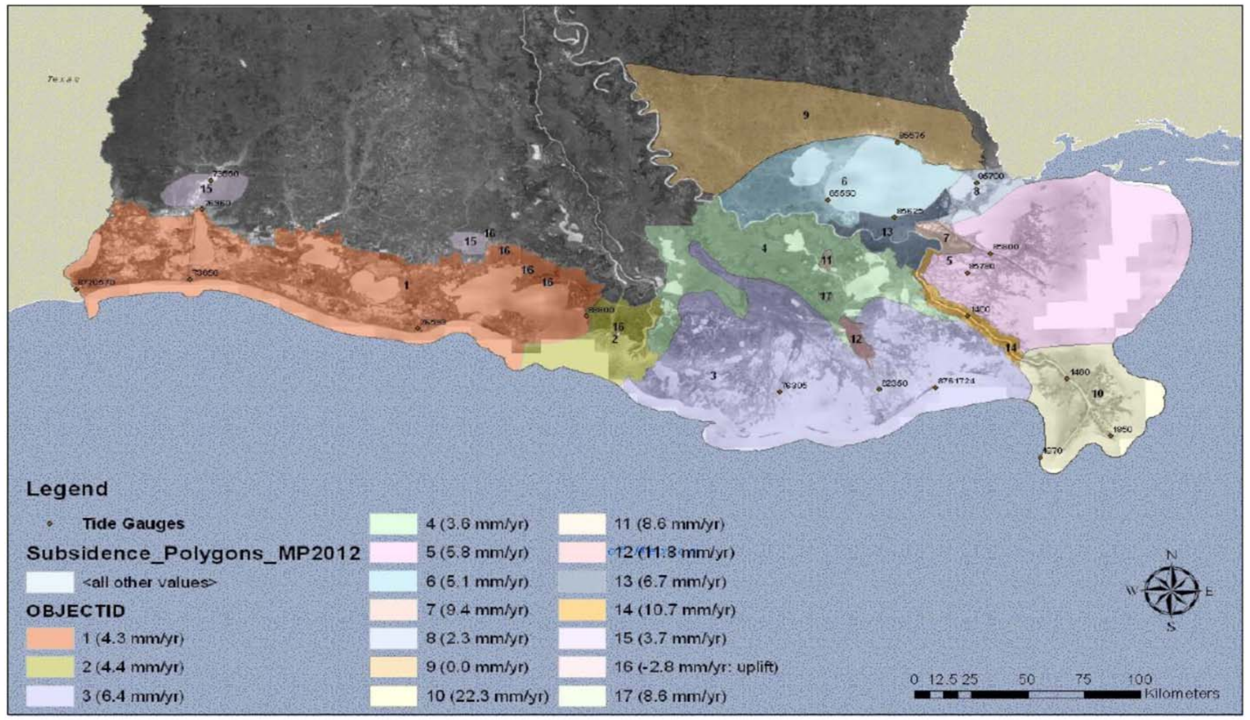


FIGURE R-3: 2017 MASTER PLAN SUBSIDENCE RATES BY REGION

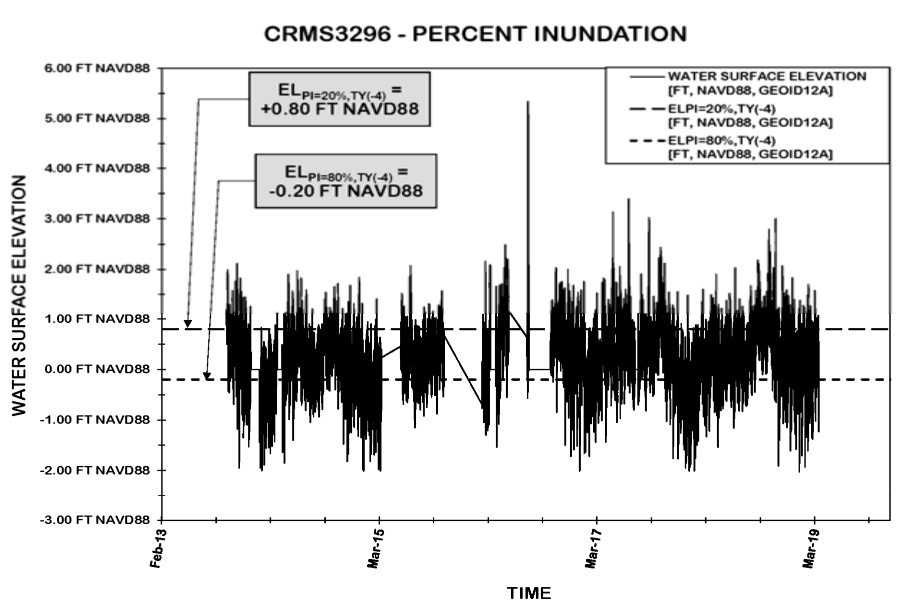


FIGURE R-4: 20%, 80% IN. EL. AGAINST CRMS3296 DATA

THEORY, EQUATIONS, AND METHODS

1) CPRA MCDG, Appendix D was consulted.

2) Per MCDG, Appendix D, the first step in using Percent Inundation methods is to perform a local water level data analysis. The earlier portion of this packet titled "TITLE DATUM DETERMINATION" contains such an analysis.

3) The Percent Inundation method then states to identify the optimal inundation zone according to marsh type within the LCZ. As such, the following was selected as the optimal inundation range values for TE-0117 project design.

- **Marsh Type** = Saline
- **Optimal (Preferred) In. Range** = 20% - 80%

4) Utilizing the local water level analysis mentioned in item 2), the Percent Inundation method then requires a check that five (5) years or more of hydrologic data has been collected and referenced to Geoid 12A. Following this check, the water surface elevation dataset is to be ranked to identify the 20th and 80th percentiles of water levels. Note that the identification/calculation of 20th and 80th percent inundation water surface elevations represent the design-level (TY0 or earlier) water surface elevations, which are projected to undergo increases in elevation value due to eustatic sea level rise (ESLR) throughout the design life of TE-0117. The following variables were calculated for design-level percent inundation water surface elevation values.

- $\mathbf{EL_{PI=20\%,TY(-4)}}$
- $\mathbf{EL_{PI=80\%,TY(-4)}}$
- $\mathbf{EL_{PI=20\%,TY0}}$
- $\mathbf{EL_{PI=80\%,TY0}}$

5) The next step in the Percent Inundation method entails the calculation of projected water surface elevations through the design life of a marsh creation project. The following variables were calculated to determine the final projected percent inundation elevation values. See Table R-5.

- $\mathbf{EL_{PI=20\%,TY20}}$
- $\mathbf{EL_{PI=80\%,TY20}}$

Note that the selected rate of ESLR used in this calculation is shown below.

Where:

$\mathbf{R_{ESLR}}$ = annual rate of sea level rise due to eustacy [ft/yr]

Note that a rate of RSLR was previously conveyed to GEO that was informed by 2012 Master Plan guidance literature. The regional subsidence map shown in Figure R-3 together with Master Plan literature were both used to provide a a range of values for GEO to develop a selection of appropriate sea level rise rates to use in generation of settlement curves. Moving forward, CPRA explored the updated 2017 Master Plan guidance literature for sea level rise and selected upper the "1.0-m by 2100" scenario. An annual rate approximation of this scenario is shown in Table R-5 in addition to other calculations. Figure R-4 and Figure R-5 show graphical representations of design-level percent inundation water surface elevation values and water surface elevation projections throughout the TE-0117 design life, respectively.

CALCULATED VALUES

1) No calculations of note.

2) No calculations of note.

3) No calculations of note.

4) The following tables contain the design-level Percent Inundation elevation calculations.

TABLE R-5: PERCENT INUNDATION CALCULATIONS

VARIABLE	VALUE	UNIT
R_{ESLR}	0.023204167	ft/yr
$EL_{PI=20\%,TY(-4)}$	+0.80	FT NAVD88
$EL_{PI=80\%,TY(-4)}$	-0.20	FT NAVD88
$MHW_{MCNA,TY(-4)}$	+0.80	FT NAVD88
$MLW_{MCNA,TY(-4)}$	-0.36	FT NAVD88
$EL_{PI=20\%,TY0}$	+0.89	FT NAVD88
$EL_{PI=80\%,TY0}$	-0.11	FT NAVD88
$MHW_{MCNA,TY0}$	+0.90	FT NAVD88
$MLW_{MCNA,TY0}$	-0.27	FT NAVD88
$EL_{PI=20\%,TY20}$	+1.36	FT NAVD88
$EL_{PI=80\%,TY20}$	+0.36	FT NAVD88
$MHW_{MCNA,TY20}$	+1.36	FT NAVD88
$MLW_{MCNA,TY20}$	+0.20	FT NAVD88

5) Calculations discussed in this item are shown in Table R-5.

FIGURES AND GRAPHICS

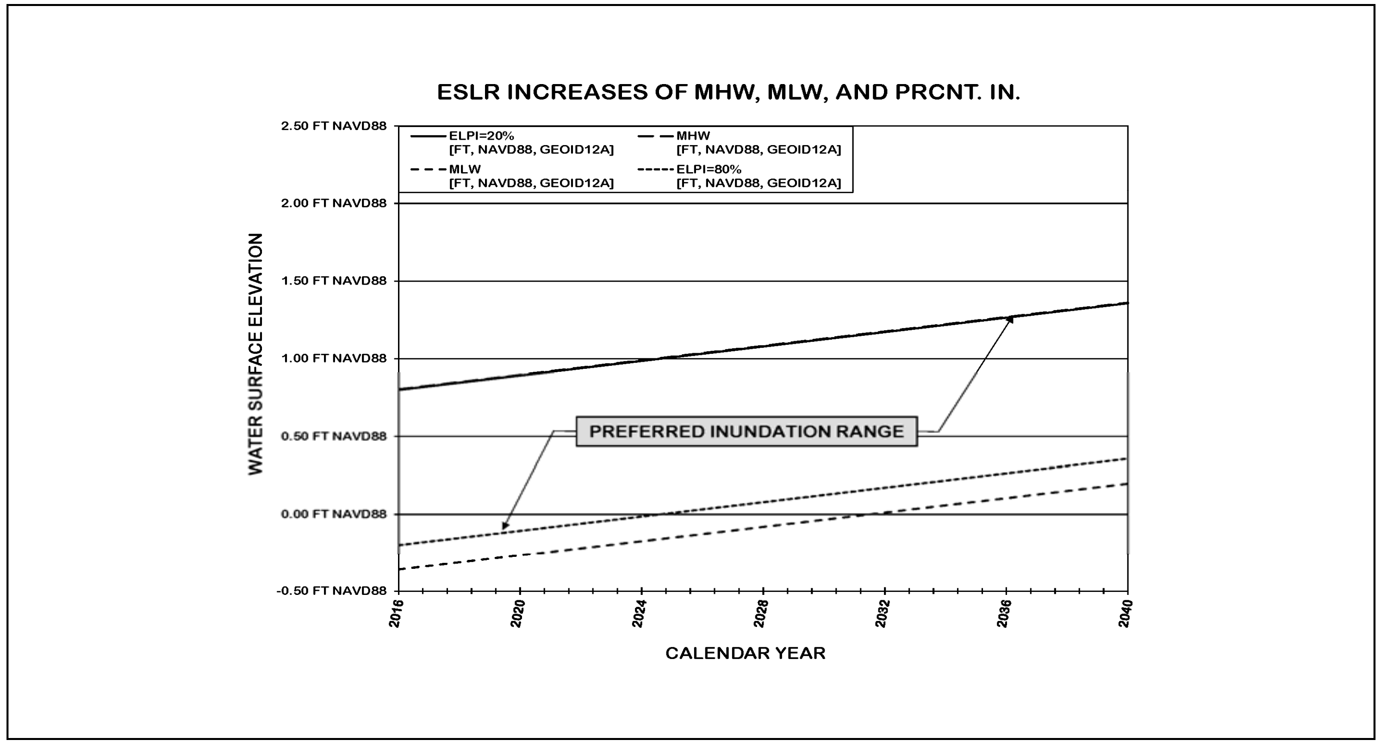


FIGURE R-5: ESLR PROJECTIONS FOR TE-0117 DESIGN

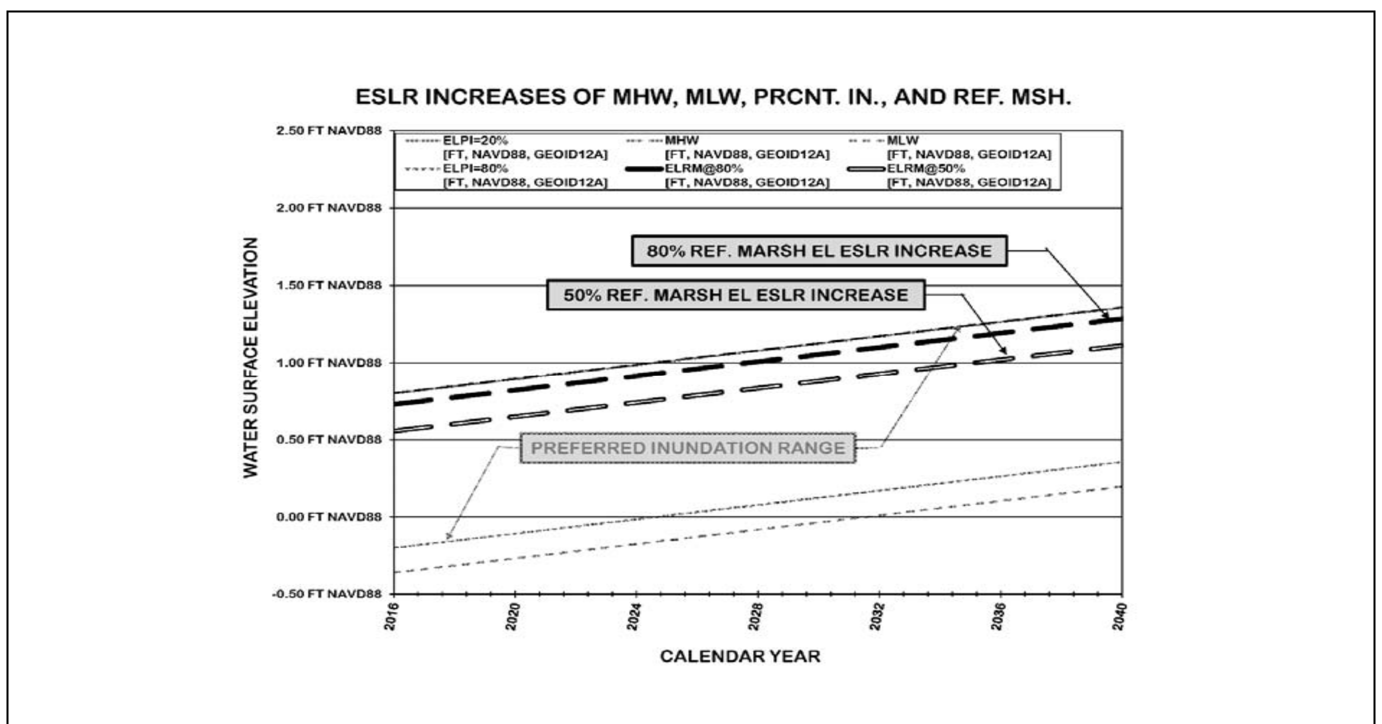


FIGURE R-6: REF MARSH EL. COMPARISON

THEORY, EQUATIONS, AND METHODS

6) For comparitive purposes, the average and 80th percentile of the reference marsh were also superimposed against percent in. and MHW/MLW. See Figure R-6.

CALCULATED VALUES

SETTLEMENT AND TARGET PUMP ELEVATION DETERMINATION

SETTLEMENT AND TARGET PUMP ELEVATION DETERMINATION

Identification of Engineering Problem

The purpose of this exercise is to determine the required target pump elevation for marsh creation design and construction via the generation of geotechnical settlement curves.

Breakdown of Governing Assumptions and Calculation Methodology

1) A critical component of successful marsh creation project designs is the generation of geotechnical settlement curves. CWPPRA project teams rely heavily on the information presented in settlement curves in order to perform a variety of functions, including but not limited to the following:
   i) calculating necessary marsh creation project design variables, as in the context of cross-sectional design dimensions and required volumetric pay quantities;
   ii) developing construction drawings and contract specifications, as in the context of prescribing necessary CMFE, overbuild tolerances, minimum durations of time between construction lifts and/or the acceptance pay surveys, ECD elevations, ECD sideslopes, ECD slope stability analyses and determinations of factors of safety against governing failure conditions, ECD borrow pit design dimensions, borrow area plan and profile designs, expectations on dewatering and dike gapping and degradation following construction, and other topics.
   iii) assisting in the development of long-term OM&M plans;
   iv) assessing post-construction restoration quality, as in the context of the performance of WVA and other restoration crediting; and
   v) informing future vegetative planting scenarios.

2) Key information that was utilized in the generation of settlement curves for the TE-0117 project include:
   i) in situ soil mechanics properties obtained from laboratory testing performed on geotechnical borings and CPTs sampled at the TE-0117 restoration area and proposed ECD alignments;
   ii) analytical data generated from soil samples extracted at the TE-0117 borrow area--both in situ and in the form of reconstitued composite samples of multiple in situ soil speciemens following homogenization;
   iii) pilot scale settling column test data generated from TE-0117 borrow area composite samples;
   iv) assumptions made for shrinkage and desiccation processes, as informed by TE-0117 borrow area analytical findings;
   v) computationally simulated dredge slurry settlement output data produced by geotechnical engineering software (i.e., PSDDF, SETANL) using TE-0117 analytical findings; and
   vi) regional subsidence rates across coastal Louisiana.
   vii) other project information, as in the context of geotechnical reporting issued for previous CPRA projects.

3) The below-listed variables were critical in calculating settlement.
   - Coefficient of compression, C_C, of governing situ foundation soil section(s)
   - Coefficient of consolidation, C_V, of governing in situ foundation soil section(s)

SETTLEMENT AND TARGET PUMP ELEVATION DETERMINATION [C]

Breakdown of Governing Assumptions and Calculation Methodology [Continued]

4) GeoEngineers, Inc., with select information provided by CPRA (discussed in the "PERCENT INUNDATION SELECTION..." portion of this packet), produced geotechnical settlement curves for an array of five (5) different target pump elevations across several strategically selected locations throughout the TE-0117 restoration area, all of which indicative of varying in situ soil conditions and existing mudline elevations. The above-listed information in item 2) was utilized in the generation of settlement curves by first analyticall determining consolidation characteristics of in situ foundation soils, which were derived empirically from consolidation geotechnical laboratory test procedures. Following the borrow area geotechnical investigation, GeoEngineers, Inc. was able to develop hydraulic dredge slurry settling properties from the settling column test and low stress consolidation test procedures conducted on borrow area homogenized soils. With the analytical findings established, computer software simulations were conducted, which were able to predict long-term settlement and time-rate settlement values for governing soil conditions across the site.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

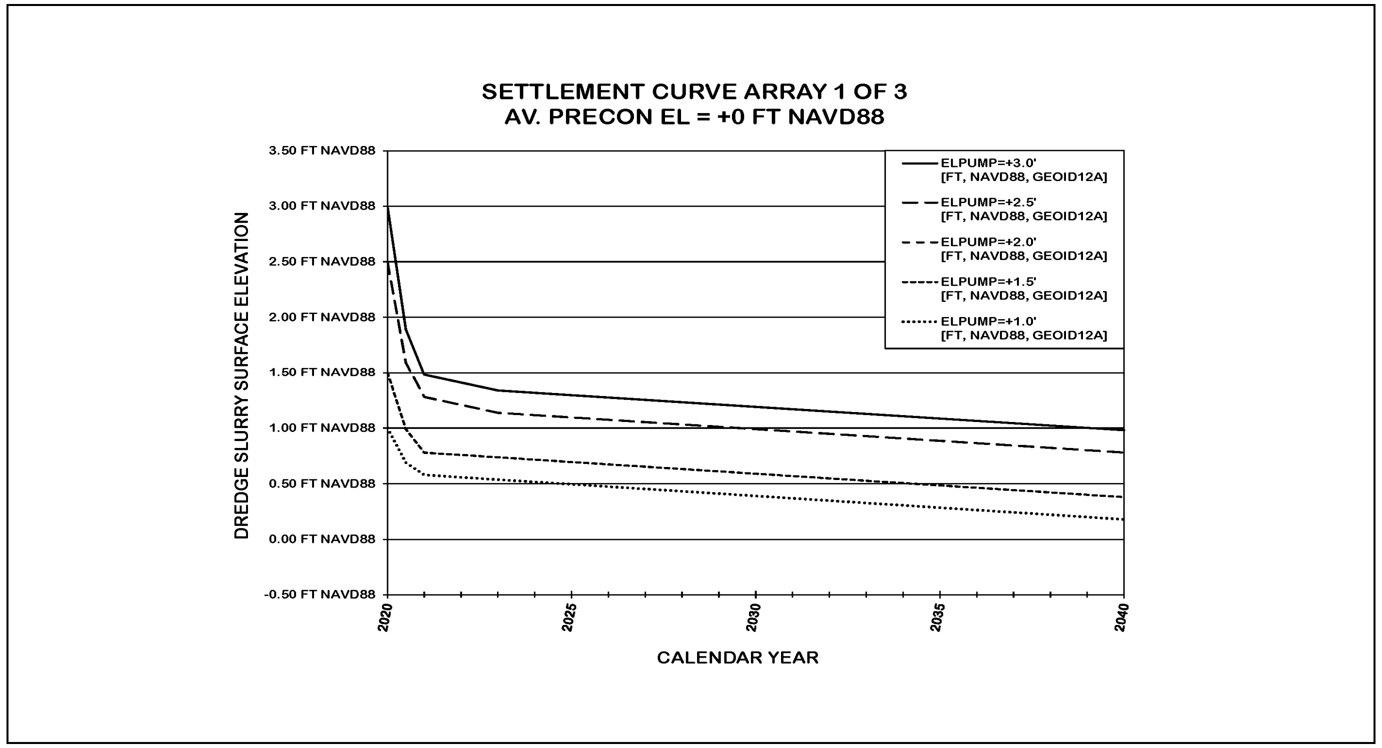


FIGURE R-7: SETTLEMENT CURVE ARRAY 1 OF 3

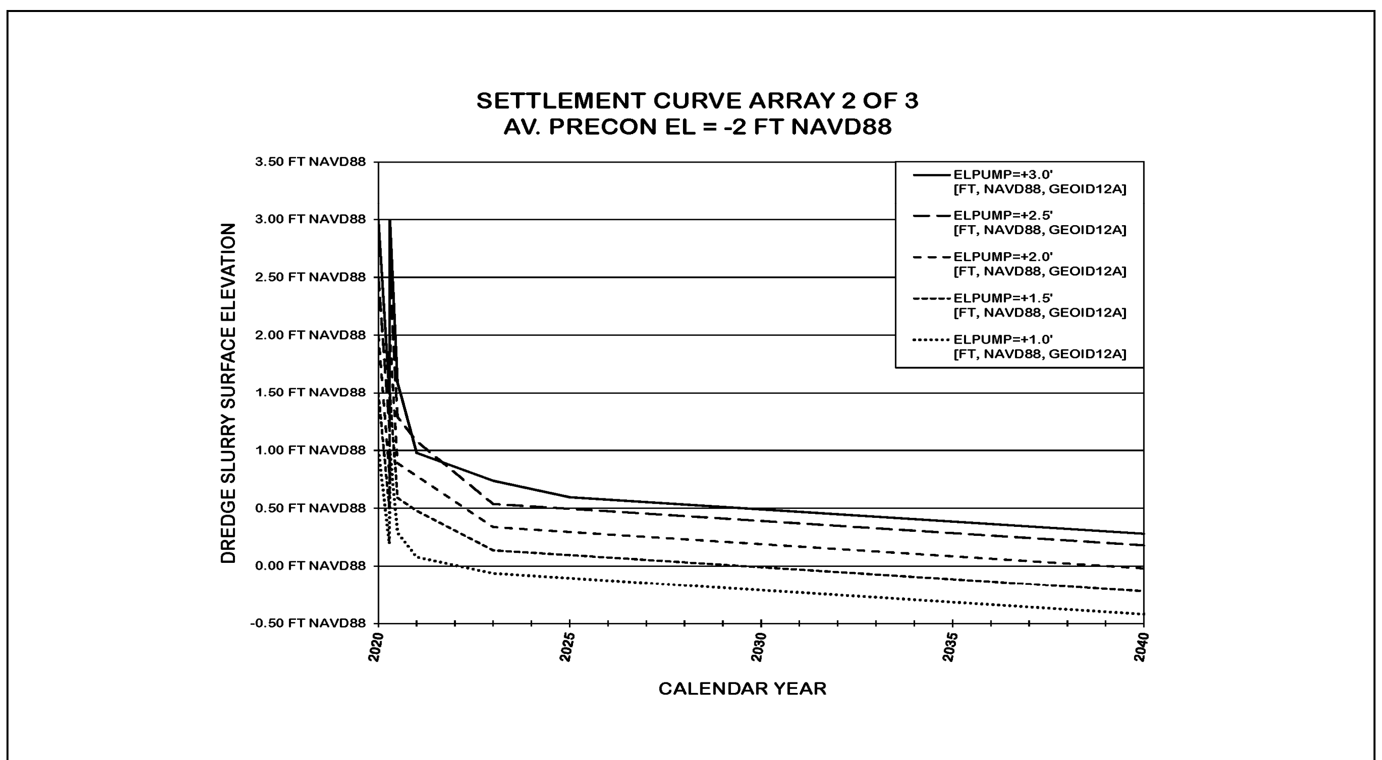


FIGURE R-8: SETTLEMENT CURVE ARRAY 2 OF 3

THEORY, EQUATIONS, AND METHODS

1) Applicable information used for this calculation procedure is as follows:
- TE-0117 Geotechnical Data Report dated July 15, 2015 by GeoEngineers, Inc.
- TE-0117 Geotechnical Investigation Data Report dated February 1, 2017 by GeoEngineers, Inc.
- TE-0117 Geotechnical Investigation Data Report Addendum 1 dated April 24, 2018 by GeoEngineers, Inc.
- TE-0117 Geotechnical Engineering Report dated August 17, 2018 by GeoEngineers, Inc.
- "PERCENT INUNDATION SELECTION AND REFERENCE MARSH ELEVATION COMPARISON" section of this calculations packet

2) Factoring in composite borrow area dredge slurry sample geotechnical properties and governing in situ soil conditions for fill site settlement characteristics, GeoEngineers, Inc. developed an array of five (5) settlement curves using computer software that simulated dredge slurry surface elevation change with the following governing formulae.

$$S = \frac{C_C H}{(1+e_0)} \log \frac{\sigma'_f}{\sigma'_p} \quad (1)$$

Where:

S	=	Degree of total settlement due to primary consolidation [ft]
C_C	=	Coefficient of compression, as determined through analytical methods [ft^2/day]
H	=	Initial height of in situ soil layer to undergo consolidation [ft]
e_0	=	Void ratio of in situ soil layer to undergo consolidation [unitless]
σ'_f	=	Final effective stress of soil layer undergoing consolidation [lb/ft^2]
σ'_p	=	Initial effective stress of soil layer undergoing consolidation [lb/ft^2]

$$t = \frac{T_V (H_{dr})^2}{C_V} \quad (2)$$

Where:

t	=	Total time required to reach degree of settlement indicated by other parameters [day]
T_V	=	Terzaghi theory dimensionless time factor corresponding to specific degree of consolidation [unitless]
H_{dr}	=	Height of drainage path (often related to H from **EQ (1)**) [ft]
C_V	=	Coefficient of consolidation, as determined through analytical methods [ft^2/day]

Figure R-7, Figure R-8, and Figure R-9 show the arrays of settlement curves representing dredge slurry surface elevation versus time with respect to average preconstruction mudline elevations varying from +0 FT NAVD88, -2 FT NAVD88, and -3 FT NAVD88.

CALCULATED VALUES

1) No calculations of note.

2) No calculations of note.

FIGURES AND GRAPHICS

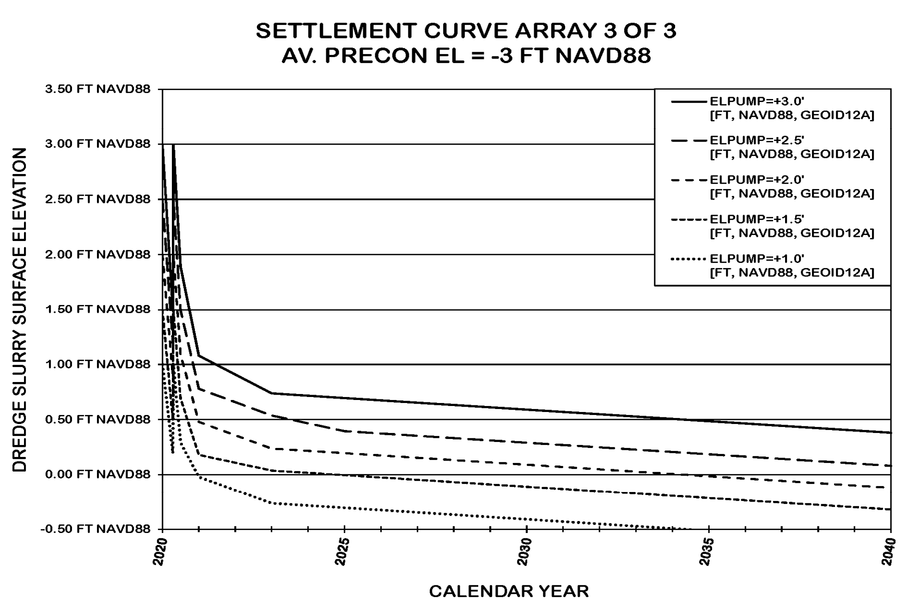


FIGURE R-9: SETTLEMENT CURVE ARRAY 3 OF 3

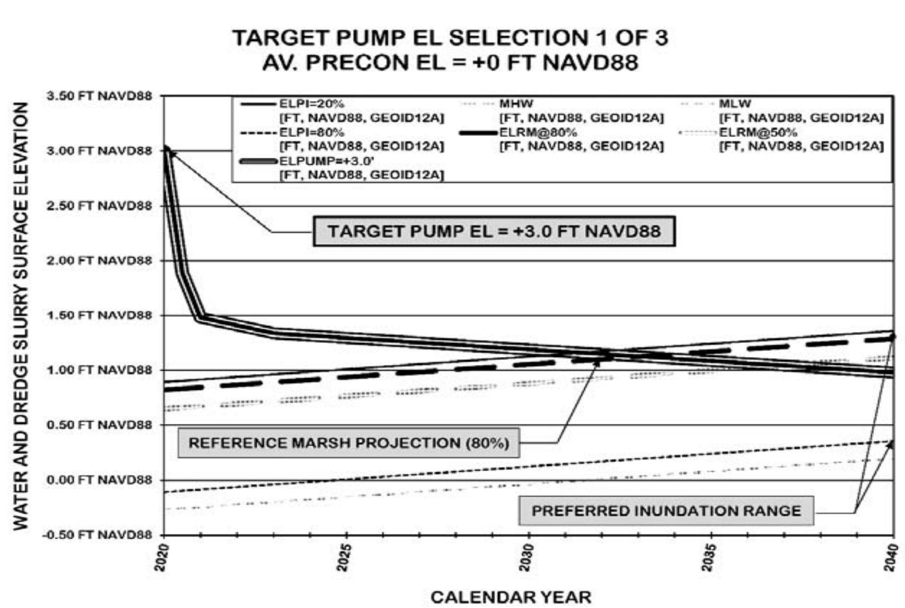


FIGURE R-10: TARGET PUMP EL 1 OF 3

THEORY, EQUATIONS, AND METHODS

3) Following the generation of settlement curves, the percent inundation and statistical tidal variable ESLR projections performed in the "PERCENT INUNDATION…" section of this calculations packet were utilized by generating additional figures superimposing settlement curves over water surface elevation projections to aid in informing the selection of target pump elevations. Figure R-10, Figure R-11, and Figure R-12 contain the optimal pump elevations for each preconstruction scenario with respect to average mudline elevations varying from +0 FT NAVD88, -2 FT NAVD88, and -3 FT NAVD88.

CALCULATED VALUES

3) No calculations of note.

FIGURES AND GRAPHICS	THEORY, EQUATIONS, AND METHODS	CALCULATED VALUES

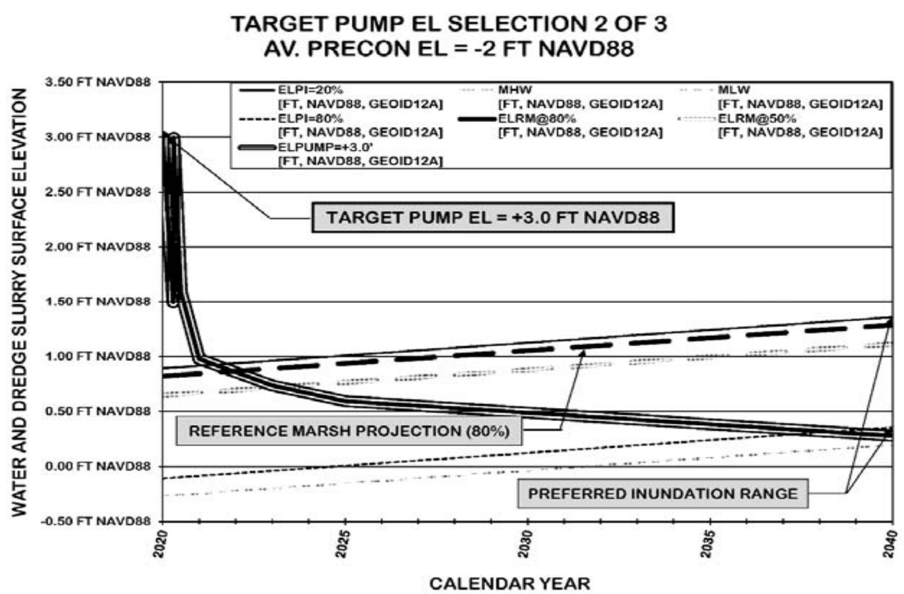


FIGURE R-11: TARGET PUMP EL 2 OF 3

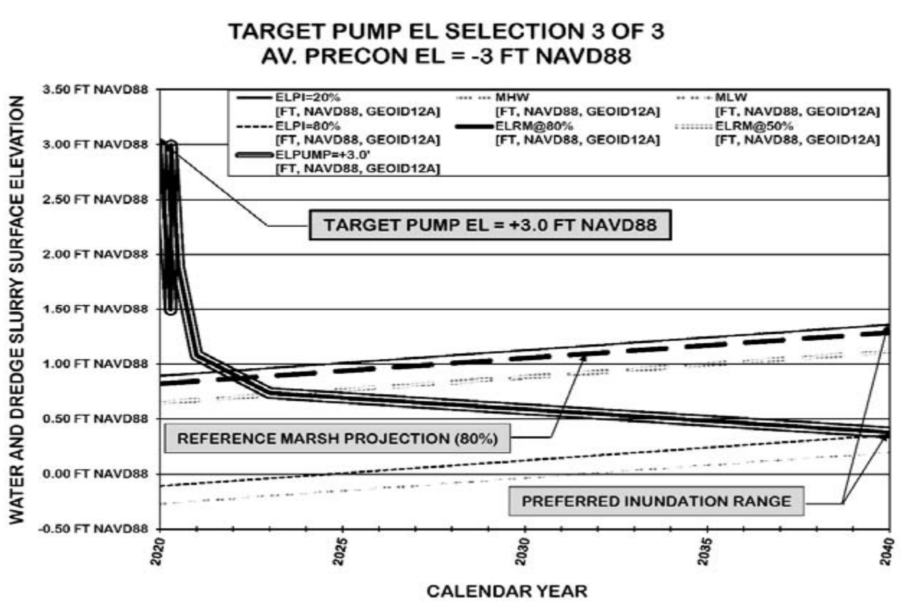


FIGURE R-12: TARGET PUMP EL 3 OF 3

EARTHEN CONTAINMENT DIKE AND ALTERNATE CLOSURE SYSTEM DESIGN CALCULATIONS

EARTHEN CONTAINMENT DIKE AND ALTERNATE CLOSURE SYSTEM DESIGN CALCULATIONS

Identification of Engineering Problem-Global Layout

The purpose of this exercise is to execute computations to support the earthen containment dike (ECD) and alternate sheetpile-sand berm gap closure designs that will assist in further E&D progress of numerous other marsh creation area project feature design decisions.

Note: This portion of the TE-0117 calculations packet has been subdivided into multiple sections. These sections are listed below and are sequentially encountered throughout the documentation of the calculation procedure outlined in the pages that follow.

Organization of ECD and Alternate Closure System Design Calculations

- Sub-Element 1 of 3 - ECD Design, Governing Design Scenarios, Single Lift
- Sub-Element 2 of 3 - ECD Design, Governing Design Scenarios, Multiple Lift
- Sub-Element 3 of 3 - Alternate Gap Closure System Design

Statement of Global Assumptions and Documentation of Calculation Processes

1) All of the following statements of problem identifications, declarations of assumptions, discussions of calculation methodologies, and presentations of calculated values/results attempt to follow the same format. In some instances, deviation from the general format is observed and is done so having been informed by the use of best engineering judgment.

2) As stated in several sections throughout the main text portion of the TE-0117 design report, the comprehensiv geotechnical design concept is (and has been throughout the progression of TE-0117 Phase I) that fill site geometry is (and will likely continue to be) governed by the geotechnical conditions of both the in situ soil strata of the marsh creation and nourishment area feature, as well as by the soil mechanics and particulate settling properties of analytical findings generated from soil samples obtained at the borrow area feature. Thus, the TE-0117 design team opted for a stepwise approach to the progression of TE-0117 project feature design, where the ECD and alternate gap closure system features would serve the roles of entailing the most critical design activities needed for completion of E&D, requiring the most rigorous amounts of design attention, having the longest duration of engineering time required for E&D completion, and likely result in being the most influential design component for the entirety of the TE-0117 project.

3) The following sections entail the case-specific identifications of engineering problem, breakdowns of governing assumptions and calculation methodologies, and solutions pertaining to each of the following three sub-elements of this section of the calculations packet.

EARTHEN CONTAINMENT DIKE AND ALTERNATE CLOSURE SYSTEM DESIGN CALCULATIONS [C]

SUB-ELEMENT 1 OF 3 - ECD DESIGN, GOVERNING DESIGN SCENARIOS, SINGLE LIFT

Identification of Engineering Problem

The purpose of this exercise is to determine the governing design dimensions needed to provide adequate factors of safety for single lift ECD construction and postconstruction conditions.

Breakdown of Governing Assumptions and Calculation Methodology

1) Although the TE-0117 project requires much E&D development at the current time, it is understood that a substantial constituent of the total linear footage of fill site containment will utilize single lift ECD, if not the majority.

2) GeoEngineers developed two governing design profiles for use across the marsh creation and nourishment areas of the TE-0117 site. Below is a summary of each design profile and their design applications.

Design Profile	Limitations	Key Parameters
DP 1	● High in situ moisture content ● C/P line shows low τ for dike cnstr. ● No c	● 30' min. stability berm ● Dike crown EL 4'* ● Dike crown width 5' ● Dike borrow sidesl. 1V:2H ● Dike constr. sidesl. 1V:4H ● Dike b. ch. min. EL -10'*
DP 2	● High in situ moisture content ● C/P more favorable τ for dike cnstr. ● Cohesive ovrbrdn., φ = 30° for d. cnstr.	● 25' min. stability berm ● Dike crown EL 4'* ● Dike crown width 5' ● Dike borrow sidesl. 1V:2H ● Dike constr. sidesl. 1V:4H ● Dike b. ch. min. EL -10'*

*Values referenced to NAVD88

3) ECD construction is expected to be achievable in one construction lift for areas that contain desirable preconstruction mudline elevations (EL. ≥ +2.0' NAVD88) and in situ soil conditions (DP 1 mostly).

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

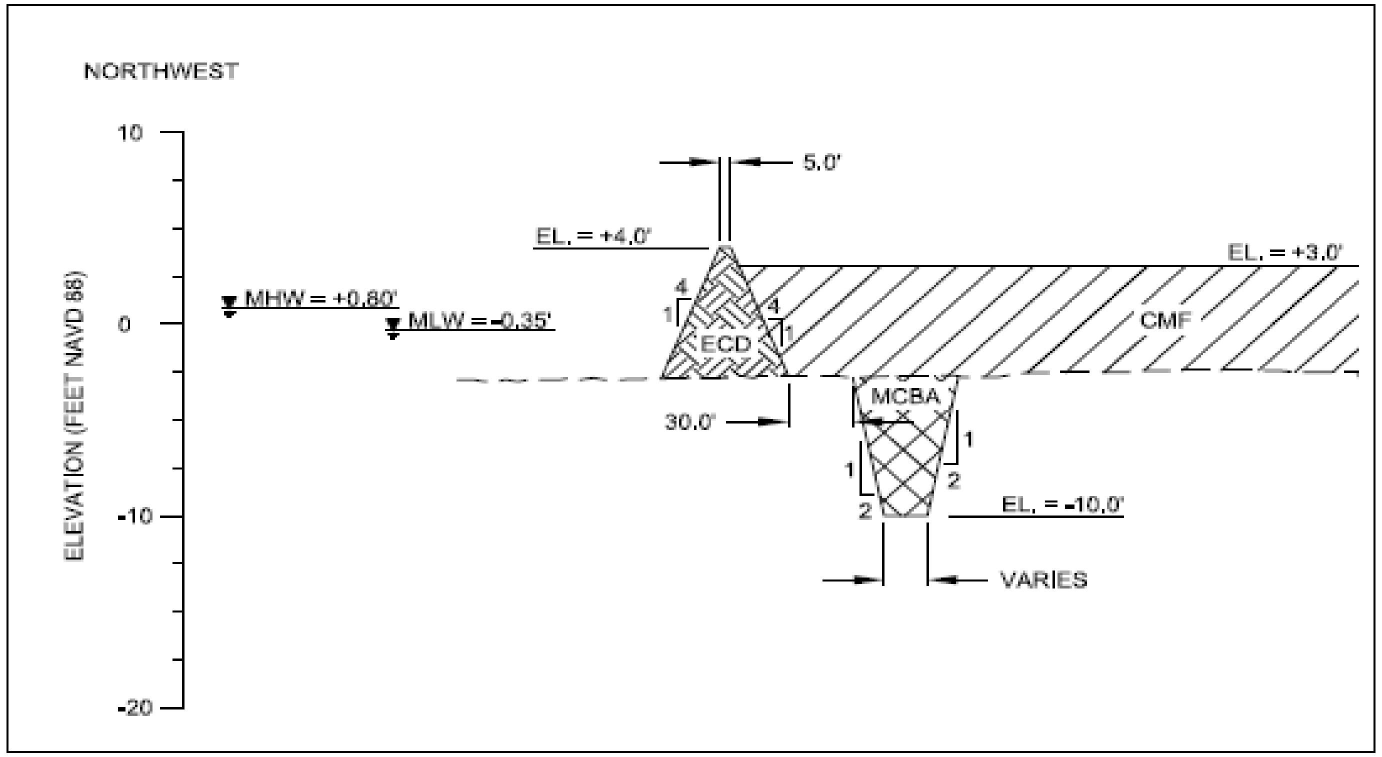


FIGURE R-13: ECD TYPICAL SECTION

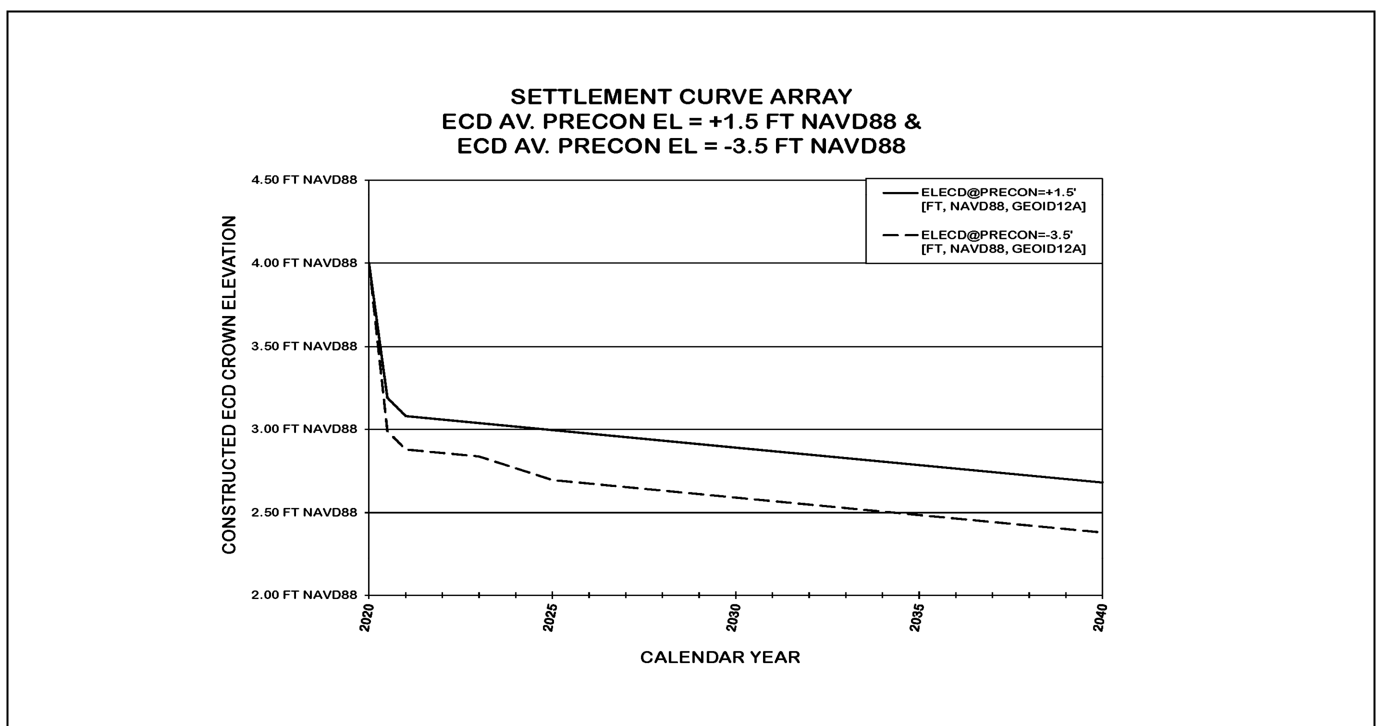


FIGURE R-14: SINGLE LIFT ECD SETTLEMENT

THEORY, EQUATIONS, AND METHODS

1) The TE-0117 30% design CAD package was used to obtain scaled drawings. See Figure R-13.

2) Single lift ECD feature design dimensions and dike design quantities were calculated using the following formulae.

$$A_{ECD,SL} = (H_{ECD,SL} * W_{CR,ECD}) + \left(SS_{ECD} * (H_{ECD,SL})^2\right) \quad (3)$$

Where:

$A_{ECD,SL}$	=	Cross-sectional area of single lift constructed ECD [SF]
$H_{ECD,SL}$	=	Height of single lift constructed ECD [FT]
$W_{CR,ECD}$	=	Crown width of constructed ECD [FT]
SS_{ECD}	=	Sideslopes of constructed ECD [FT/FT]

$$V_{ECD,SL} = A_{ECD,SL} * L_{ECD,SL} \quad (4)$$

Where:

$V_{ECD,SL}$	=	Volume of single lift constructed ECD [CF]
$L_{ECD,SL}$	=	Linear footage of single lift constructed ECD [LF]

Note that the calculations shown in Table R-6 correspond to proposed construction for single lift ECDs on a per LF basis. Also note that a borrow volume demand of 1.5:1 was utilized to size dimensions of the borrow channel. The shown borrow pit width corresponds to the maximum borrow pit geometry needed to satisfy the volume requirements for multiple lift ECD construction.

The following formulae were utilized in calculating ECD borrow pit quantities.

$$A_{ECDBA} = (H_{ECDBA} * W_{CR,ECDBA}) + (SS_{ECDBA} * (H_{ECDBA})^2) \quad (5)$$

$$V_{ECDBA} = A_{ECDBA} * L_{ECDBA} \quad (6)$$

3) Single lift ECD settlement was calculated using a similar calculation procedure as outlined in **EQ (1)** and **EQ (2)**. Figure R-14 shows the array of settlement curves representing ECD crown elevation versus time with respect to average mudline elevations at +1.5 FT NAVD88 to -3.5 FT NAVD88.

CALCULATED VALUES

1) No calculations of note.

2) The following table contains the values calculated for design dimensions and design quantities for single lift ECD construction.

TABLE R-6: SINGLE LIFT ECD CALCULATIONS

VARIABLE	VALUE	UNIT
$H_{ECD,SL}$	6	FT
$W_{CR,ECD}$	5	FT
SS_{ECD}	1V:4H	FT/FT
$A_{ECD,SL}$	174	SF
$V_{ECD,SL}$*	174	CF
$V_{ECD,SL}$*	6.44	CY
H_{ECDBA}	8	FT
$W_{CR,ECDBA}$**	40	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	448	SF
V_{ECDBA}*	448	CF
V_{ECDBA}*	16.59	CY

*Values represented as per LF of ECD/borrow channel reach
**Borrow pit width based on worst case ECD construction

3) No calculations of note.

EARTHEN CONTAINMENT DIKE AND ALTERNATE CLOSURE SYSTEM DESIGN CALCULATIONS [C]

SUB-ELEMENT 2 OF 3 - ECD DESIGN, GOVERNING DESIGN SCENARIOS, MULTIPLE LIFT

Identification of Engineering Problem

The purpose of this exercise is to determine the governing design dimensions needed to provide adequate factors of safety for multiple lift ECD construction and postconstruction conditions.

Breakdown of Governing Assumptions and Calculation Methodology

1) As stated in item 1) beneath the previous section, while single lift ECD designs are proposed for a a substantial constituent of the total linear footage of fill site containment, a critical design component of TE-0117 is the multiple lift ECD proposed design.

2) The same design profiles developed in item 2) beneath the previous section apply.

3) ECD construction is expected to be achievable in two construction lifts for areas that contain preconstructio mudline elevations that are not desirable for one lift ECD construction.

4) In areas that require multiple lift construction, future E&D progress should consider the following prior to the final design milestone.
   - The necessity to specify a predetermined wait period following completion of the first lift and commencing the second lift is critical when developing construction bidding documetns and contract specifications.
   - The declaration of a predetermined ECD construction sequence would ideally begin in an area of the projec site such that lift one of the ECD exhibiting the most challenging in situ soil conditions has the first opportunity to undergo strength gains.
   - The creation of construction budgets, schedules, and construction specifications should consider changing field conditions as a result of dike performance of multiple lift ECD construction introducing complications

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

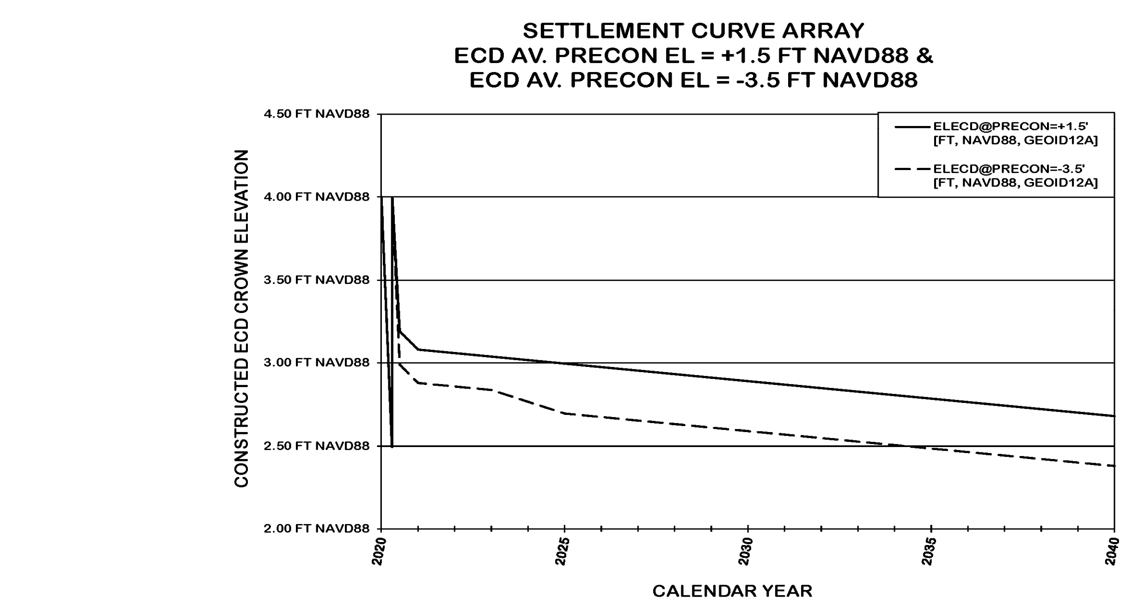


FIGURE R-15: MULTIPLE LIFT ECD SETTLEMENT

THEORY, EQUATIONS, AND METHODS

1) Figure R-13 shows the same design template corresponding to multiple lift ECD proposed design. Note that as determined by GEO, the first lift is expected to settle to an elevation of +2.5 FT NAVD88 (See Figure R-13).

2) Similar to the calculations beneath the preceding section titled "Sub-Element 1 of 3", **EQ (3)** and **EQ (4)** were utilized to calculate dike design quantities for the first lift of ECD construction. These values are shown in Table R-7.

Note that the calculations shown in Tables R-7 through R-9 correspond to proposed construction for multiple lift ECDs on a per LF basis. Also note that a borrow volume demand of 1.5:1 was utilized to size dimensions of the borrow channel.

With dike design dimensions in place from the previous section, multiple lift ECD design quantities were calculated using the following formulae for second lift ECD construction.

$$A_{ECD,ML} = \left(H_{ECD,ML} * W_{CR,ECD}\right) + \left(SS_{ECD} * \left(H_{ECD,ML}\right)^2\right) \quad (7)$$

$$V_{ECD,ML} = A_{ECD,ML} * L_{ECD,ML} \quad (8)$$

Table R-8 contains the second lift ECD design quantity calculations.

EQ (5) and **EQ (6)** were then utilized to calculate ECD borrow pit quantities. See Table R-9.

3) Multiple lift ECD settlement was calculated similar to the process as outlined in **EQ (1)** and **EQ (2)**. See Figure R-15.

NOTE FOR CALCULATED VALUES
*Values represented as per LF of ECD/borrow channel reach

CALCULATED VALUES

1) No calculations of note.

2) The following tables contain the values calculated for the design quantities for multiple lift ECD construction.

TABLE R-7: FIRST LIFT ECD CALCULATIONS

VARIABLE	VALUE	UNIT
$H_{ECD,SL}$	7	FT
$W_{CR,ECD}$	5	FT
SS_{ECD}	1V:4H	FT/FT
$A_{ECD,SL}$	231	SF
$V_{ECD,SL}$*	231	CF
$V_{ECD,SL}$*	8.56	CY

TABLE R-8: SECOND LIFT ECD CALCULATIONS

VARIABLE	VALUE	UNIT
$H_{ECD,ML}$	1.5	FT
$W_{CR,ECD}$	5	FT
SS_{ECD}	1V:4H	FT/FT
$A_{ECD,ML}$	16.5	SF
$V_{ECD,ML}$*	16.5	CF
$V_{ECD,ML}$*	0.61	CY

TABLE R-9: ECD BORROW QUANTITIES

VARIABLE	VALUE	UNIT
H_{ECDBA}	7	FT
$W_{CR,ECDBA}$	40	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	378	SF
V_{ECDBA}*	378	CF
V_{ECDBA}*	14.00	CY

EARTHEN CONTAINMENT DIKE AND ALTERNATE CLOSURE SYSTEM DESIGN CALCULATIONS [C]

SUB-ELEMENT 3 OF 3 - ALTERNATE GAP CLOSURE SYSTEM DESIGN

Identification of Engineering Problem

The purpose of this exercise is to determine the governing design dimensions needed to provide adequate factors of safety for the alternate gap closure system design.

Breakdown of Governing Assumptions and Calculation Methodology

1) In the southernmost portion of FILL SITE C, a deep bathymetric channel pit-like feature exists. In this area, the bathymetric relief deepens from approximately -3 FT NAVD88 to approximately -11 FT NAVD88. In order to maximize benefit acreage, the TE-0117 project team, alongside GeoEngineers, Inc., has explored the use of a sand berm-sheetpile closure complex for a proposed containment design at this location.

2) In situ soil characteristics at this portion of the marsh creation area are similar to select other locations with the exception of cohesive and peat overburden being nonexistent and a silty sand and sand layer understood to be exposed at the waterbottom surface.

3) The alternate gap closure system construction, operation, and long-term performance is expected to be acheivable as designed based on safety factors for what are believed to be the governing failure conditions based on what is known at the current time. If decided to move forward with the alternate gap closure system design, future E&D progress should consider incorporating a more significant, detailed design effort to explore other potential sources of failure and even consider increasing factors of safety used for design by GeoEngineers, Inc.

4) The acquiring of additional knowledge and review of past CPRA project literature in which sand berm-sheetpile closure systems have been designed, constructed, and successfully operated during and post construction is recommended prior to the final design milestone.

5) Contrary to ECD construction at the TE-0117 project site, construction loads are not analyzed as governing conditions, so much as oveturning moments and shear forces are believed to be drivers of design dimensions

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

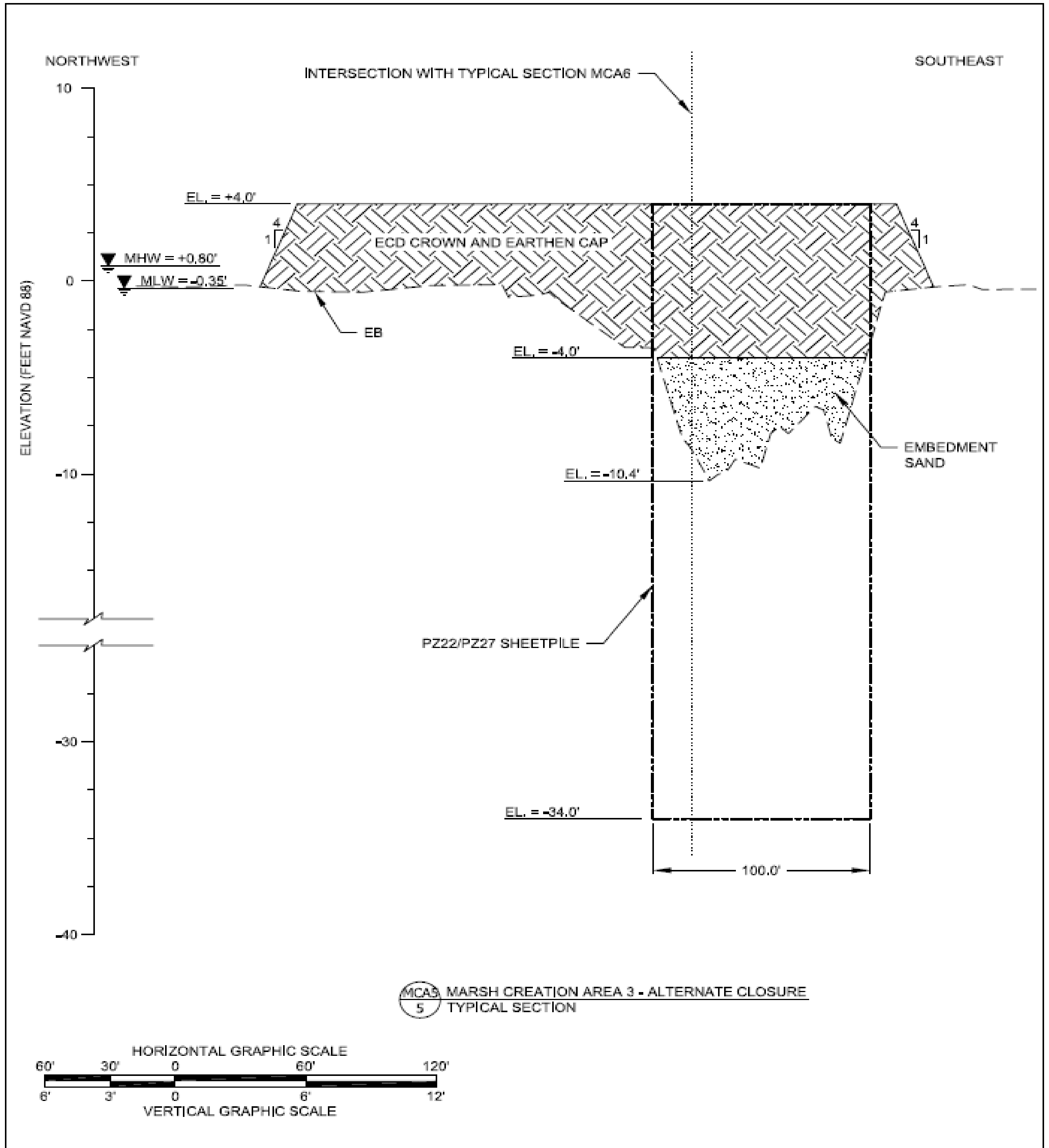


FIGURE R-16: ALTERNATE CLOSURE SYSTEM TYPICAL SECTION

THEORY, EQUATIONS, AND METHODS

1) See Figure R-16 for scaled drawing of the alternate closure system design.

2) GEO developed an extensive design appendix documenting the alternate closure system design. This information is available in Appendix K of the of the TE-0117 design report.

CALCULATED VALUES

1) No calculations of note.

2) No calculations of note.

MARSH CREATION AND NOURISHMENT AREA DESIGN CALCULATIONS

TE-0117 ISLAND ROAD MARSH CREATION AND NOURISHMENT
30% DESIGN CALCULATIONS PACKET

MARSH CREATION AND NOURISHMENT AREA DESIGN CALCULATIONS

Identification of Engineering Problem

The purpose of this exercise is to compute: (1) the total proposed benefit acreage; and (2) the total required in-place fill volume corresponding to the marsh creation and nourishment area design shown in the 30% design drawing package.

Breakdown of Governing Assumptions and Calculation Methodology

1) In order to produce the above-mentioned calculations, the following information was reviewed:
   i) TE-0117 restoration area and vicinity survey data, survey report, and accompanying survey drawings submitted by T. Baker Smith, LLC.
   ii) TE-0117 supplementary marsh creation area geotechnical engineering report and accompanying geotechnical investigation data reports submitted by GeoEngineers, Inc.
   iii) TE-0117 30% design drawings (applicable restoration area plan and profile sheets).

2) The calculation procedure utilized entailed the following methodologies.
   - The proposed marsh creation and nourishment area restoration cell boundaries were overlaid onto the design level survey data collected by T. Baker Smith, LLC. Following this step, design template transects at finished CMFE were drawn corresponding to the survey transects taken as part of the design level survey package.
   - The use of CAD computational methods were used to create volumetric estimates by first generating a three-dimensional surface contour of the existing conditions at the restoration area, as indicated by design-level survey data. A second three-dimensional surface contour was created of the finished marsh creation and nourishment area surface corresponding to the finished CMFE. The inscribed volume was then calculated.

3) Note that certain portions within this calculations packet call for future recommendations to implement desig changes that could alter the currently propsed marsh creation and nourishment area benefit acreage, and therefore the currently estimated total required in-place fill volume.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

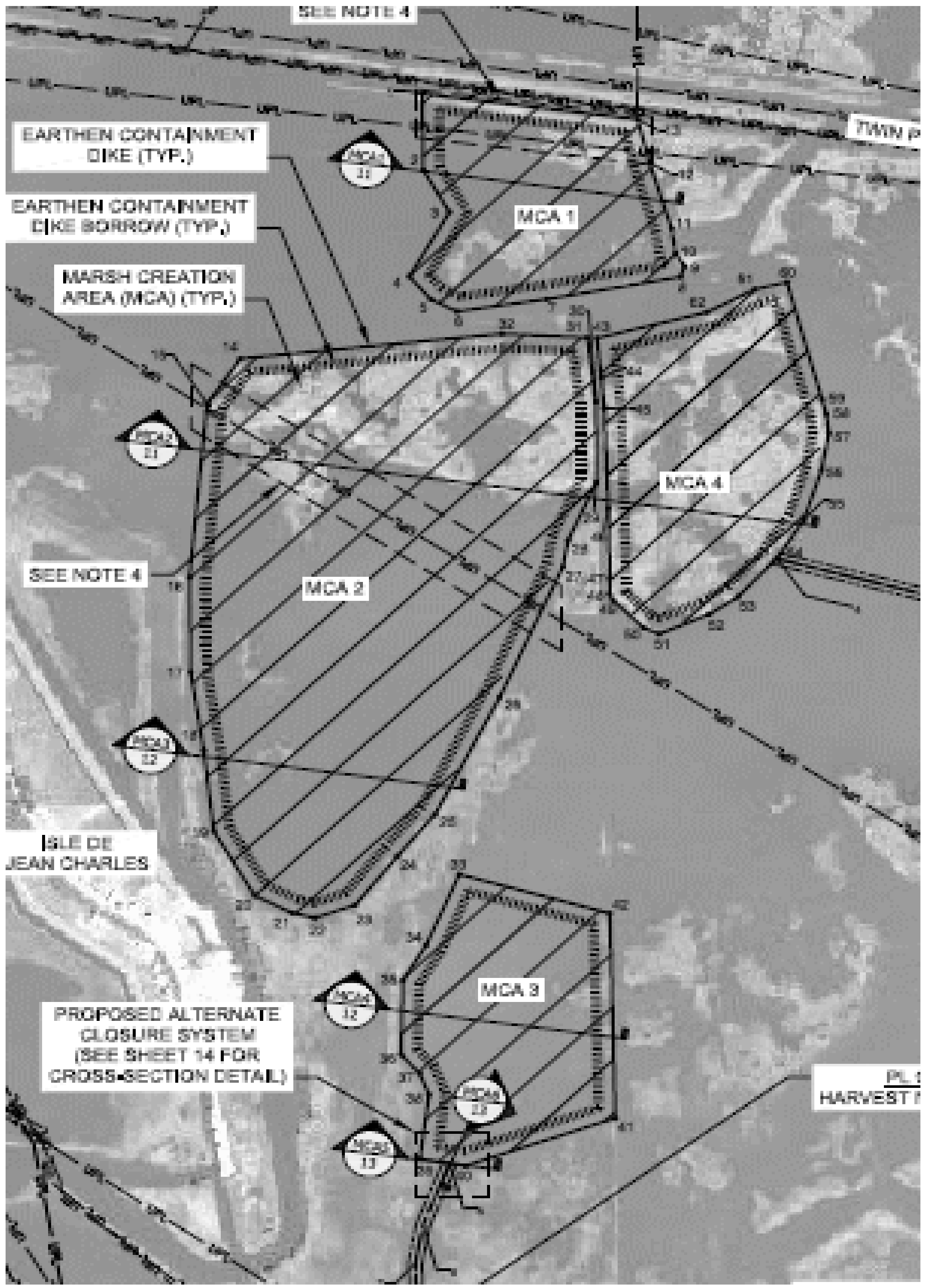


FIGURE R-17: TE-0117 PROPOSED MARSH CREATION AND NOURISHMENT

THEORY, EQUATIONS, AND METHODS

1) The TE-0117 30% design CAD package was used to obtain planview layout drawings of the marsh creation and nourishment area. See Figure R-17.

2) CAD was used to accurately measure total proposed benefit acres and to execute volumetric calculation methods to compute in-place fill volumes. Table R-10 contains applicable benefit acreage values for proposed design; Table R-11 contains in-place volumetric calculations.

CALCULATED VALUES

1) No calculations of note.

2) The following tables contain calculated values for proposed benefit acreages and in-place volumetric quantities.

TABLE R-10: TE-0117 PROPOSED BENEFITS

POLYGON	AREA [SF]	AREA [AC]
MCA1	1,711,647	39.3
MCA2	6,780,236	155.7
MCA3	1,898,582	43.6
MCA4	2,298,264	52.8
TOTAL	12,688,729	291.3

TABLE R-11: TE-0117 VOLUMETRIC CALCULATIONS

POLYGON	VOLUMETRIC FEATURE	TOTAL VOLUME [CY]
	FILL VOLUME	156,257
MCA1	DIKE B. FILL	84,272
	TOTAL	240,529
	FILL VOLUME	592,774
MCA2	DIKE B. FILL	189,676
	TOTAL	782,450
	FILL VOLUME	211,882
MCA3	DIKE B. FILL	85,775
	TOTAL	297,657
	FILL VOLUME	103,929
MCA4	DIKE B. FILL	114,203
	TOTAL	218,132
TOTAL		1,538,767

ACCESS AND CONVEYANCE CORRIDOR DESIGN CALCULATIONS

NORTHERN ACCESS/CONVEYANCE/SOUTHERN ACCESS CORRIDOR DESIGN CALCULATIONS

Identification of Engineering Problem

The purpose of this exercise is to compute the total estimated maximum access dredging quantity (on the bases of total volumetric quantity and total LF quantity) corresponding to the corridor design shown in the 30% design drawing package.

Breakdown of Governing Assumptions and Calculation Methodology

1) In order to compute the estimated access dredging quantity required for the TE-0117 project, the following actions were carried out.
   - Information was gathered on draft depths, marine navigation, and overall equipment performance for a hypothetical hydraulic dredge and construction euqipment fleet needed in order to execute all construction operations needed for a project of similar scale and scope as TE-0117.
   - The total maximum LF of required navigable conveyance corridor was calculated, based on project layout dimensions and a review of applicable sections of the TE-0117 surveying deliverables submitted by CHF.

2) Along with the tidal datum determination presented in this calculations packet, a minimum mudline elevation corresponding to the requirement for access dredging was selected. This mudline elevation was selected based on information collected on draft depths and TE-0117 survey data that established a controlling water depth needed for vessel draft requirements envisioned for the TE-0117 project.

3) An operating width was selected, based on knowledge of dredge and equipment logistics and the contents of applicable information gathered on marine navigation and overall equipment performance.

4) Based on all of the above information, the following variables were calculated:
   i) $\mathbf{L_{CORR,TOTAL}}$ is defined as the total length of navigable marine corridor needed for the TE-0117 project.
   ii) $\mathbf{L_{CORR,MECH\text{-}D}}$ is defined as the total length of marine corridor requiring mechanical access dredging in order to establish complete navigable marine access.
   iii) $\mathbf{V_{CORR,MECH\text{-}D}}$ is defined as the total volume of mechanical access dredging required in order to establish complete navigable marine access.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

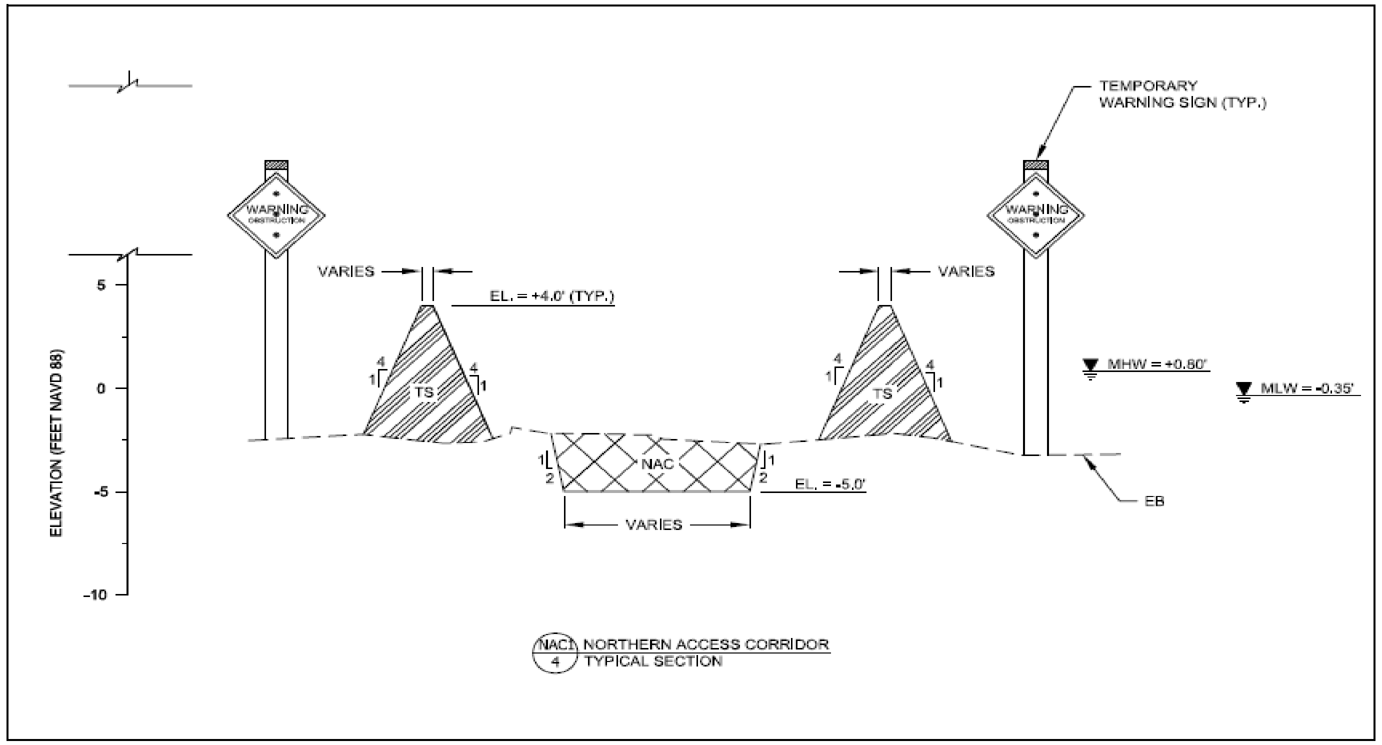


FIGURE R-18: ACCESS CORRIDOR TYPICAL SECTION

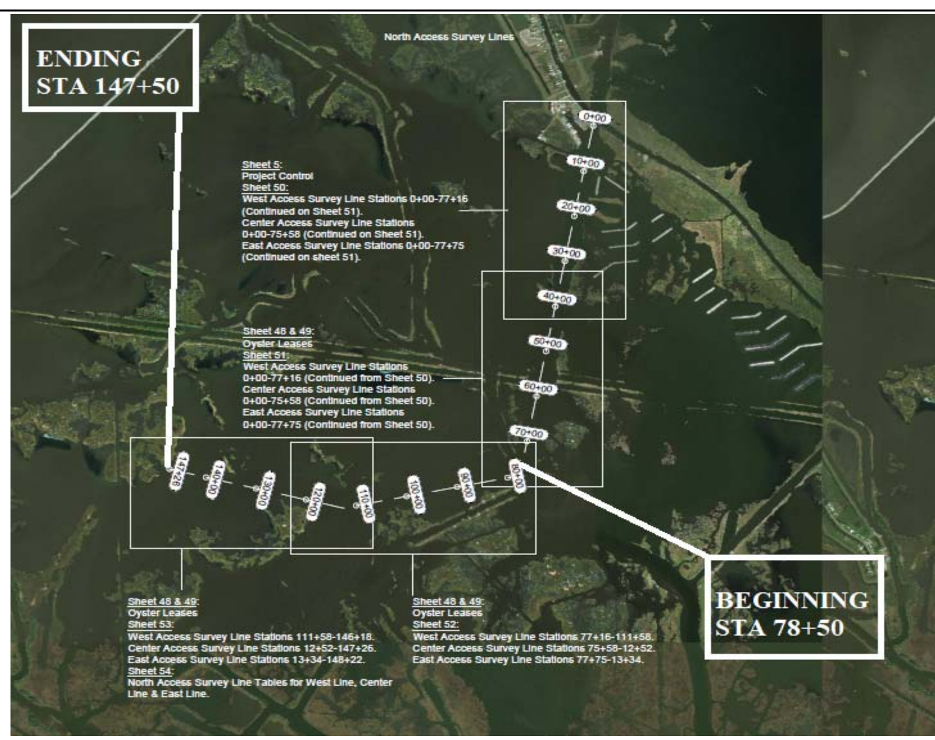


FIGURE R-19: NAC ACCESS DREDGING LIMITS

THEORY, EQUATIONS, AND METHODS

1) See Figure R-18 for scaled drawing of the access corridor design.

2) CAD was used to accurately measure the centerline distances corresponding to total lengths of navigable access corridor required for the following project access corridor features:

- Northern Access Corridor (NAC)
- Conveyance Corridor (CC)
- Southern Access Corridor (SAC)
- Southern Access Corridor Spur (SAC SPUR)

Table R-12 shows these lengths as determined from CAD.

3) The CHF survey drawing set was used to delineate a zone of required access dredging in the NAC. Figure R-19 shows the approximate limits of required access dredging.

- **NAC Access Dredging POB** = STA 78+50
- **NAC Access Dredging POE** = STA 147+50

Using a maximum bottom of cut width of 80 FT and a minimum threshhold mudline elevation of -5 FT NAVD88, the total required volume of access dredging was computed. A worst case existing mudline elevation of -2 FT NAVD88 was assumed for all longitudnal length of access dredging required. Applicable equations utilized are shown in **EQ (5)** and **EQ (6)**. See Table R-13 for NAC access dredging compuations.

CALCULATED VALUES

1) No calculations of note.

2) The following table contains the values corrspondencing to lengths of navigable access corridor required for TE-0117.

TABLE R-12: TE-0117 ACCESS CORRIDOR LENGTHS

CORRIDOR	LENGTH [LF]	LENGTH [MI]
NAC	15,545	2.94
CC	21,286	4.03
SAC	79,110	14.98
SAC SPUR	16,508	3.13
TOTAL	132,449	25.09

3) The following table contains the NAC calculations.

TABLE R-13: NAC CALCULATIONS

VARIABLE	VALUE	UNIT
$L_{CORR,TOTAL,NAC}$	15,545	LF
$L_{CORR,MECH-D,NAC}$	6,900	LF
H_{ECDBA}	7	FT
$W_{CR,ECDBA}$	80	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	658	SF
V_{ECDBA}*	658	CF
V_{ECDBA}*	24.37	CY
$V_{CORR,MECH-D,NAC}$	4,540,200	CF
$V_{CORR,MECH-D,NAC}$	168,156	CY

*Values represented as per LF of ECD/borrow channel reach

FIGURES AND GRAPHICS

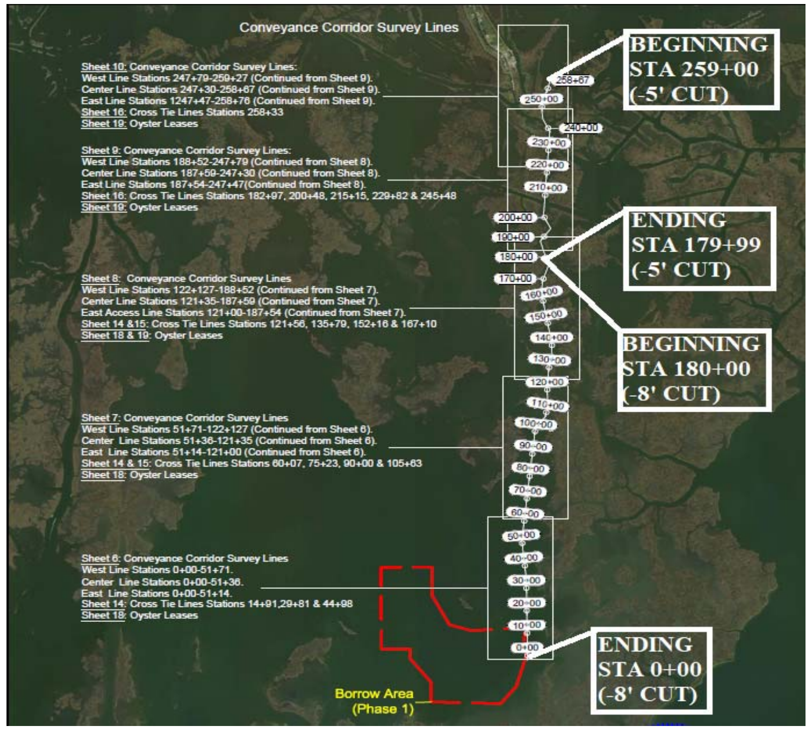


FIGURE R-20: CC ACCESS DREDGING LIMITS

THEORY, EQUATIONS, AND METHODS

4) The CHF survey drawing set was used to delineate a zone of required access dredging in the CC. Figure R-20 shows the approximate limits of required access dredging.

- **CC Access Dredging POB (-5' Cut)** = STA 259+00
- **CC Access Dredging POE (-5' Cut)** = STA 179+99
- **CC Access Dredging POB (-8' Cut)** = STA 180+00
- **CC Access Dredging POE (-8' Cut)** = STA 0+00

As shown in 3), a maximum bottom of cut width of 80 FT was used for the computation of total required access dredging volume. Survey data was analyzed to delineate the zones of required access dredging according to the two following constraints:

1) The southern region of CC would require booster mobilization and heavy equipment drafts that could necessitate mechanical dredging to -8 FT NAVD88; a worst case existing mudline elevation of -4 FT NAVD88 was assumed for all longitudinal length of access dredging required.
2) The northern region of CC would not require booster placement and would not require dredging in excess of -5 FT NAVD88; a worst case existing elevation of -4 FT NAVD88 was assumed for all longitudinal length of access dredging required.

Applicable equations utilized are shown in **EQ (5)** and **EQ (6)**. See Tables R-14 and R-15.

CALCULATED VALUES

4) The following table contains the CC calculations.

TABLE R-14: CC CALCULATIONS (@ -5' CUT)

VARIABLE	VALUE	UNIT
$L_{CORR,TOTAL,CC}$	21,286	LF
$L_{CORR,MECH\text{-}D,CC}$	7,901	LF
H_{ECDBA}	1	FT
$W_{CR,ECDBA}$	80	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	82	SF
V_{ECDBA}*	82	CF
V_{ECDBA}*	3.04	CY
$V_{CORR,MECH\text{-}D,NAC}$	647,882	CF
$V_{CORR,MECH\text{-}D,NAC}$	23,996	CY

*Values represented as per LF of ECD/borrow channel reach

TABLE R-15: CC CALCULATIONS (@ -8' CUT)

VARIABLE	VALUE	UNIT
$L_{CORR,TOTAL,CC}$	21,286	LF
$L_{CORR,MECH\text{-}D,CC}$	18,000	LF
H_{ECDBA}	4	FT
$W_{CR,ECDBA}$	80	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	352	SF
V_{ECDBA}*	352	CF
V_{ECDBA}*	13.04	CY
$V_{CORR,MECH\text{-}D,NAC}$	6,336,000	CF
$V_{CORR,MECH\text{-}D,NAC}$	234,667	CY

*Values represented as per LF of ECD/borrow channel reach

FIGURES AND GRAPHICS

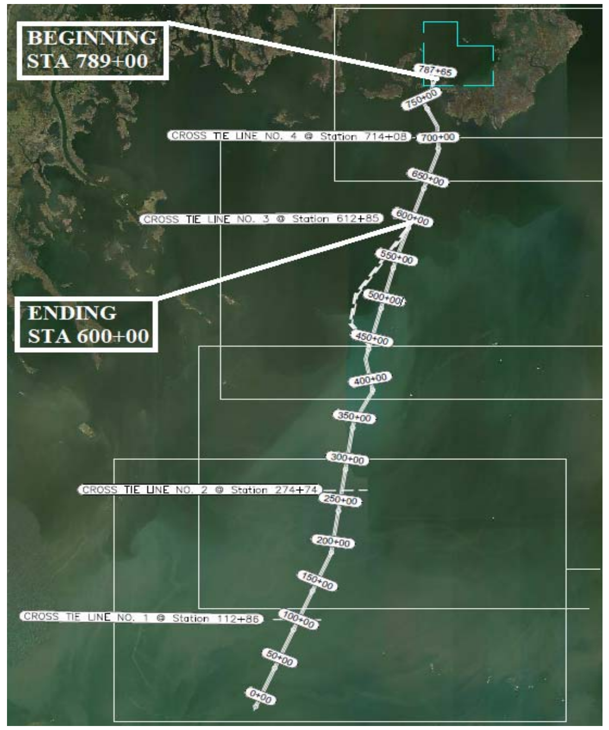


FIGURE R-21: SAC ACCESS DREDGING LIMITS

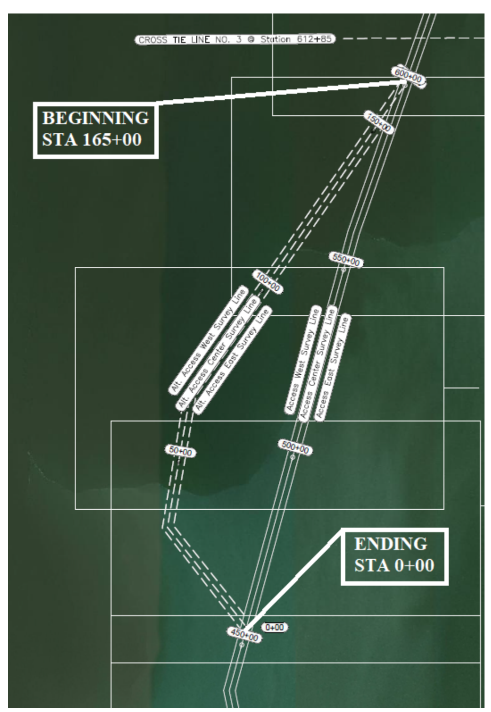


FIGURE R-22: SAC SPUR ACCESS DREDGING LIMITS

THEORY, EQUATIONS, AND METHODS

5) The CHF survey drawing set was used to delineate a zone of required access dredging in the SAC and SAC SPUR. Figure R-21 shows the approximate limits of required access dredging for the SAC, while Figure R-22 shows those of the SAC SPUR.

- **SAC Access Dredging POB** = STA 789+00
- **SAC Access Dredging POE** = STA 600+00
- **SAC SPUR Access Dredging POB** = STA 165+00
- **SAC SPUR Access Dredging POE** = STA 0+00

Using a maximum bottom of cut width of 80 FT and a minimum threshhold mudline elevation of -8 FT NAVD88, the total required volume of access dredging was computed. A worst case existing mudline elevation of -6 FT NAVD88 was assumed for all longitudinal length of access dredging required. Applicable equations utilized are shown in **EQ (5)** and **EQ (6)**. See Tables R-16 and R-17.

CALCULATED VALUES

5) The following table contains the CC calculations.

TABLE R-16: SAC CALCULATIONS

VARIABLE	VALUE	UNIT
$L_{CORR,TOTAL,CC}$	79,110	LF
$L_{CORR,MECH\text{-}D,CC}$	18,900	LF
H_{ECDBA}	2	FT
$W_{CR,ECDBA}$	80	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	168	SF
V_{ECDBA}*	168	CF
V_{ECDBA}*	6.22	CY
$V_{CORR,MECH\text{-}D,NAC}$	3,175,200	CF
$V_{CORR,MECH\text{-}D,NAC}$	117,600	CY

*Values represented as per LF of ECD/borrow channel reach

TABLE R-17: SAC SPUR CALCULATIONS

VARIABLE	VALUE	UNIT
$L_{CORR,TOTAL,CC}$	16,508	LF
$L_{CORR,MECH\text{-}D,CC}$	16,500	LF
H_{ECDBA}	2	FT
$W_{CR,ECDBA}$	80	FT
SS_{ECDBA}	1V:2H	FT/FT
A_{ECDBA}	168	SF
V_{ECDBA}*	168	CF
V_{ECDBA}*	6.22	CY
$V_{CORR,MECH\text{-}D,NAC}$	2,772,000	CF
$V_{CORR,MECH\text{-}D,NAC}$	102,667	CY

*Values represented as per LF of ECD/borrow channel reach

BORROW AREA DESIGN CALCULATIONS

TE-0117 ISLAND ROAD MARSH CREATION AND NOURISHMENT
30% DESIGN CALCULATIONS PACKET

BORROW AREA DESIGN CALCULATIONS

Identification of Engineering Problem

The purpose of this exercise is to compute the total available borrow volume quantity corresponding to the borrow area design shown in the 30% design drawing package.

Breakdown of Governing Assumptions and Calculation Methodology

1) In order to perform the borrow area boundary layout and then compute the total borrow volume availability, the following information was reviewed:
   i) TE-0117 Borrow Area Development Services Deliverable Package submitted by C. H. Fenstermaker & Associates, LLC;
   ii) Volumetric quantity estimates produced for the TE-0117 30% design package.

2) Dissolved oxygen (DO) impacts due to borrow area excavation operations were voiced by NMFS as a potential concern. During TE-0117 design, it was decided to restrict hydraulic dredging to bottom elevations no deeper than than -12 FT NAVD88.

3) A cut-to-fill ratio for hydraulic dredging of 1.2:1 was utilized, as recommended by GeoEngineers, Inc.

4) Based on the above-stated review of project information and the DO constraint, the borrow area layout was selected as shown in TE-0117 design documents, and a maximum excavation elevation contour was selected as shown. The volume was calculated with the CAD surface compulation methodology as stated in item 2) of the "MARSH CREATION AND..." section of this calculations packet.

Solution

See the following page(s) for applicable calculations and the statement of final solution(s).

FIGURES AND GRAPHICS

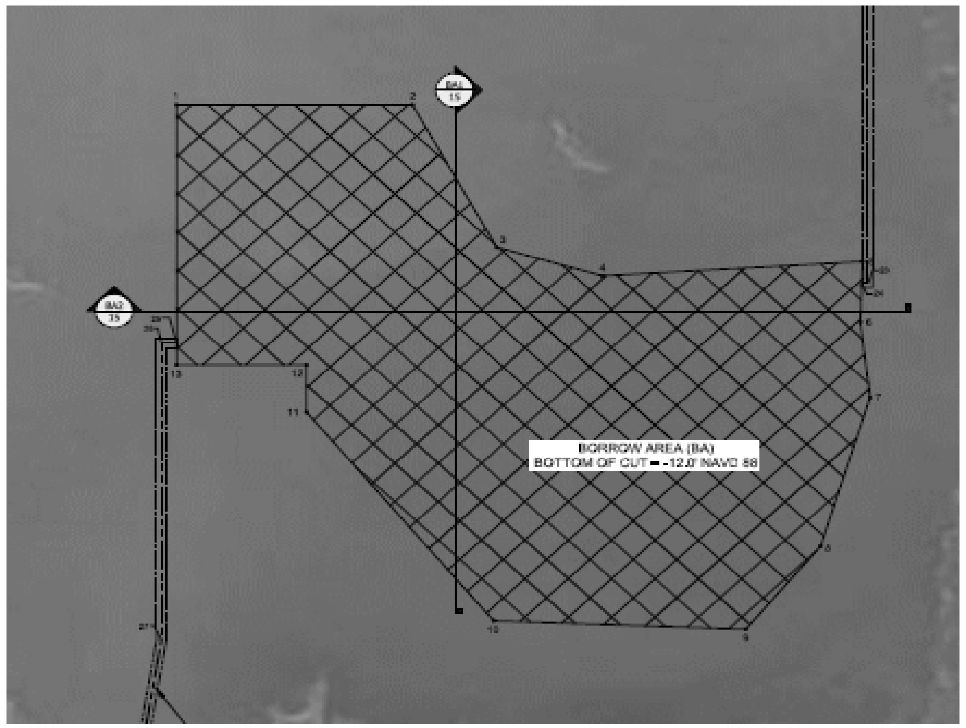


FIGURE R-23: PLANVIEW OF BORROW AREA

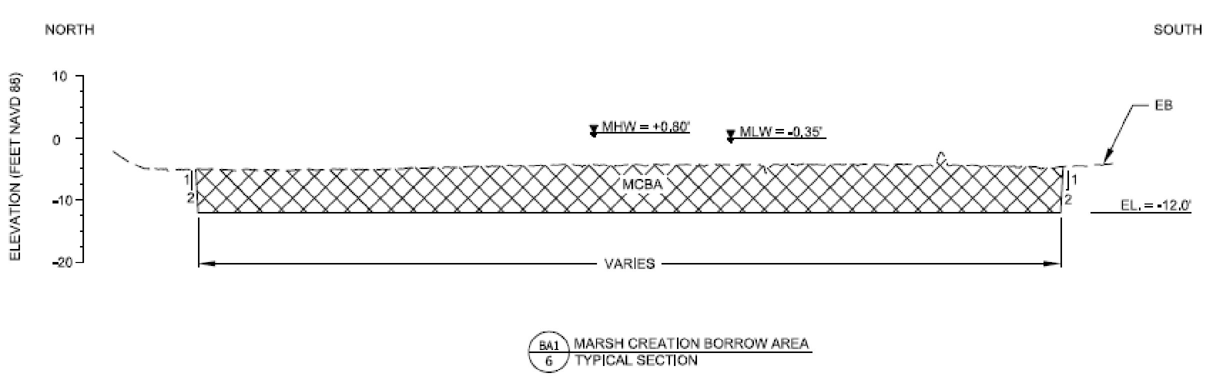


FIGURE R-24: PROFILE VIEW OF BORROW AREA

THEORY, EQUATIONS, AND METHODS

1) The CHF borrow area development services deliverable package was used to obtain the borrow area layout.

2) The borrow area delineation produced by CHF was estimated to be in excess of 6M CY for a proposed bottom of cut contour at -15 FT NAVD88. In order to alleviate water quality concerns, the proposed TE-0117 borrow area design reduced dredge depths from a bottom of cut contour of -15 FT NAVD88 to a bottom of cut contour of -12 FT NAVD88.

3) Using the recommended C:F of 1.2:1, the in-place fill volume was converted to a total volume demand. The borrow area was then sized based on volumetric availability and the selection of an optimal cut depth for dredging operations. See Table R-18 for borrow area calculations.

CALCULATED VALUES

1) No calculations of note.

2) No calculations of note.

3) The following table contains volumetric quantities used in borrow area sizing.

TABLE R-18: BORROW AREA CALCULATIONS

VOLUMETRIC FEATURE	VOLUME [CY]
Total Volume Demand (C:F = 1.2:1)	1,846,521
-10' NAVD88 Total Borrow Availability	3,307,155
-12' NAVD88 Total Borrow Availability	4,561,581
-15' NAVD88 Total Borrow Availability	6,911,180

APPENDIX E

TE-0117 MARSH CREATION AREA TOPOGRAPHIC, BATHYMETRIC, AND MAGNETOMETER SURVEYING DATA COLLECTION INFORMATION

(Deliverables submitted April 2016 by T. Baker Smith, LLC)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_E/Final.ZIP>

APPENDIX F

TE-0117 BORROW AREA AND ACCESS CORRIDOR TOPOGRAPHIC, BATHYMETRIC, MAGNETOMETER, AND GEOPHYSICAL DATA COLLECTION INFORMATION

(Deliverables submitted September 2018 by C. H. Fenstermaker & Associates, LLC)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_F/_FINAL.ZIP>

APPENDIX G

TE-0117 GEOTECHNICAL INVESTIGATION DATA REPORT, EXPLORATORY MARSH CREATION AREA GEOTECHNICAL INVESTIGATION

(Deliverables submitted July 2015 by GeoEngineers, Inc.)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_G/_FINAL.ZIP>

APPENDIX H

TE-0117 GEOTECHNICAL INVESTIGATION DATA REPORT, SUPPLEMENTARY MARSH CREATION AREA GEOTECHNICAL INVESTIGATION

(Deliverables submitted February 2017 by GeoEngineers, Inc.)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_H/_FINAL_Data_Report.ZIP>

APPENDIX I

TE-0117 GEOTECHNICAL INVESTIGATION DATA REPORT, BORROW AREA
GEOPHYSICAL DATA REPORT ADDENDUM

(Deliverables submitted April 2018 by GeoEngineers, Inc.)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_I/_FINAL.ZIP>

APPENDIX J

TE-0117 GEOTECHNICAL ENGINEERING REPORT, EXPLORATORY MARSH CREATION AREA GEOTECHNICAL INVESTIGATION

(Deliverables submitted July 2015 by GeoEngineers, Inc.)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_J/_FINAL.ZIP>

APPENDIX K

TE-0117 GEOTECHNICAL ENGINEERING REPORT, SUPPLEMENTARY MARSH CREATION AREA GEOTECHNICAL INVESTIGATION

(Deliverables submitted August 2018 by GeoEngineers, Inc.)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_K/_FINAL_Engineering_Report.ZIP>

APPENDIX L

TE-0117 BORROW REGION WAVE AND VELOCITY IMPACT ANALYSIS MODELING REPORT

(Deliverables submitted August 2018 by University of Louisiana at Lafayette)

ELECTRONIC FILES AVAILABLE AT:

<ftp://ftp.coastal.la.gov/TE-117/Preliminary_Design_Report/2_Appendices/Appendix_L/_FINAL.ZIP>

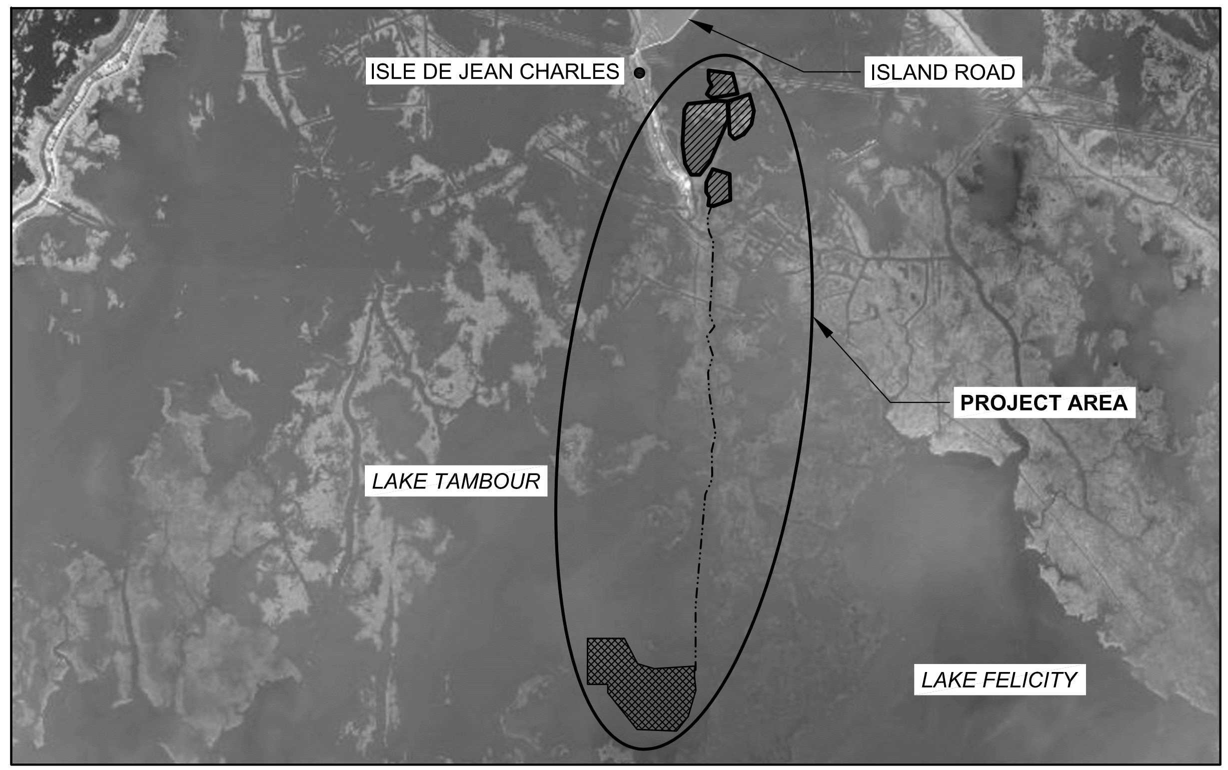
APPENDIX M

30% DESIGN DRAWINGS

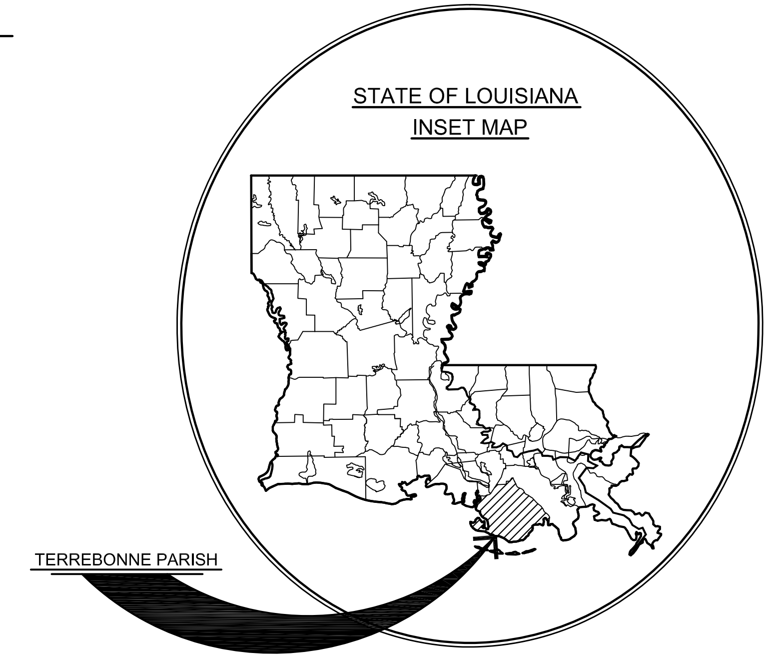
STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT
TE-0117
TERREBONNE PARISH

INDEX TO SHEETS



20,000' 10,000' 0' 20,000' 40,000'



PRELIMINARY

DOCUMENTS ARE NOT TO BE USED FOR CONSTRUCTION, BIDDING, RECORDATION, CONVEYANCE, SALES, OR AS THE BASIS FOR THE ISSUANCE OF A PERMIT.

LICENSURE CLASSIFICATION REQUIREMENTS

MAJOR CLASSIFICATION: HEAVY CONSTRUCTION AND/OR DREDGING

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TITLE SHEET

DESIGNED BY: JACQUES BOUDREAUX, P.E.

APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117

DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

SHEET 1 OF 19

GENERAL NOTES:

1. EQUIPMENT ACCESS TO THE PROJECT SITE SHALL BE THROUGH NAVIGABLE WATERWAYS AND SHALL NOT IMPACT EXISTING WATER BOTTOMS OR WETLANDS UNLESS OTHERWISE NOTED.
2. PLANS AND SPECIFICATIONS ARE COMPLEMENTARY; WHAT IS REQUIRED BY ONE IS BINDING AS IF REQUIRED BY ALL. CLARIFICATIONS AND INTERPRETATIONS OF, OR NOTIFICATIONS OF MINOR VARIATIONS AND DEVIATIONS IN THE CONTRACT DOCUMENTS, WILL BE ISSUED BY THE ENGINEER.
3. THE CONTRACTOR SHALL MAINTAIN AIDS TO NAVIGATION DURING CONSTRUCTION AND HAVE ADEQUATE NAVIGATIONAL EQUIPMENT ON THE DREDGE TO AVOID DREDGING IN RESTRICTED AREAS. ANY DAMAGE TO EXISTING AIDS TO NAVIGATION SHALL BE REPAIRED BY THE CONTRACTOR TO U.S. COAST GUARD STANDARDS AT THE EXPENSE OF THE CONTRACTOR.
4. PROJECT FEATURES MAY BE REVISED BY THE ENGINEER THROUGHOUT THE WORK TO REFLECT CHANGES IN FIELD CONDITIONS.
5. A MAGNETOMETER SURVEY SHALL BE PERFORMED IN ANY AREAS POTENTIALLY REQUIRING EARTHWORK OR PROPOSING WATER BOTTOM DISTURBANCE PRIOR TO EXCAVATION OR DREDGING. DRAWINGS SHOWING THE TRACK LINES, COORDINATES, AMPLITUDE, SIGNATURE TYPE, AND DURATION OF ALL ANOMALIES SHALL BE SUBMITTED TO THE ENGINEER IN THE PRECONSTRUCTION SURVEY. THE DRAWINGS SHALL BE ACCOMPANIED BY A WRITTEN REPORT DISCUSSING THE INTERPRETATION OF MAGNETOMETER RESULTS AND THE IDENTIFICATION OF INFRASTRUCTURE.
6. THE CONTRACTOR IS RESPONSIBLE FOR CONTAINING THE HYDRAULICALLY DREDGED MATERIAL WITHIN THE BOUNDARIES OF THE MARSH CREATION AREAS.
7. BACKGROUND IMAGERY WAS TAKEN IN 2016.
8. PIPELINE AND UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE. THE CONTRACTOR SHALL LOCATE AND MARK ALL PIPELINES AND UTILITIES LOCATED WITHIN 250 FT. OF THE WORK PRIOR TO BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL MAINTAIN THESE MARKERS DURING CONSTRUCTION. VERIFIED PIPELINES REFERENCE THE PIPELINE LOCATION (X, Y, Z) DETERMINED FROM THE DESIGN SURVEY(S).

NOTIFICATIONS:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE FOLLOWING PIPELINE AND UTILITY OPERATORS AT LEAST FIVE (5) WORKING DAYS IN ADVANCE OF THE WORK. CALL LOUISIANA ONE CALL AT 1-800-272-3020 5 DAYS PRIOR TO ANY EXCAVATION AND/OR DREDGING TO LOCATE ALL PIPELINES OR UTILITIES.
2. THE CONTRACTOR SHALL NOTIFY THE LANDOWNERS LISTED BELOW AT LEAST FIVE (5) WORKING DAYS PRIOR TO PERFORMING THE WORK.

APACHE LOUISINA MINERALS, INC.	CONOCOPHILLIPS	TERREBONNE PARISH CONSOLIDATED GOVERNMENT
CONTACT: TIMOTHY J. ALLEN	CONTACT: ORDIS J. SMITH	CONTACT: MART BLACK
PHONE: (985) 876-5267	PHONE: (985) 853-3018	PHONE: (985) 873-6889

3. MODIFICATIONS TO THE DREDGE PIPELINE CORRIDOR AND EQUIPMENT ACCESS CORRIDOR SHALL REQUIRE APPROVAL BY THE ENGINEER.

DESIGN NOTES:

1. ALL ELEVATIONS ARE GIVEN IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) U.S. SURVEY FEET, GEOID 12A. ALL HORIZONTAL COORDINATES ARE GIVEN IN THE NORTH AMERICAN DATUM OF 1983 (NAD 83, LOUISIANA STATE PLANE SOUTH ZONE U.S. FEET). ALL ELEVATIONS ARE BASED ON THE FOLLOWING:

SECONDARY SURVEY MONUMENT	ELEVATION	NORTHING	EASTING
TE10-SM-08	1.09'	334,370.51	3,562,994.43
CRMSTE-SM-19	0.86'	303,440.69	3,533,118.70

3. DATA FROM STATIONS CRMS3296 AND CRMS0341 WERE USED TO CALCULATE THE MHW AND MLW. ELEVATIONS ARE REFERENCED TO NAVD 88, US FEET, GEOID 12A. MHW = +0.80' AND MLW = -0.35' WITHIN PROJECT AREA.
4. THE EXISTING ELEVATIONS SHOWN ON THE PLANS ARE BASED ON THE DESIGN SURVEYS PERFORMED IN 2016 BY T.BAKER SMITH, LLC. (TBS) AND 2017 BY C.H. FENDSTERMAKER & ASSOCIATES, LLC (CHF). SURVEY INFORMATION HAS BEEN INCLUDED IN APPENDIX E AND APPENDIX F TO THE DESIGN REPORT.
5. GEOTECHNICAL INVESTIGATION WERE PERFORMED BY GEOENGINEERS INC. IN 2015 AND 2018. GEOTECHNICAL INFORMATION HAS BEEN INCLUDED IN APPENDICES G THROUGH K TO THE DESIGN REPORT.

LEGEND - SECTION VIEWS

- BORROW AREA
- CONSTRUCTED MARSH FILL
- EARTHEN CONTAINMENT DIKE
- EXISTING WATER BOTTOM
- REHANDLING AREA
- TEMPORARY SPOIL

SUMMARY OF ESTIMATED QUANTITIES

ITEM No.	DESCRIPTION	UNIT	ESTIMATED QUANTITY[1]
1	MOBILIZATION / DEMOBILIZATION	LS	1
2	ACCESS DREDGING WITH SIGNAGE	LS	1
3	MARSH FILL (INCLUDING DIKE BACKFILL)	CY	1,846,521
4	EARTHEN CONTAINMENT DIKES	LF	27,350
5	ALTERNATE SHEETPILE CLOSURE SYSTEM	LS	1
6	GRADESTAKES	LS	1
7	INSTRUMENTED SETTLEMENT PLATES	EA	6
8	VEGETATIVE PLANTINGS	PLANTS	170,625
9	CONSTRUCTION SURVEYS	LS	1

1. THE QUANTITIES SHOWN WERE CALCULATED FROM THE DESIGN SURVEY. THE OWNER RESERVES THE RIGHT TO ADJUST QUANTITIES 25% HIGHER OR LOWER WITHOUT ADJUSTMENT OF THE UNIT PRICE.
2. QUANTITY IS BASED ON THE BORROW AREA CUT VOLUMES. PAYMENT QUANTITY WILL BE BASED ON PROCESS SURVEYS OF THE MARSH CREATION BORROW AREA.

LEGEND - PLAN VIEWS

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR LIMITS (BOC)
- DREDGE PIPELINE CORRIDOR
- EARTHEN CONTAINMENT DIKE
- EARTHEN CONTAINMENT DIKE BORROW AREA
- FEDERAL NAVIGATIONAL CHANNEL
- GRADE STAKE
- PL-1 KNOWN PIPELINE CROSSING
- MAGNETOMETER ANOMALY
- MARSH CREATION AREA
- MARSH CREATION BORROW AREA
- SP-1 SETTLEMENT PLATE
- B-1 SOIL BORING
- SURVEY MONUMENT
- SURVEY TRANSECT
- TEMPORARY SPOIL
- PL VERIFIED PIPELINE
- UPL UNVERIFIED PIPELINE

ABBREVIATIONS:

BOC	BOTTOM OF CUT
CC	CONVEYANCE CORRIDOR
CHF	C. H. FENSTERMAKER & ASSOCIATES
CL	CENTERLINE
CMF	CONSTRUCTED MARSH FILL
CPT	CONE PENETRATION TEST
CY	CUBIC YARD
DPC	DREDGE PIPE CORRIDOR
EAC	EQUIPMENT ACCESS CORRIDOR
EB	EXISTING WATER BOTTOM
ECD	EARTHEN CONTAINMENT DIKE
ECDBA	EARTHEN CONTAINMENT DIKE BORROW AREA
EL	ELEVATION
FT	FOOT
HNC	HOUMA NAVIGATION CHANNEL
LF	LINEAR FOOT
LS	LUMP SUM
MBFM	THOUSAND BOARD FEET MEASURE
MCA	MARSH CREATION AREA
MCBA	MARSH CREATION BORROW AREA
NAC	NORTHERN ACCESS CORRIDOR
NTS	NOT TO SCALE
PI	POINT OF INTERSECTION
PL	PIPELINE
SAC	SOUTHERN ACCESS CORRIDOR
SB	SOIL BORING
SF	SQUARE FOOT
SM	SURVEY MONUMENT
SP	SETTLEMENT PLATE
ST	SURVEY TRANSECT
SY	SQUARE YARD
TBS	T. BAKER SMITH
TOP	TOP OF PIPE
TS	TEMPORARY SPOIL
UPL	UNVERIFIED PIPELINE

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

GENERAL NOTES

DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

ACCESS CORRIDOR INFORMATION		
CORRIDOR	LENGTH (FT)	WIDTH (FT)
NAC	15,059	80
CC	24,724	80
SAC	95,638	80
SAC SPUR	16,508	80

NORTHERN ACCESS CHANNEL CENTERLINE COORDINATES

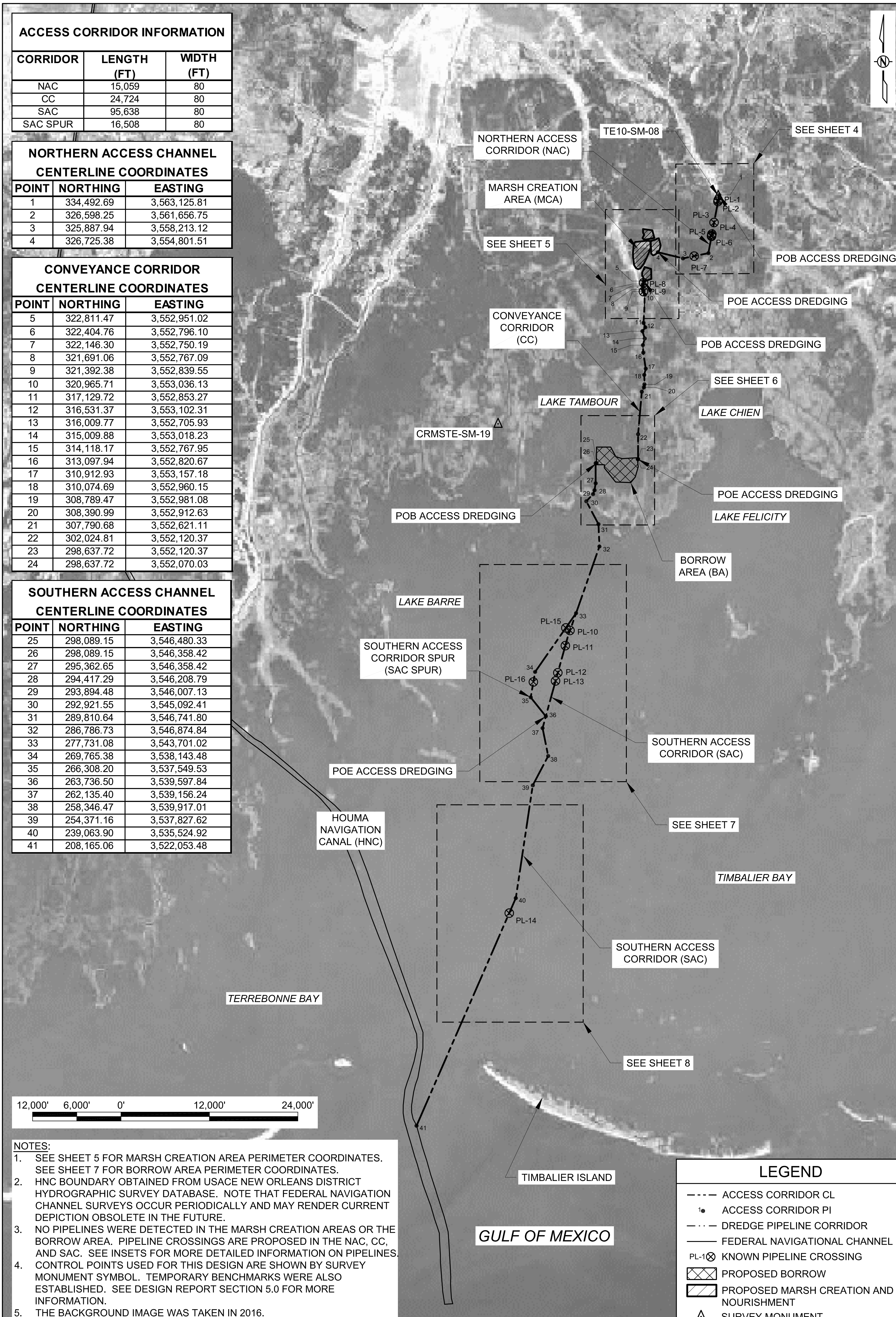
POINT	NORTHING	EASTING
1	334,492.69	3,563,125.81
2	326,598.25	3,561,656.75
3	325,887.94	3,558,213.12
4	326,725.38	3,554,801.51

CONVEYANCE CORRIDOR CENTERLINE COORDINATES

POINT	NORTHING	EASTING
5	322,811.47	3,552,951.02
6	322,404.76	3,552,796.10
7	322,146.30	3,552,750.19
8	321,691.06	3,552,767.09
9	321,392.38	3,552,839.55
10	320,965.71	3,553,036.13
11	317,129.72	3,552,853.27
12	316,531.37	3,553,102.31
13	316,009.77	3,552,705.93
14	315,009.88	3,553,018.23
15	314,118.17	3,552,767.95
16	313,097.94	3,552,820.67
17	310,912.93	3,553,157.18
18	310,074.69	3,552,960.15
19	308,789.47	3,552,981.08
20	308,390.99	3,552,912.63
21	307,790.68	3,552,621.11
22	302,024.81	3,552,120.37
23	298,637.72	3,552,120.37
24	298,637.72	3,552,070.03

SOUTHERN ACCESS CHANNEL CENTERLINE COORDINATES

POINT	NORTHING	EASTING
25	298,089.15	3,546,480.33
26	298,089.15	3,546,358.42
27	295,362.65	3,546,358.42
28	294,417.29	3,546,208.79
29	293,894.48	3,546,007.13
30	292,921.55	3,545,092.41
31	289,810.64	3,546,741.80
32	286,786.73	3,546,874.84
33	277,731.08	3,543,701.02
34	269,765.38	3,538,143.48
35	266,308.20	3,537,549.53
36	263,736.50	3,539,597.84
37	262,135.40	3,539,156.24
38	258,346.47	3,539,917.01
39	254,371.16	3,537,827.62
40	239,063.90	3,535,524.92
41	208,165.06	3,522,053.48



NOTES:

1. SEE SHEET 5 FOR MARSH CREATION AREA PERIMETER COORDINATES. SEE SHEET 7 FOR BORROW AREA PERIMETER COORDINATES.
2. HNC BOUNDARY OBTAINED FROM USACE NEW ORLEANS DISTRICT HYDROGRAPHIC SURVEY DATABASE. NOTE THAT FEDERAL NAVIGATION CHANNEL SURVEYS OCCUR PERIODICALLY AND MAY RENDER CURRENT DEPICTION OBSOLETE IN THE FUTURE.
3. NO PIPELINES WERE DETECTED IN THE MARSH CREATION AREAS OR THE BORROW AREA. PIPELINE CROSSINGS ARE PROPOSED IN THE NAC, CC, AND SAC. SEE INSETS FOR MORE DETAILED INFORMATION ON PIPELINES.
4. CONTROL POINTS USED FOR THIS DESIGN ARE SHOWN BY SURVEY MONUMENT SYMBOL. TEMPORARY BENCHMARKS WERE ALSO ESTABLISHED. SEE DESIGN REPORT SECTION 5.0 FOR MORE INFORMATION.
5. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR PI
- DREDGE PIPELINE CORRIDOR
- FEDERAL NAVIGATIONAL CHANNEL
- PL-1 KNOWN PIPELINE CROSSING
- PROPOSED BORROW
- PROPOSED MARSH CREATION AND NOURISHMENT
- SURVEY MONUMENT

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

PROJECT LAYOUT

STATE PROJECT NUMBER: TE-0117

DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST

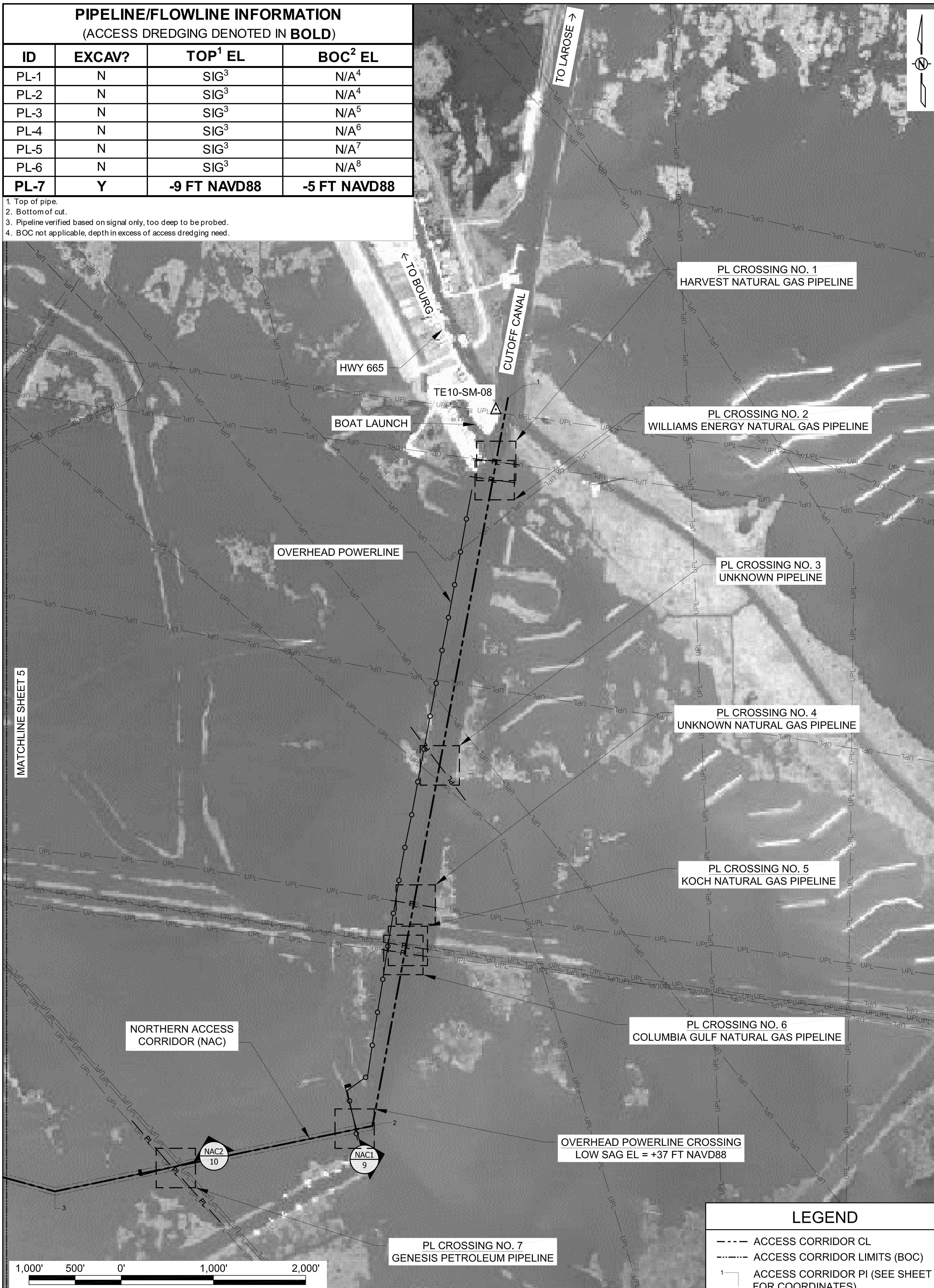
DESIGNED BY: JACQUES BOUDREAUX, P.E.

APPROVED BY: DAIN GILLEN, P.E.

PIPELINE/FLOWLINE INFORMATION
(ACCESS DREDGING DENOTED IN **BOLD**)

ID	EXCAV?	TOP[1] EL	BOC[2] EL
PL-1	N	SIG[3]	N/A[4]
PL-2	N	SIG[3]	N/A[4]
PL-3	N	SIG[3]	N/A[5]
PL-4	N	SIG[3]	N/A[6]
PL-5	N	SIG[3]	N/A[7]
PL-6	N	SIG[3]	N/A[8]
PL-7	**Y**	**-9 FT NAVD88**	**-5 FT NAVD88**

1. Top of pipe.
2. Bottom of cut.
3. Pipeline verified based on signal only, too deep to be probed.
4. BOC not applicable, depth in excess of access dredging need.



LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR LIMITS (BOC)
- ACCESS CORRIDOR PI (SEE SHEET 3 FOR COORDINATES)
- MATCHLINE
- OVERHEAD POWERLINE
- SURVEY MONUMENT
- UNVERIFIED PIPELINE
- VERIFIED PIPELINE

NOTES:

1. SEE SHEET 3 FOR ACCESS CORRIDOR PI'S AND OTHER INFORMATION.
2. PIPELINE INFORMATION ON THE PLANS IS APPROXIMATE. UNVERIFIED PIPELINE LOCATIONS ARE BASED ON LDNR SONRIS DATABASE AND IS NOT GUARANTEED TO BE ACCURATE.
3. SEE SECTION 5.0 OF THE DESIGN REPORT FOR MORE IN-DEPTH PIPELINE INFORMATION AS IDENTIFIED DURING TE-0117 PROJECT DATA COLLECTION BY TBS AND CHF.
4. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

NORTHERN ACCESS CORRIDOR PLAN VIEW

STATE PROJECT NUMBER: TE-0117

DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST | DESIGNED BY: JACQUES BOUDREAUX, P.E. | APPROVED BY: DAIN GILLEN, P.E. | SHEET 4 OF 19

PIPELINE/FLOWLINE INFORMATION
(ACCESS DREDGING DENOTED IN **BOLD**)

ID	EXCAV?	TOP[1] EL	BOC[2] EL
PL-8	**Y**	**-7 FT NAVD88**	**-5 FT NAVD88**
PL-9	**Y**	**SIG[3]**	**-5 FT NAVD88**

1. Top of pipe.
2. Bottom of cut.
3. Pipeline verified based on signal only, too deep to be probed.

ESTIMATED QUANTITIES

MCA + ECDBA	VOLUME (CY)	AREA (ACRES)	LENGTH (LF)
MCA 1	288,634	39	5,362
MCA 2	938,940	156	10,460
MCA 3	357,188	44	5,477
MCA 4	261,759	53	6,051
TOTAL	***1,846,521***	***291***	***27,350***

MARSH CREATION AREA 1 BOUNDARY COORDINATES

POINT	NORTHING	EASTING
1	329,864.58	3,552,791.43
2	329,359.67	3,552,799.12
3	329,082.84	3,552,949.84
4	328,657.93	3,552,716.51
5	328,507.05	3,552,843.87
6	328,427.67	3,552,992.64
7	328,509.13	3,553,520.57
8	328,656.13	3,554,304.13
9	328,724.69	3,554,327.43
10	328,811.13	3,554,275.05
11	328,974.40	3,554,251.00
12	329,410.38	3,554,123.17
13	329,695.12	3,554,053.67

MARSH CREATION AREA 2 BOUNDARY COORDINATES

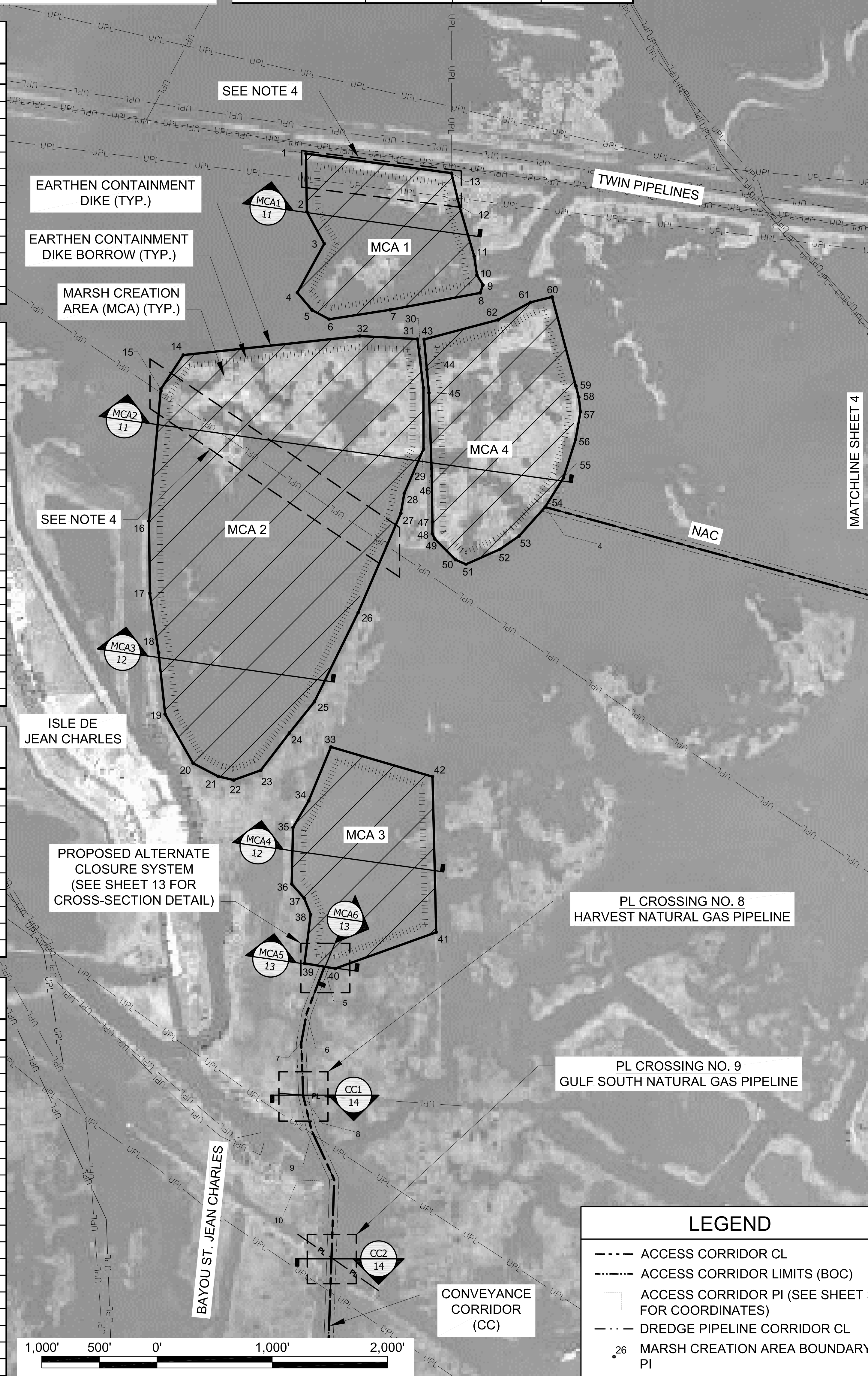
POINT	NORTHING	EASTING
14	328,116.97	3,551,725.70
15	327,821.09	3,551,530.84
16	326,676.07	3,551,428.55
17	326,049.65	3,551,435.96
18	325,534.27	3,551,512.37
19	325,002.85	3,551,568.46
20	324,575.92	3,551,811.63
21	324,462.79	3,552,029.81
22	324,430.46	3,552,163.43
23	324,514.89	3,552,398.67
24	324,838.75	3,552,647.07
25	325,110.22	3,552,864.88
26	325,884.64	3,553,244.67
27	326,744.77	3,553,614.47
28	326,918.79	3,553,644.65
29	327,301.34	3,553,811.61
30	327,832.54	3,553,810.67
31	328,255.89	3,553,758.69
32	328,282.07	3,553,256.53

MARSH CREATION AREA 3 BOUNDARY COORDINATES

POINT	NORTHING	EASTING
33	324,717.64	3,553,007.68
34	324,250.25	3,552,814.72
35	324,019.24	3,552,678.34
36	323,528.95	3,552,667.43
37	323,405.16	3,552,775.99
38	323,265.14	3,552,831.65
39	322,840.89	3,552,778.97
40	322,795.44	3,553,044.81
41	323,110.08	3,553,921.11
42	324,460.31	3,553,889.31

MARSH CREATION AREA 4 BOUNDARY COORDINATES

POINT	NORTHING	EASTING
43	328,252.86	3,553,816.64
44	327,990.88	3,553,840.47
45	327,788.72	3,553,858.85
46	327,131.22	3,553,881.19
47	326,546.85	3,554,640.52
48	326,283.60	3,554,145.58
49	326,542.09	3,553,888.94
50	326,342.29	3,554,087.31
51	326,301.79	3,554,179.79
52	326,430.98	3,554,472.22
53	326,546.85	3,554,640.52
54	326,798.43	3,554,867.38
55	327,052.29	3,555,025.28
56	327,382.76	3,555,130.89
57	327,625.78	3,555,173.75
58	327,749.91	3,555,159.55
59	327,847.81	3,555,133.70
60	328,621.26	3,554,927.33
61	328,574.63	3,554,739.32
62	328,422.41	3,554,459.13



LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR LIMITS (BOC)
- ACCESS CORRIDOR PI (SEE SHEET 3 FOR COORDINATES)
- DREDGE PIPELINE CORRIDOR CL
- MARSH CREATION AREA BOUNDARY PI
- MATCHLINE
- PROPOSED EARTHEN CONTAINMENT DIKE CL
- PROPOSED EARTHEN CONTAINMENT DIKE BORROW CL
- PROPOSED MARSH CREATION AND NOURISHMENT
- VERIFIED PIPELINE
- UNVERIFIED PIPELINE

NOTES:
1. SEE SHEET 3 FOR ACCESS CORRIDOR PI'S AND OTHER INFORMATION.
2. PIPELINE INFORMATION ON THE PLANS IS APPROXIMATE. UNVERIFIED PIPELINE LOCATIONS ARE BASED ON LDNR SONRIS DATABASE AND IS NOT GUARANTEED TO BE ACCURATE.
3. SEE SECTION 5.0 OF THE DESIGN REPORT FOR PIPELINE INFORMATION AS IDENTIFIED BY TBS AND CHF.
4. LINE INDICATED WITH UNVERIFIED PIPELINE LINETYPE IN THIS LOCATION WAS NOT IDENTIFIED DURING DATA COLLECTION AND IS NOT BELIEVED TO EXIST.
5. MULTIPLE LIFT CONSTRUCTION IS ANTICIPATED FOR BOTH MARSH FILL AND CONTAINMENT DIKES. HOWEVER, SOME SECTIONS ARE UNDERSTOOD TO ACHIEVE ADEQUATE FACTORS OF SAFETY WITH SINGLE LIFT. FOR 30% DESIGN, SINGLE LIFT CONSTRUCTION IS DEPICTED IN DESIGN DRAWINGS, WHILE COSTS WERE ESTIMATED ASSUMING ALL MULTIPLE LIFT CONSTRUCTION.
6. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

MARSH CREATION AREA AND CONVEYANCE CORRIDOR PLAN VIEW

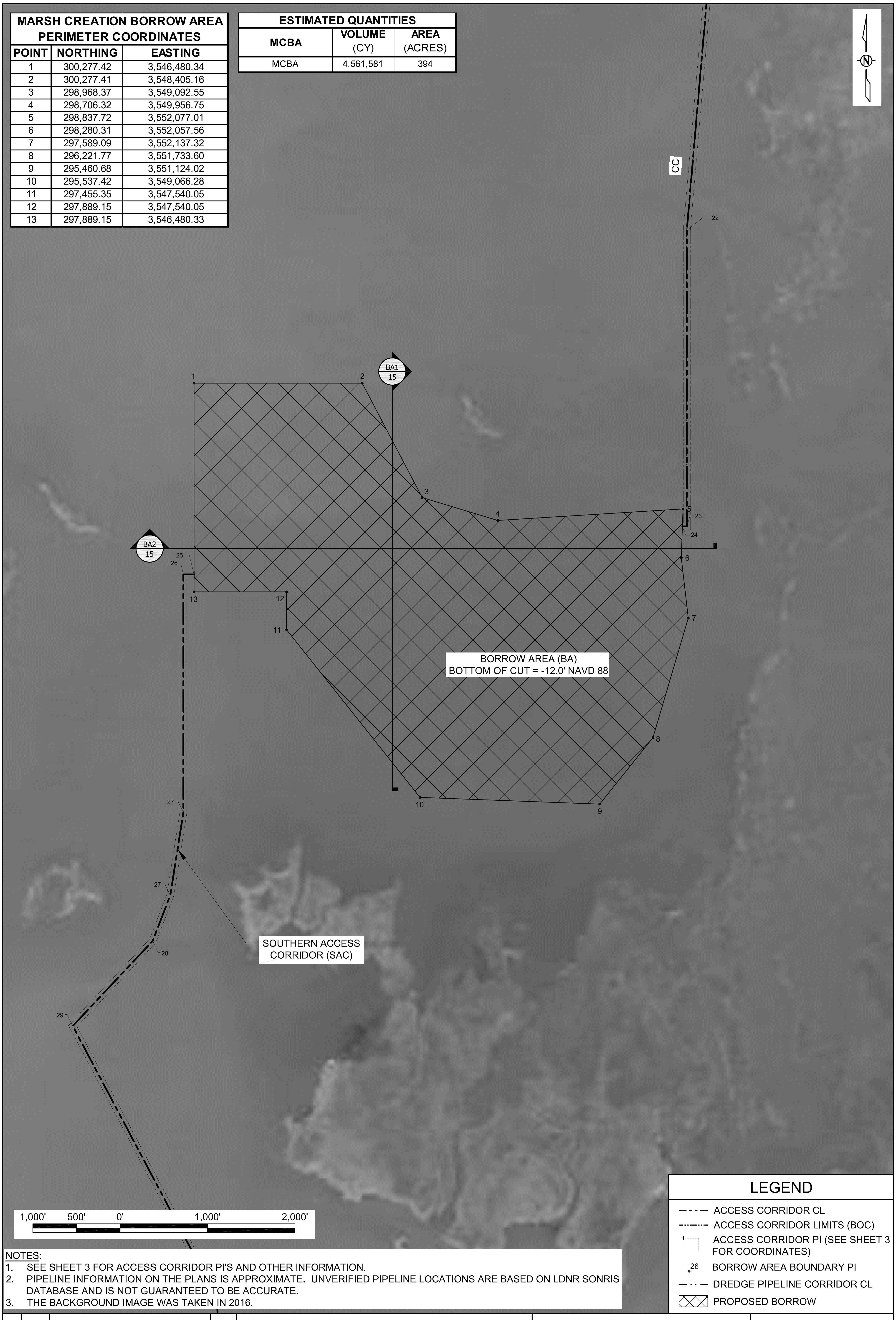
STATE PROJECT NUMBER: TE-0117

DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST | DESIGNED BY: JACQUES BOUDREAUX, P.E. | APPROVED BY: DAIN GILLEN, P.E.

MARSH CREATION BORROW AREA PERIMETER COORDINATES		
POINT	NORTHING	EASTING
1	300,277.42	3,546,480.34
2	300,277.41	3,548,405.16
3	298,968.37	3,549,092.55
4	298,706.32	3,549,956.75
5	298,837.72	3,552,077.01
6	298,280.31	3,552,057.56
7	297,589.09	3,552,137.32
8	296,221.77	3,551,733.60
9	295,460.68	3,551,124.02
10	295,537.42	3,549,066.28
11	297,455.35	3,547,540.05
12	297,889.15	3,547,540.05
13	297,889.15	3,546,480.33

ESTIMATED QUANTITIES		
MCBA	VOLUME (CY)	AREA (ACRES)
MCBA	4,561,581	394



LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR LIMITS (BOC)
- ACCESS CORRIDOR PI (SEE SHEET 3 FOR COORDINATES)
- BORROW AREA BOUNDARY PI
- DREDGE PIPELINE CORRIDOR CL
- PROPOSED BORROW

NOTES:
1. SEE SHEET 3 FOR ACCESS CORRIDOR PI'S AND OTHER INFORMATION.
2. PIPELINE INFORMATION ON THE PLANS IS APPROXIMATE. UNVERIFIED PIPELINE LOCATIONS ARE BASED ON LDNR SONRIS DATABASE AND IS NOT GUARANTEED TO BE ACCURATE.
3. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

BORROW AREA AND SOUTHERN ACCESS CORRIDOR PLAN VIEW

STATE PROJECT NUMBER: TE-0117

DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST

DESIGNED BY: JACQUES BOUDREAUX, P.E.

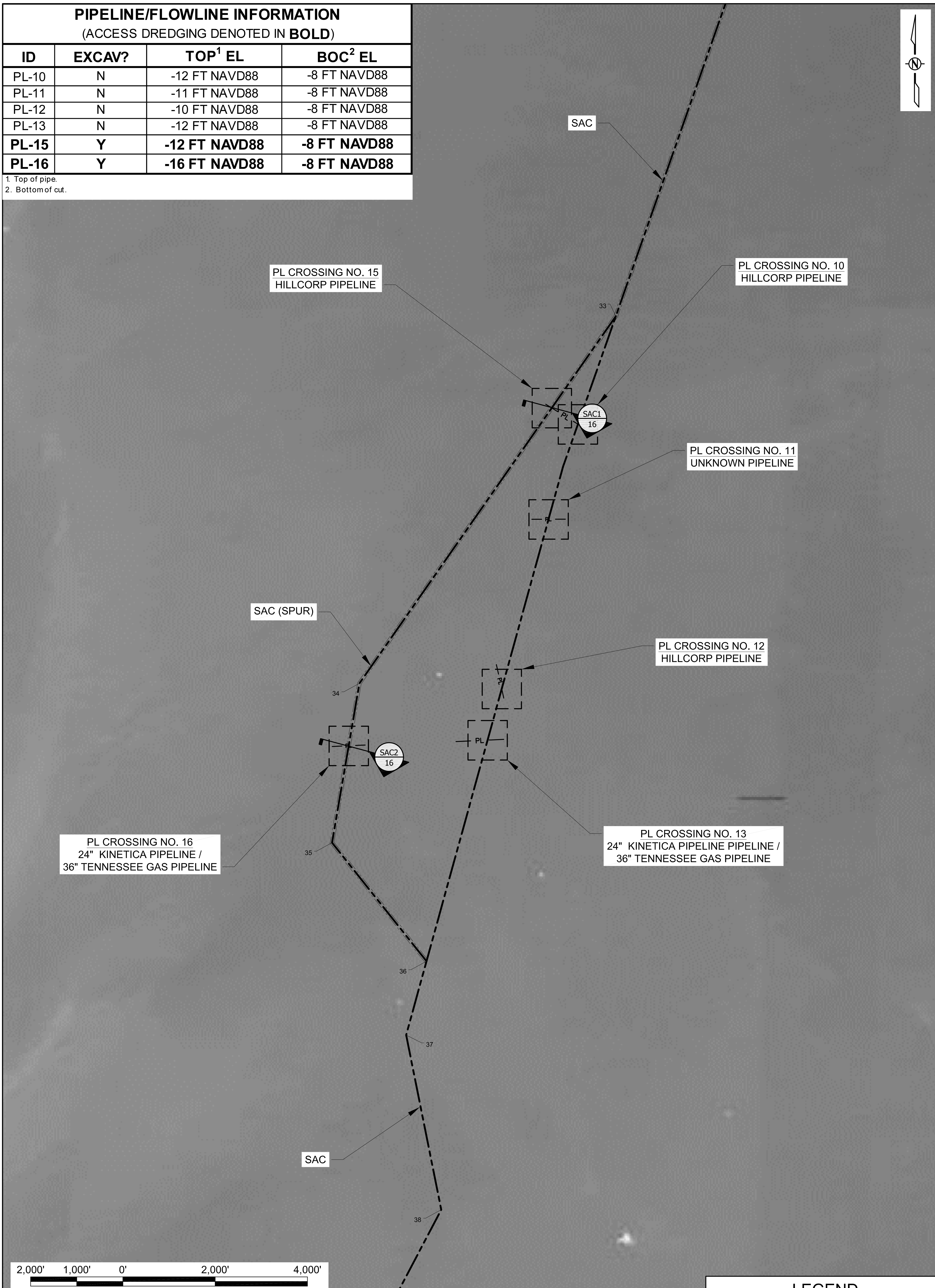
APPROVED BY: DAIN GILLEN, P.E.

PIPELINE/FLOWLINE INFORMATION

(ACCESS DREDGING DENOTED IN **BOLD**)

ID	EXCAV?	TOP[1] EL	BOC[2] EL
PL-10	N	-12 FT NAVD88	-8 FT NAVD88
PL-11	N	-11 FT NAVD88	-8 FT NAVD88
PL-12	N	-10 FT NAVD88	-8 FT NAVD88
PL-13	N	-12 FT NAVD88	-8 FT NAVD88
PL-15	**Y**	**-12 FT NAVD88**	**-8 FT NAVD88**
PL-16	**Y**	**-16 FT NAVD88**	**-8 FT NAVD88**

1. Top of pipe.
2. Bottom of cut.



NOTES:

1. SEE SHEET 3 FOR ACCESS CORRIDOR PI'S AND OTHER INFORMATION.
2. PIPELINE INFORMATION ON THE PLANS IS APPROXIMATE. UNVERIFIED PIPELINE LOCATIONS ARE BASED ON LDNR SONRIS DATABASE AND IS NOT GUARANTEED TO BE ACCURATE.
3. SEE SECTION 5.0 OF THE DESIGN REPORT FOR MORE IN-DEPTH PIPELINE INFORMATION AS IDENTIFIED DURING TE-0117 PROJECT DATA COLLECTION BY TBS AND CHF.
4. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR LIMITS (BOC)
- ACCESS CORRIDOR PI (SEE SHEET 3 FOR COORDINATES)
- PL — VERIFIED PIPELINE

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

SOUTHERN ACCESS CORRIDOR AND SOUTHERN ACCESS CORRIDOR SPUR PLAN VIEW

STATE PROJECT NUMBER: TE-0117

DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST | DESIGNED BY: JACQUES BOUDREAUX, P.E. | APPROVED BY: DAIN GILLEN, P.E.

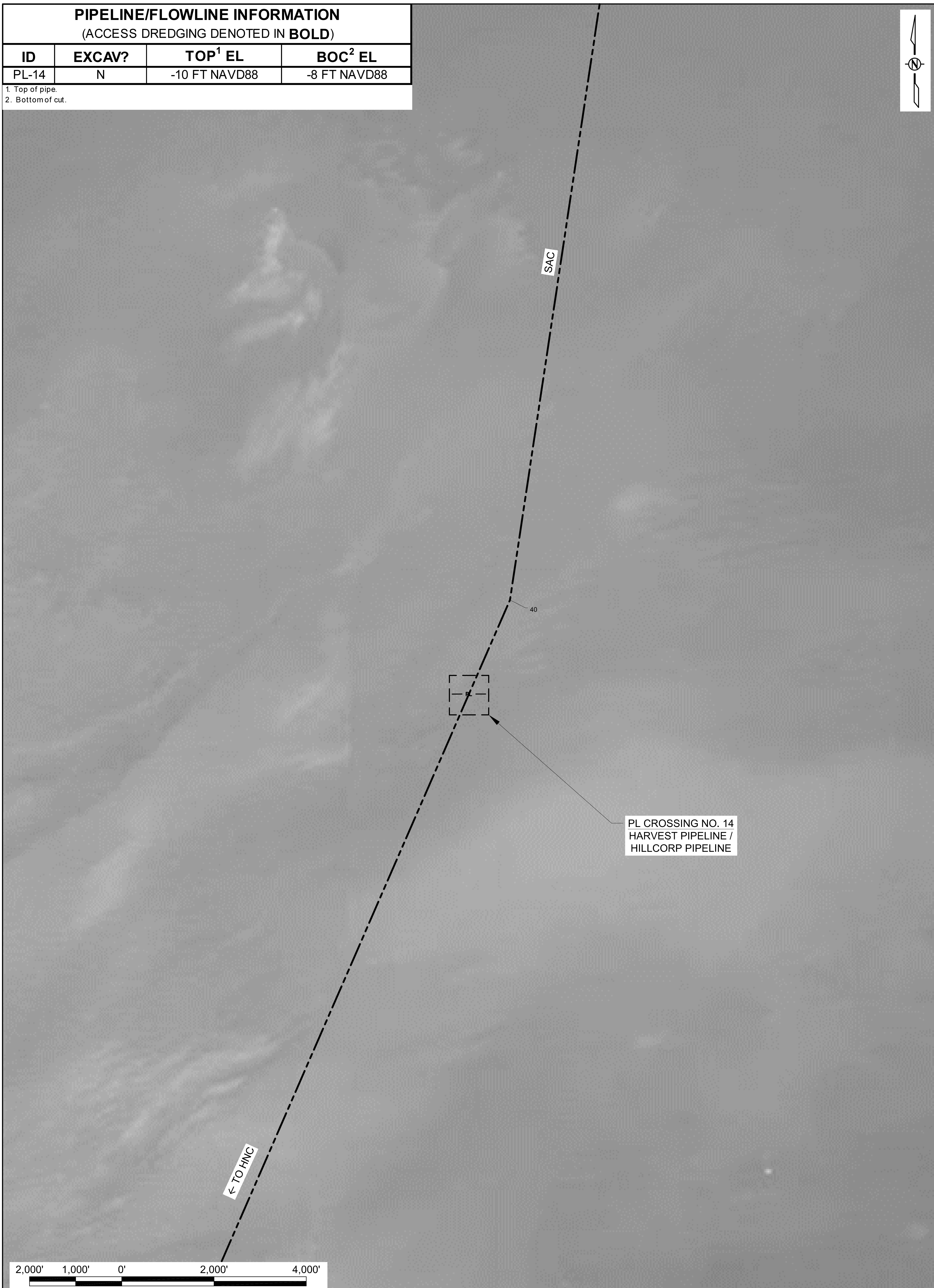
SHEET 7 OF 19

PIPELINE/FLOWLINE INFORMATION

(ACCESS DREDGING DENOTED IN **BOLD**)

ID	EXCAV?	TOP[1] EL	BOC[2] EL
PL-14	N	-10 FT NAVD88	-8 FT NAVD88

1. Top of pipe.
2. Bottom of cut.



NOTES:

1. SEE SHEET 3 FOR ACCESS CORRIDOR PI'S AND OTHER INFORMATION.
2. PIPELINE INFORMATION ON THE PLANS IS APPROXIMATE. UNVERIFIED PIPELINE LOCATIONS ARE BASED ON LDNR SONRIS DATABASE AND IS NOT GUARANTEED TO BE ACCURATE.
3. SEE SECTION 5.0 OF THE DESIGN REPORT FOR MORE IN-DEPTH PIPELINE INFORMATION AS IDENTIFIED DURING TE-0117 PROJECT DATA COLLECTION BY TBS AND CHF.
4. THE BACKGROUND IMAGE WAS TAKEN IN 2016.

LEGEND

- ACCESS CORRIDOR CL
- ACCESS CORRIDOR PI (SEE SHEET 3 FOR COORDINATES)
- PL — VERIFIED PIPELINE

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVEUNUE
BATON ROUGE, LOUISIANA 70802

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

SOUTHERN ACCESS CORRIDOR PLAN VIEW

STATE PROJECT NUMBER: TE-0117

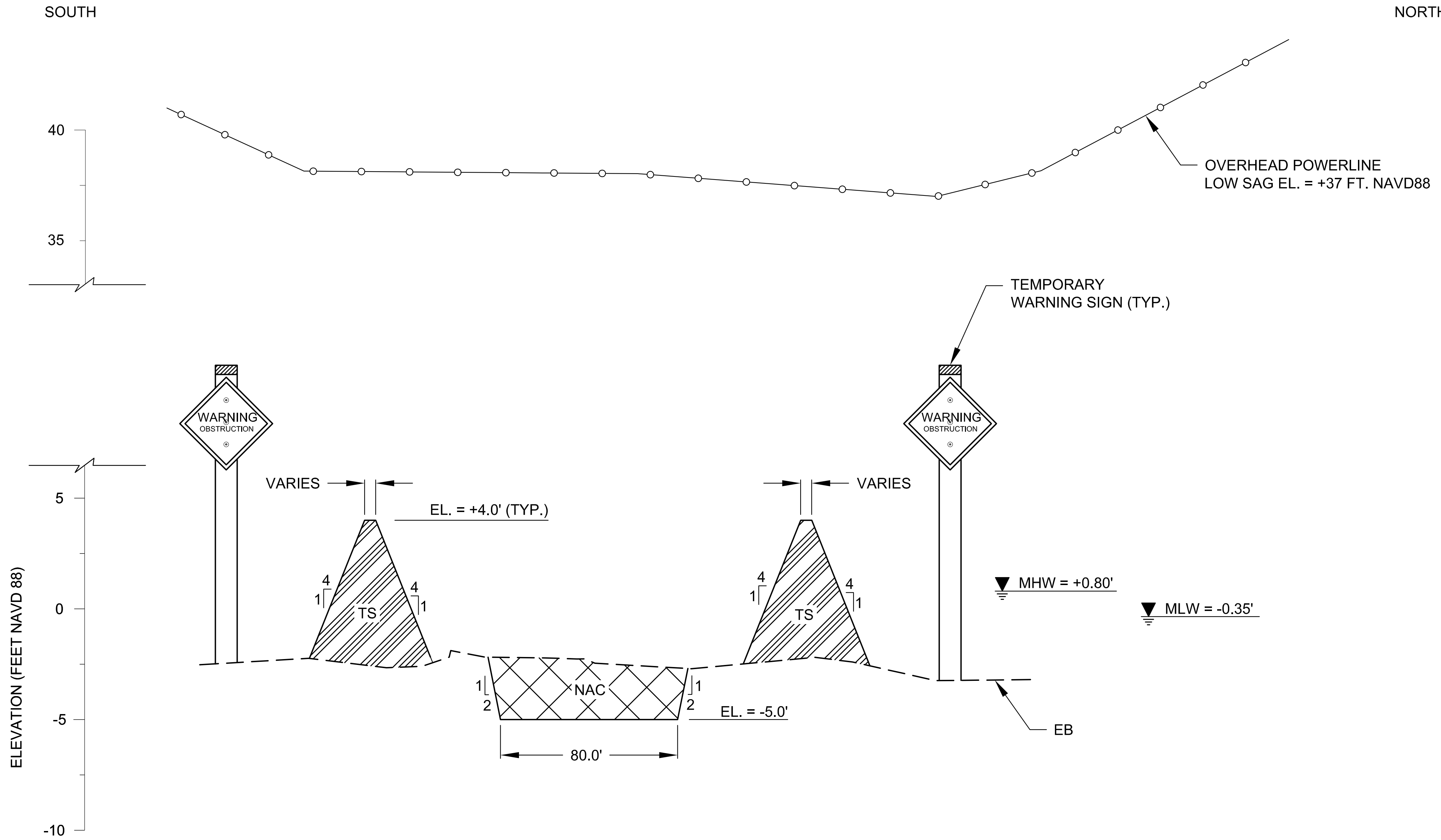
DATE: OCTOBER 2019

DRAWN BY: SHANE FAUST

DESIGNED BY: JACQUES BOUDREAUX, P.E.

APPROVED BY: DAIN GILLEN, P.E.

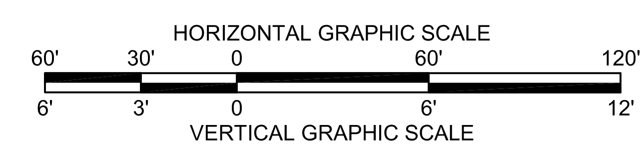
SHEET 8 OF 19



NAC1 NORTHERN ACCESS CORRIDOR
4 TYPICAL SECTION

NOTES:

1. MAXIMUM WIDTH OF FLOTATION CHANNEL TO BE 80' AT BOTTOM ELEVATION CONTOUR. A MAXIMUM REQUIRED TEMPORARY SPOIL TEMPLATE HAS BEEN DETERMINED AND WILL BE SHOWN IN CONSTRUCTION PERMIT DRAWINGS. FOLLOWING CONSTRUCTION, PRE-PROJECT CONDITIONS WILL BE RESTORED.
2. A MINIMUM OFFSET OF 30' WILL BE MAINTAINED BETWEEN TOP OF CUT IN FLOTATION CHANNEL AND TOE OF FILL OF TEMPORARY SPOIL PLACEMENT, WHICH IS CONSISTENT WITH WORST CASE SOIL CONDITIONS ANALYZED FOR EARTHEN CONTAINMENT DIKE DESIGN IN MARSH CREATION AREA.
3. TEMPORARY WARNING SIGNS WILL BE PLACED TO WARN BOATERS OF POTENTIAL HAZARDS AND TO DELINEATE TOTAL RIGHT-OF-WAY OF WORK AREA.
4. CHF PERFORMED A TOPOGRAPHIC SURVEY IN THE VICINITY AND DETERMINED THE ELEVATION OF THE LOW SAG OF THE SHOWN OVERHEAD POWERLINE TO BE +37 FT. NAVD88. BASED ON HISTORICAL WATER LEVEL ANALYSIS AND TIDE DATUM CALCULATIONS, VESSELS HAVING A TOTAL VERTICAL CLEARANCE OF OVER 30' WILL NOT BE ABLE TO ACCESS THE LOCATION.



REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

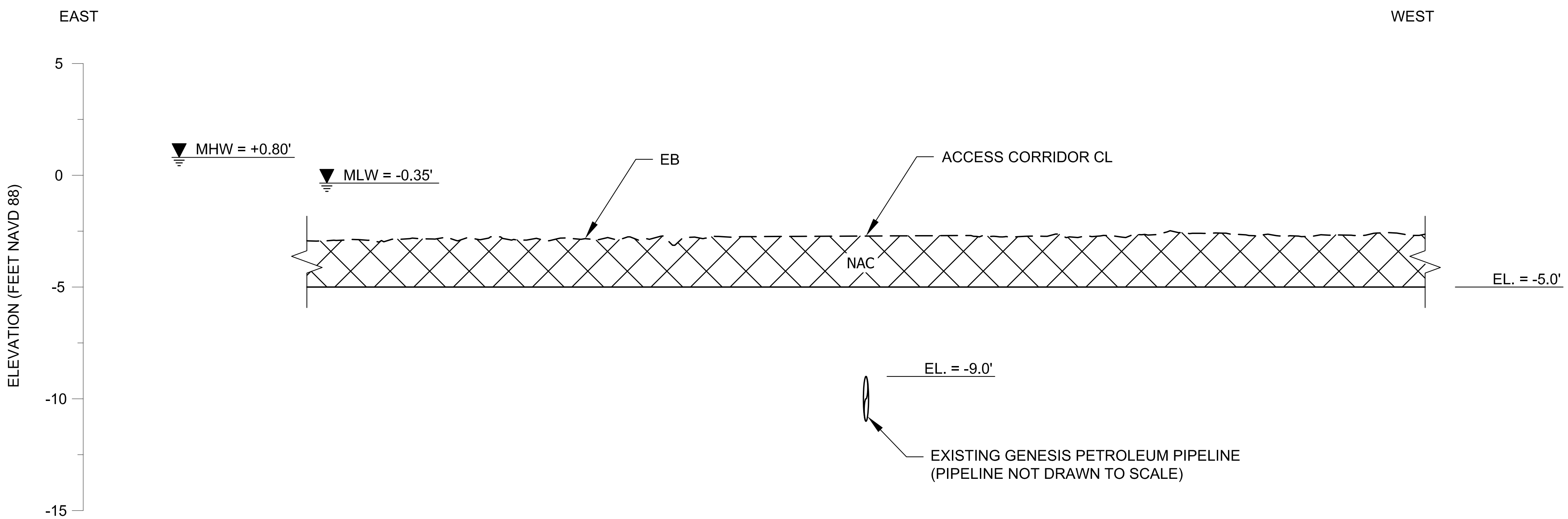
DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD
MARSH CREATION AND
NOURISHMENT PROJECT

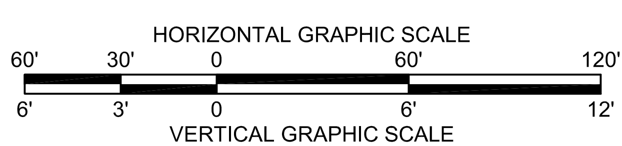
STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

SHEET 9 OF 19



NAC2 / 4 NORTHERN ACCESS CORRIDOR TYPICAL SECTION



NOTES:

1. FOLLOWING CONSTRUCTION, PRE-PROJECT CONDITIONS WILL BE REQUESTED.
2. CMF PERFORMED A MAGNETOMETER SURVEY AND PROBINGS IN THIS VICNITY AND DETERMINED THE TOP OF PIPE ELEVATION OF THE SHOWN PIPELINE TO BE -9.0' FT. NAVD88. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHICAL/BATHYMETRIC CONSDITIONS.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

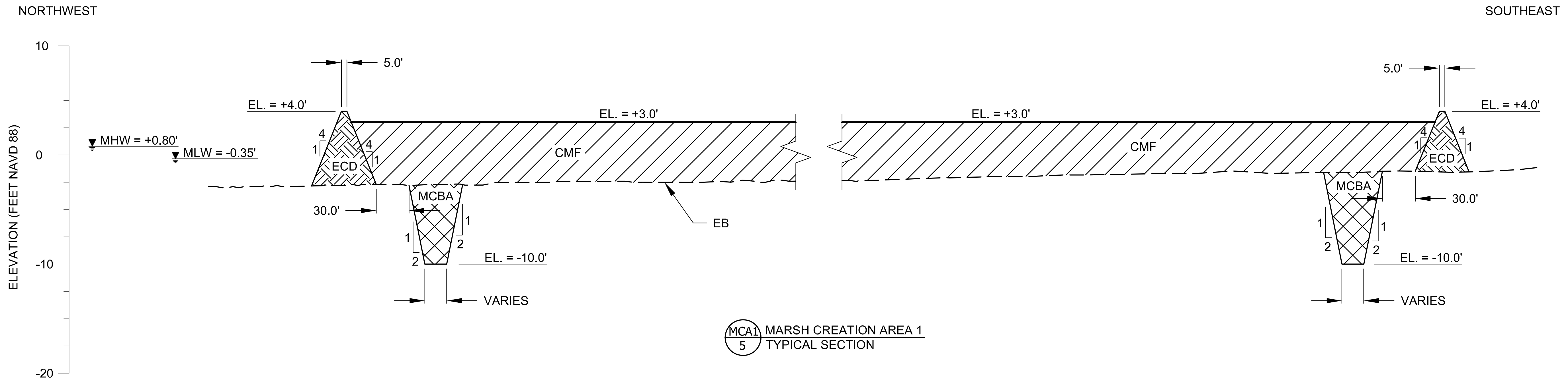
TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

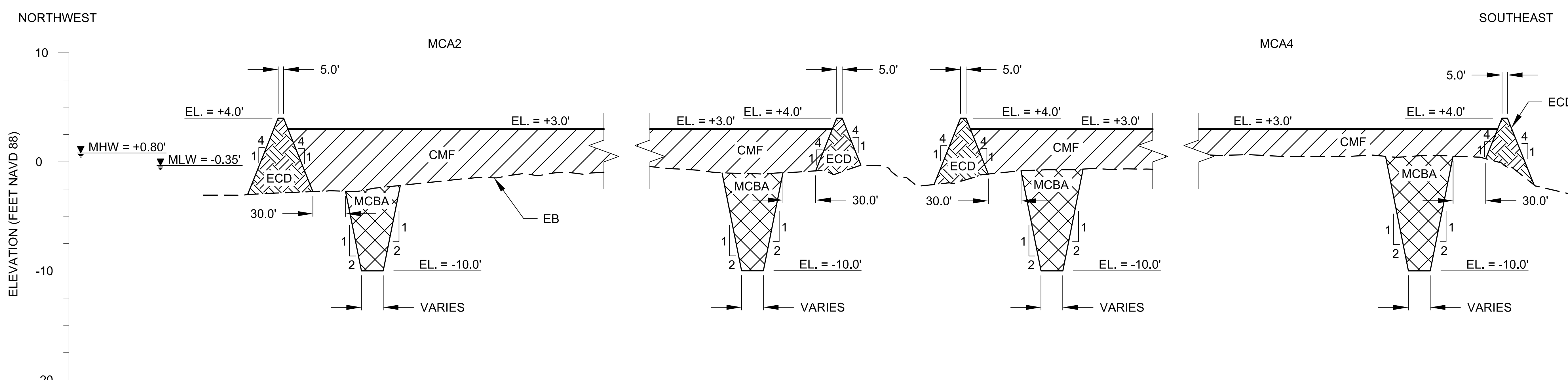
ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019
SHEET 10 OF 19



MCA1 / 5 MARSH CREATION AREA 1 TYPICAL SECTION



MCA2 / 5 MARSH CREATION AREA 2 & 4 TYPICAL SECTION

NOTES:

1. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.
2. MULTIPLE LIFT CONSTRUCTION IS ANTICIPATED FOR BOTH MARSH FILL AND CONTAINMENT DIKES. HOWEVER, SOME SECTIONS ARE UNDERSTOOD TO ACHIEVE ADEQUATE FACTORS OF SAFETY WITH SINGLE LIFT. FOR 30% DESIGN, SINGLE LIFT CONSTRUCTION IS DEPICTED IN DESIGN DRAWINGS, WHILE COSTS WERE ESTIMATED ASSUMING ALL MULTIPLE LIFT CONSTRUCTION.

HORIZONTAL GRAPHIC SCALE

100' 50' 0 100' 200'

10' 5' 0 10' 20'

VERTICAL GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.

APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD
MARSH CREATION AND
NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117

DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

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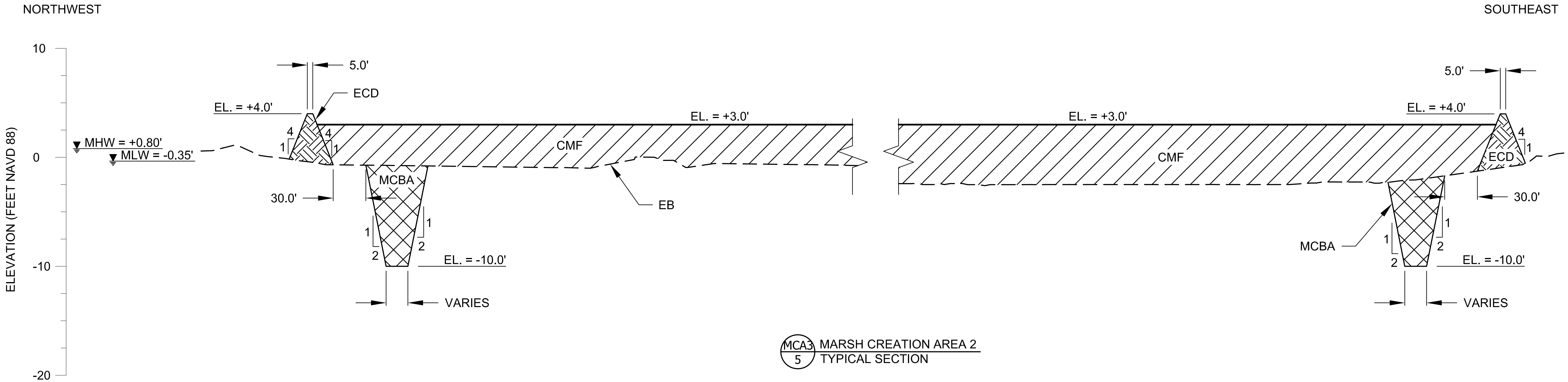
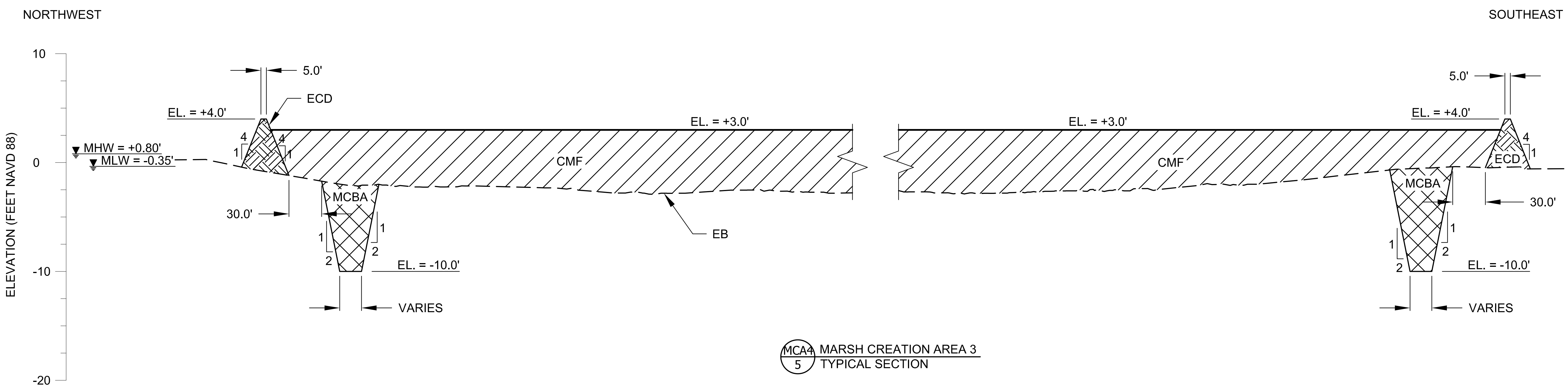


MCA3
5
MARSH CREATION AREA 2
TYPICAL SECTION



MCA4
5
MARSH CREATION AREA 3
TYPICAL SECTION

NOTE:

1. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.
2. MULTIPLE LIFT CONSTRUCTION IS ANTICIPATED FOR BOTH MARSH FILL AND CONTAINMENT DIKES. HOWEVER, SOME SECTIONS ARE UNDERSTOOD TO ACHIEVE ADEQUATE FACTORS OF SAFETY WITH SINGLE LIFT. FOR 30% DESIGN, SINGLE LIFT CONSTRUCTION IS DEPICTED IN DESIGN DRAWINGS, WHILE COSTS WERE ESTIMATED ASSUMING ALL MULTIPLE LIFT CONSTRUCTION.

HORIZONTAL GRAPHIC SCALE
100' 50' 0 100' 200'
10' 5' 0 10' 20'
VERTICAL GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD
MARSH CREATION AND
NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

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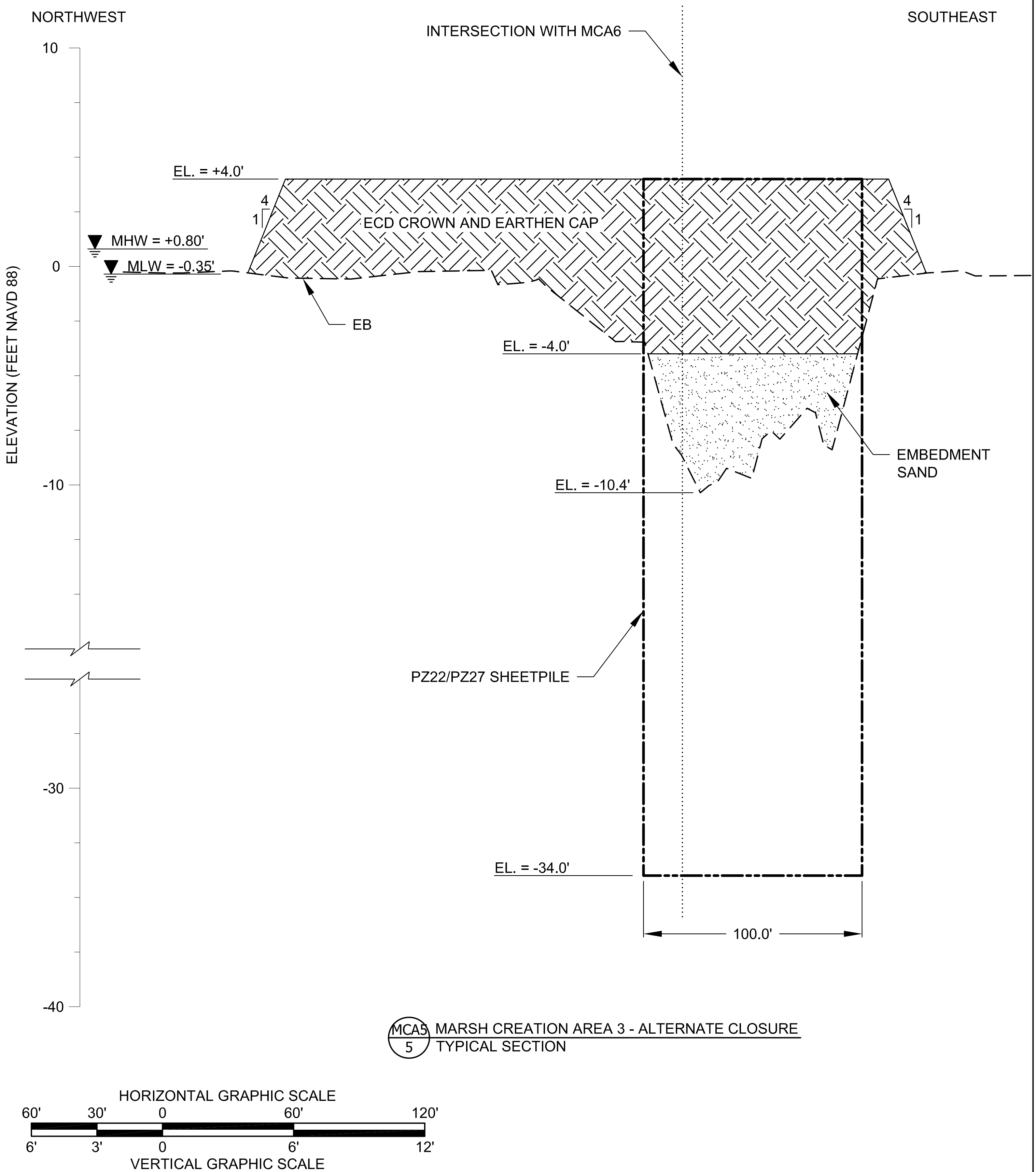

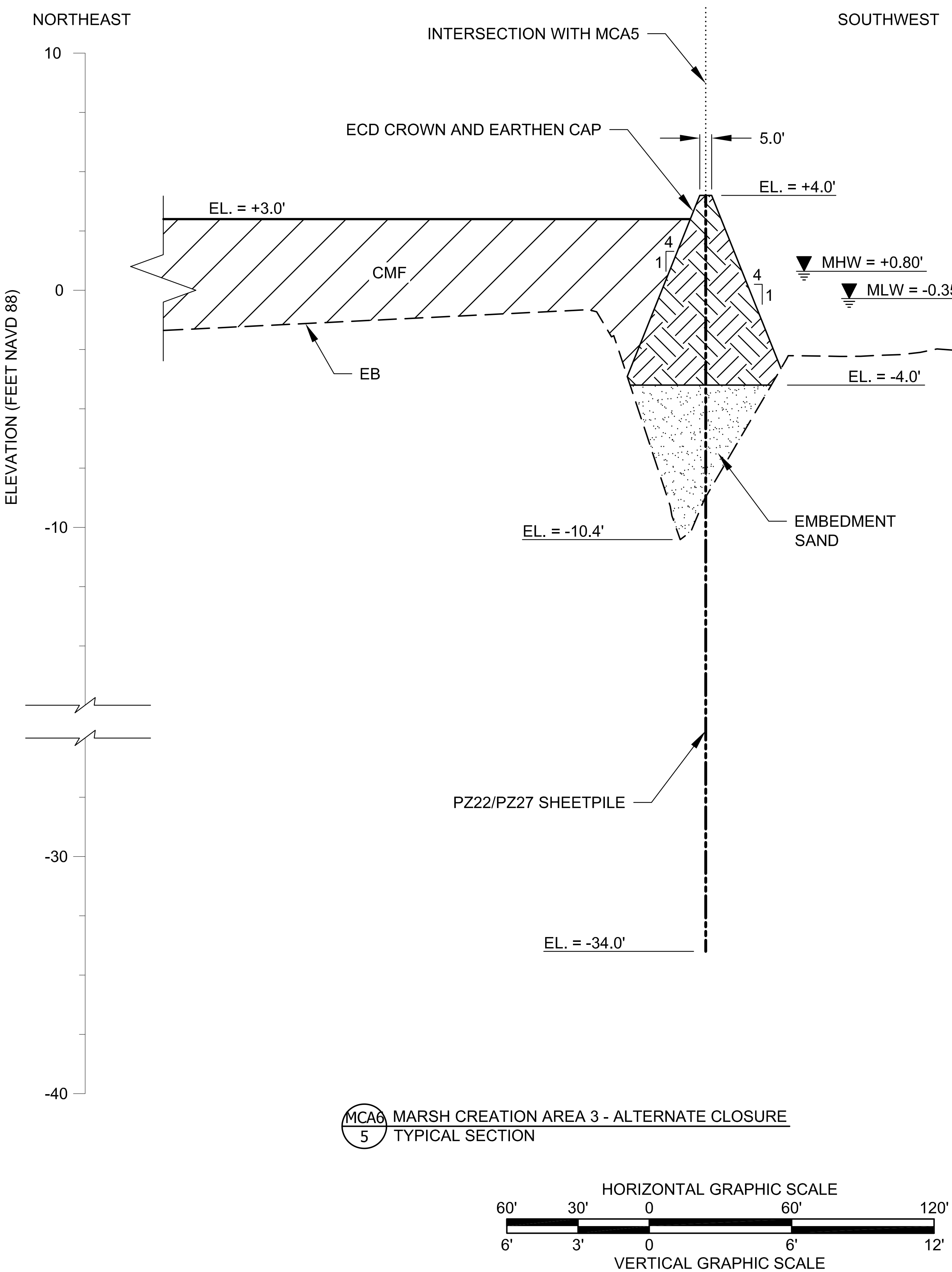

NOTES:

1. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.
2. ALTERNATIVE CLOSURE SYSTEM TO BE CONSTRUCTED AS SHOWN. EMBEDMENT SAND TO BE TRANSPORTED TO LOCATION BY MARINE VESSEL AND PLACED TO TEMPLATE. SHEET PILE TO BE INSTALLED TO BASE EL. = -34.0 FT. NAVD88 AND TIP EL. = +4.0 FT. NAVD88. EARTHEN CAP TO BE PLACED AS SHOWN AND TIED IN WITH REMAINING DIKE ALIGNMENT.
3. MULTIPLE LIFT CONSTRUCTION IS ANTICIPATED FOR BOTH MARSH FILL AND CONTAINMENT DIKES. HOWEVER, SOME SECTIONS ARE UNDERSTOOD TO ACHIEVE ADEQUATE FACTORS OF SAFETY WITH SINGLE LIFT. FOR 30% DESIGN, SINGLE LIFT CONSTRUCTION IS DEPICTED IN DESIGN DRAWINGS, WHILE COSTS WERE ESTIMATED ASSUMING ALL MULTIPLE LIFT CONSTRUCTION.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.
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ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

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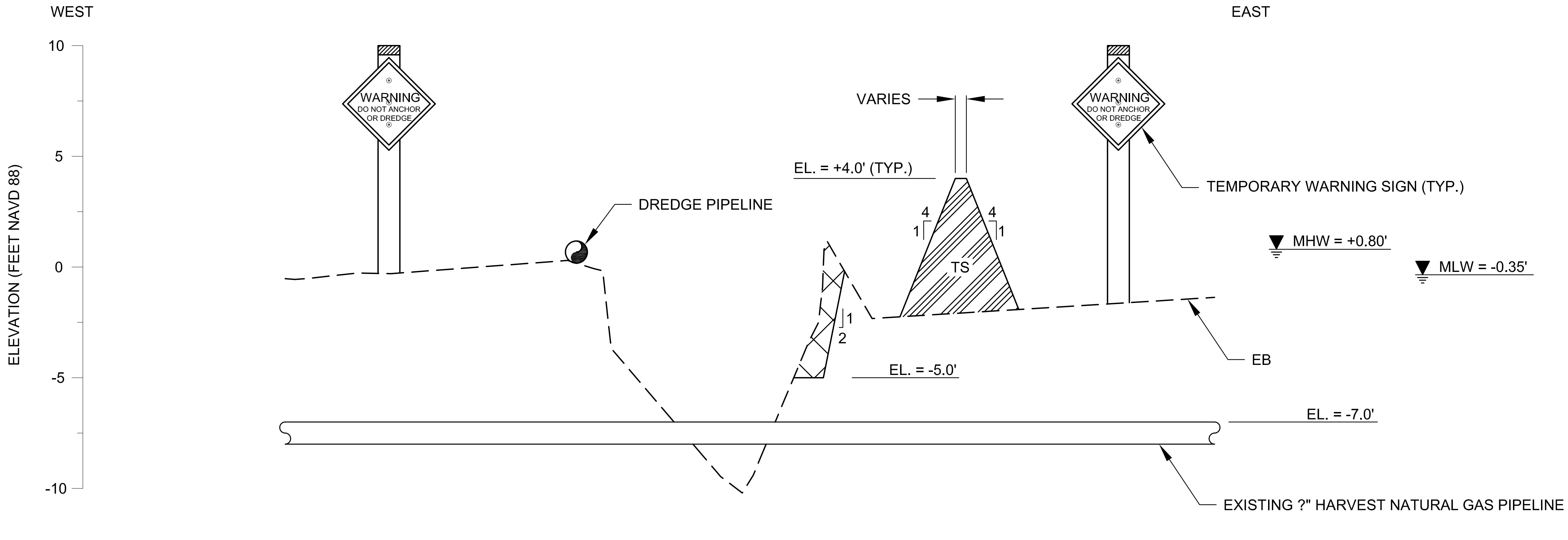
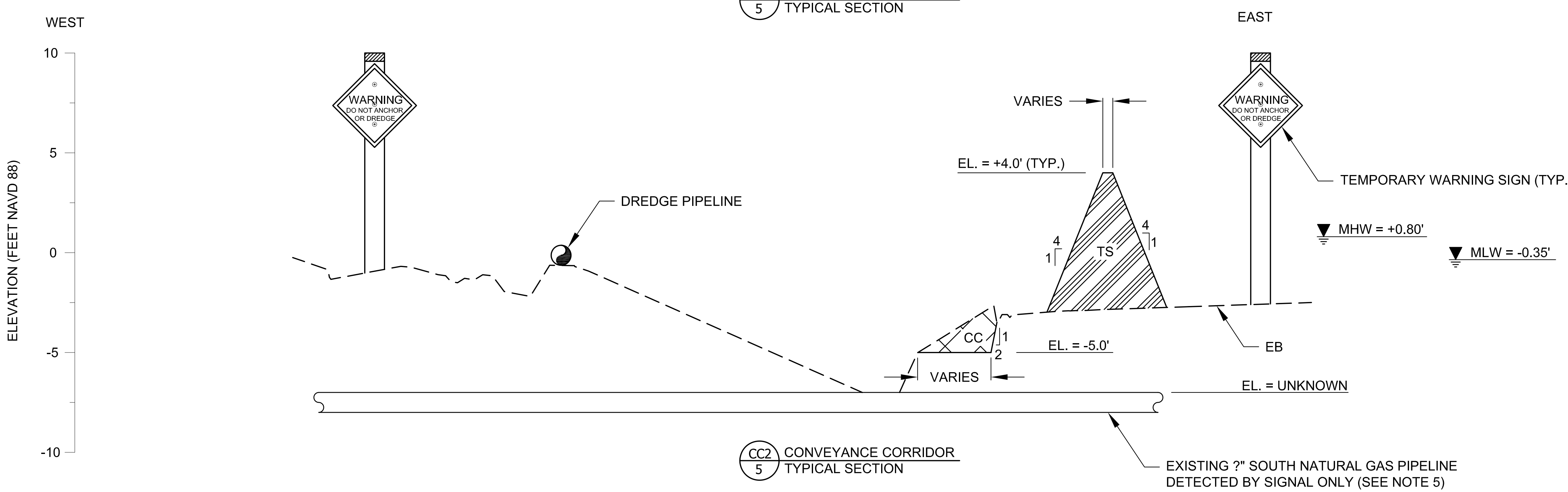
DATE: OCTOBER 2019

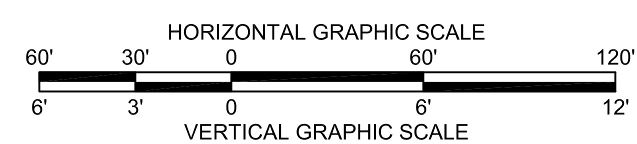


CC1 / 5 CONVEYANCE CORRIDOR TYPICAL SECTION



CC2 / 5 CONVEYANCE CORRIDOR TYPICAL SECTION

NOTES:
1. MAXIMUM WIDTH OF FLOTATION CHANNEL ANTICIPATED TO BE 80' AT BOTTOM OF CUT ELEVATION CONTOUR. A MAXIMUM REQUIRED TEMPORARY SPOIL TEMPLATE HAS BEEN DETERMINED AND WILL BE SHOWN IN CONSTRUCTION PERMIT DRAWINGS. FOLLOWING CONSTRUCTION, PRE-PROJECT CONDITIONS WILL BE RESTORED.
2. A MINIMUM OFFSET OF 30' WILL BE MAINTAINED BETWEEN TOP OF CUT IN FLOATATION CHANNEL AND TOE OF FILL OF TEMPORARY SPOIL PLACEMENT, WHICH IS CONSISTENT WITH WORST CASE SOIL CONDITIONS ANALYZED FOR EARTHEN CONTAINMENT DIKE DESIGN IN MARSH CREATION AREA.
3. DREDGE PIPELINE IS TO BE LAID ADJACENT TO OUTSIDE TOE OF WESTERN TEMPORARY SPOIL BANK.
4. TEMPORARY WARNING SIGNS WILL BE PLACED TO WARN BOATS OF POTENTIAL HAZARDS AND TO DELINEATE TOTAL RIGHT-OF-WAY OF WORK AREA.
5. CHF PERFORMED A MAGNETOMETER SURVEY AND PROBING IN THIS VICINITY AND DETERMINED THE TOP PIPE ELEVATION OF THE PIPELINE SHOWN IN CC1 TO BE -7.0 FT. NAVD88. THE PIPELINE SHOWN IN CC2 WAS UNABLE TO BE DETECTED VIA PROBING BUT IS EXPECTED TO BE SUFFICIENTLY DEEP IN THIS AREA. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.



REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

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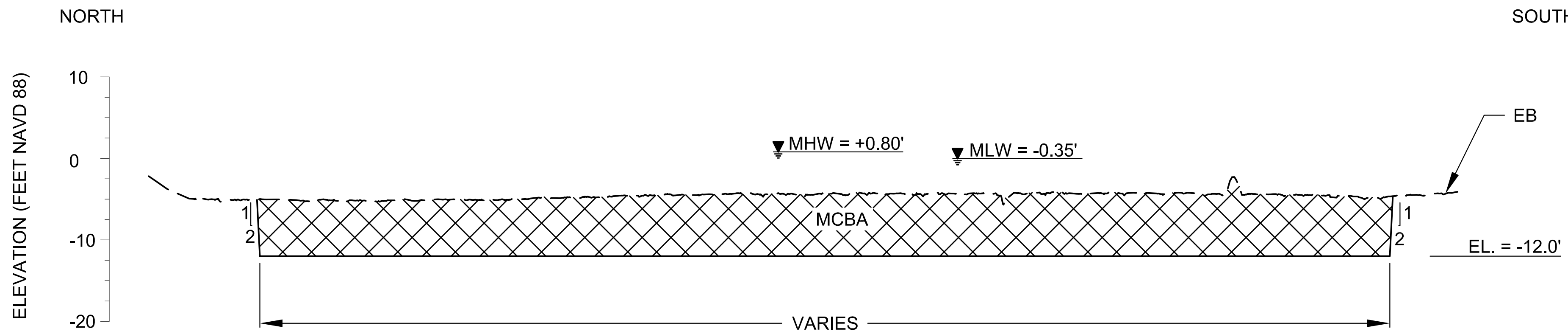
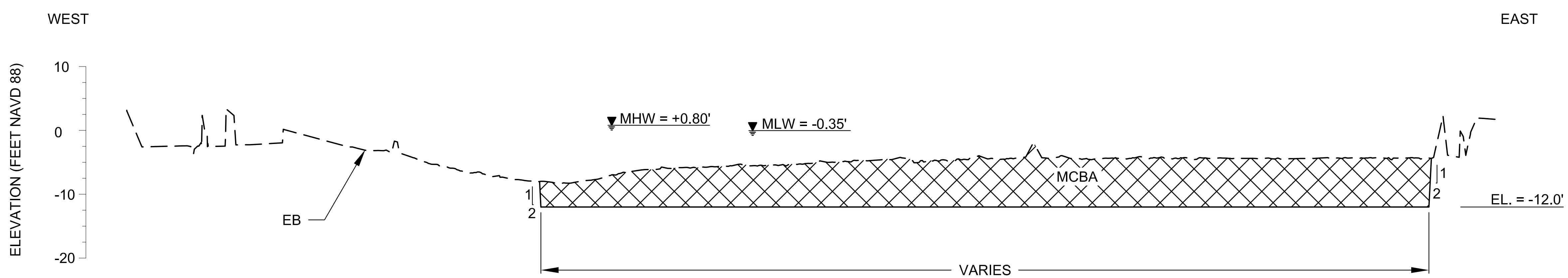
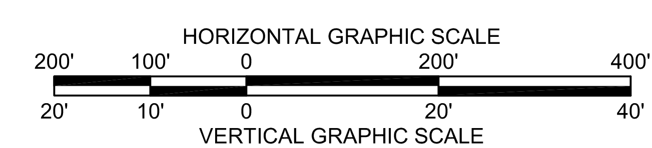


BA1 / 6 MARSH CREATION BORROW AREA TYPICAL SECTION



BA2 / 6 MARSH CREATION BORROW AREA TYPICAL SECTION

NOTE:
THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.



REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

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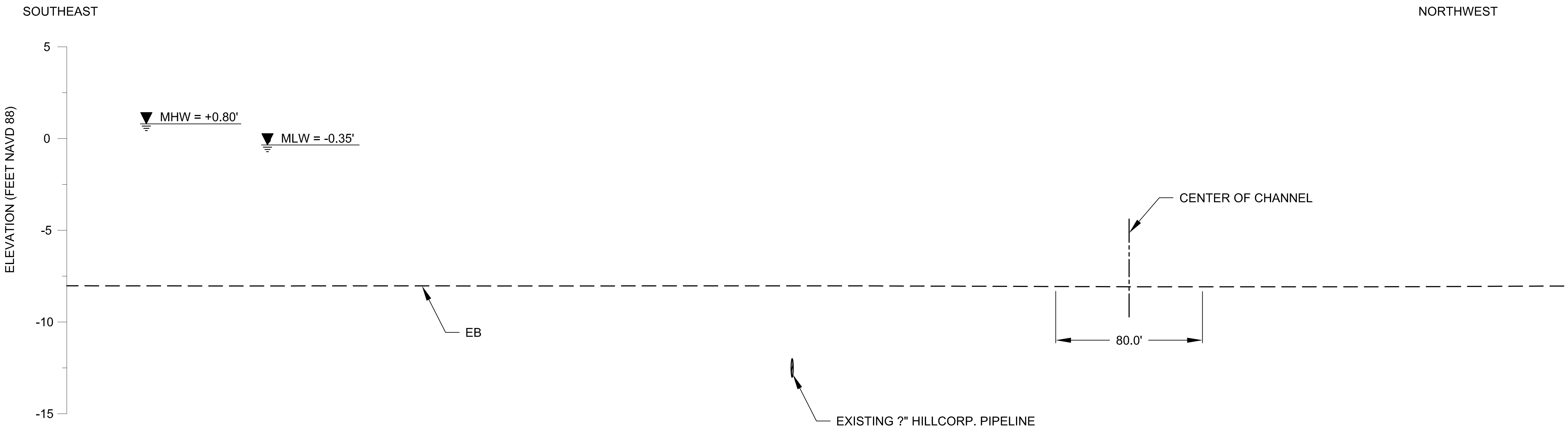
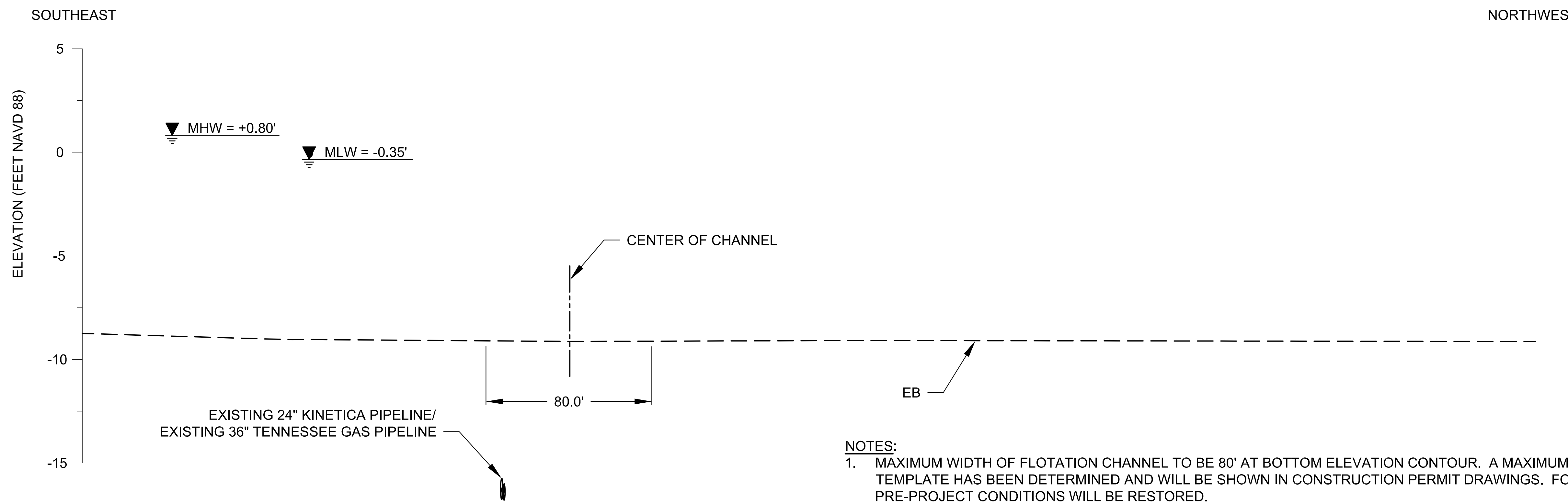
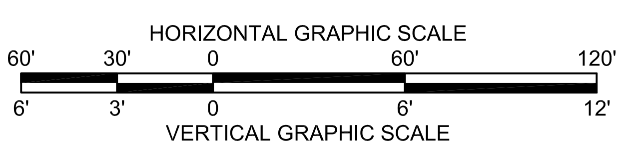


SAC1 / 7 SOUTHERN ACCESS CORRIDOR TYPICAL SECTION



SAC2 / 7 SOUTHERN ACCESS CORRIDOR TYPICAL SECTION



NOTES:

1. MAXIMUM WIDTH OF FLOTATION CHANNEL TO BE 80' AT BOTTOM ELEVATION CONTOUR. A MAXIMUM REQUIRED TEMPORARY SPOIL TEMPLATE HAS BEEN DETERMINED AND WILL BE SHOWN IN CONSTRUCTION PERMIT DRAWINGS. FOLLOWING CONSTRUCTION, PRE-PROJECT CONDITIONS WILL BE RESTORED.
2. A MINIMUM OFFSET OF 30' WILL BE MAINTAINED BETWEEN TOP OF CUT IN FLOTATION CHANNEL AND TOE OF FILL OF TEMPORARY SPOIL PLACEMENT, WHICH IS CONSISTENT WITH WORST CASE SOIL CONDITIONS ANALYZED FOR EARTHEN CONTAINMENT DIKE DESIGN IN MARSH CREATION AREA.
3. TEMPORARY WARNING SIGNS WILL BE PLACED TO WARN BOATERS OF POTENTIAL HAZARDS AND TO DELINEATE TOTAL RIGHT-OF-WAY OF WORK AREA.
4. CHF PERFORMED A MAGNETOMETER SURVEY AND PROBING IN THIS VICINITY AND DETERMINED THE TOP PIPE ELEVATION OF THE PIPELINE SHOWN IN SAC 1 TO BE -12.0' FT. NAVD88 AND IN SAC2 TO BE -16.0 FT. NAVD88. THE CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO PERFORM A PRE-CONSTRUCTION SURVEY IN ORDER TO LOCATE ANY AND ALL PIPELINE INFRASTRUCTURE AND POTENTIAL HAZARDS AND IN ORDER TO DETERMINE CHANGES IN TOPOGRAPHIC/BATHYMETRIC CONDITIONS.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TYPICAL SECTIONS

DESIGNED BY: JACQUES BOUDREAUX, P.E.

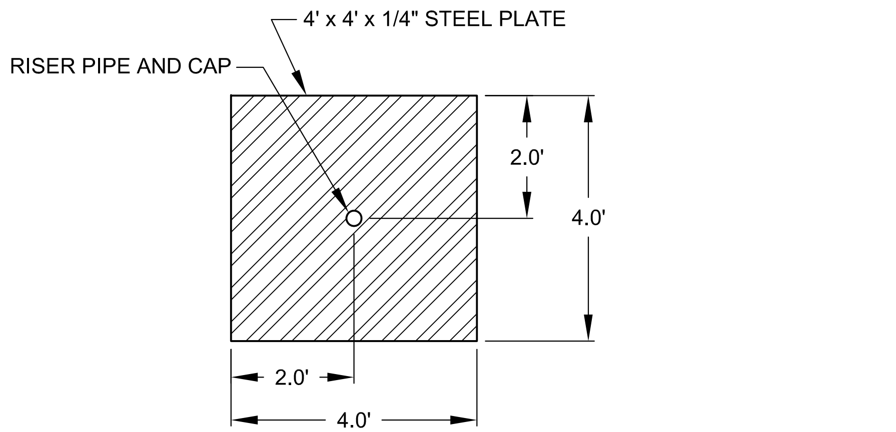
APPROVED BY: DAIN GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

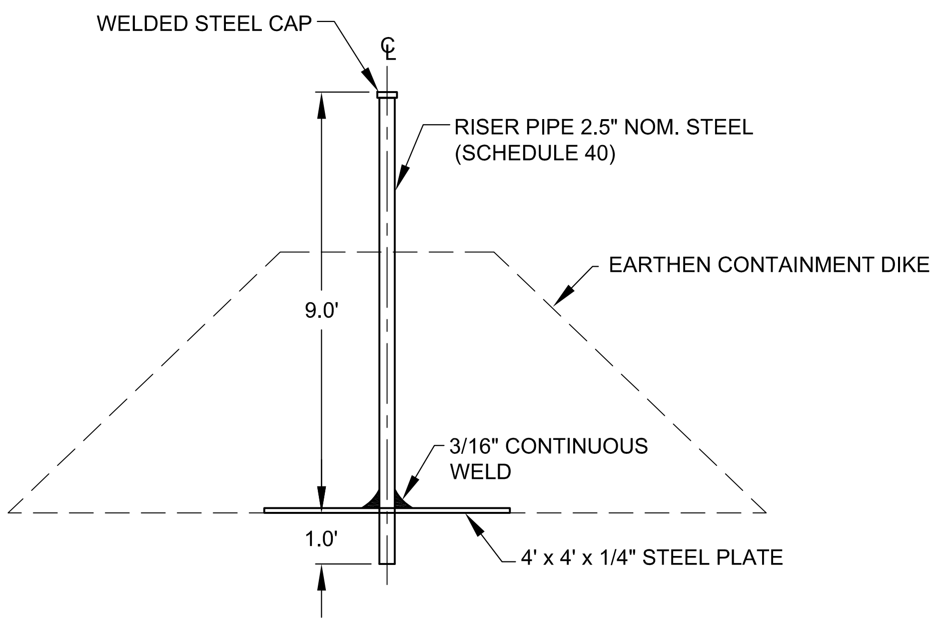
STATE PROJECT NUMBER: TE-0117

DRAWN BY: SHANE FAUST

DATE: OCTOBER 2019

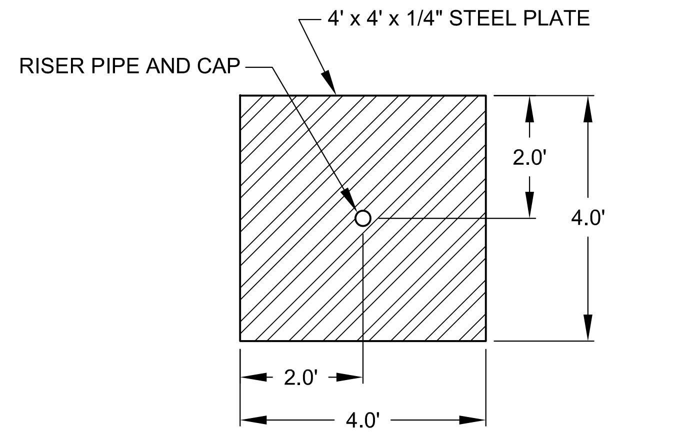


PLAN VIEW



PROFILE VIEW

EARTHEN CONTAINMENT DIKE SETTLEMENT PLATE
NTS



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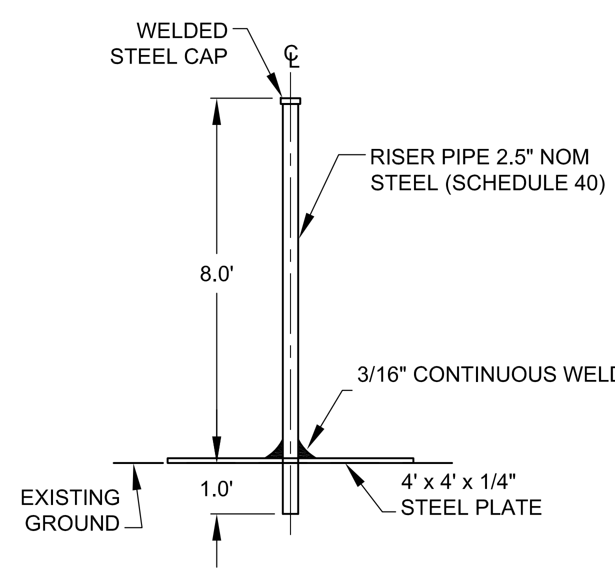
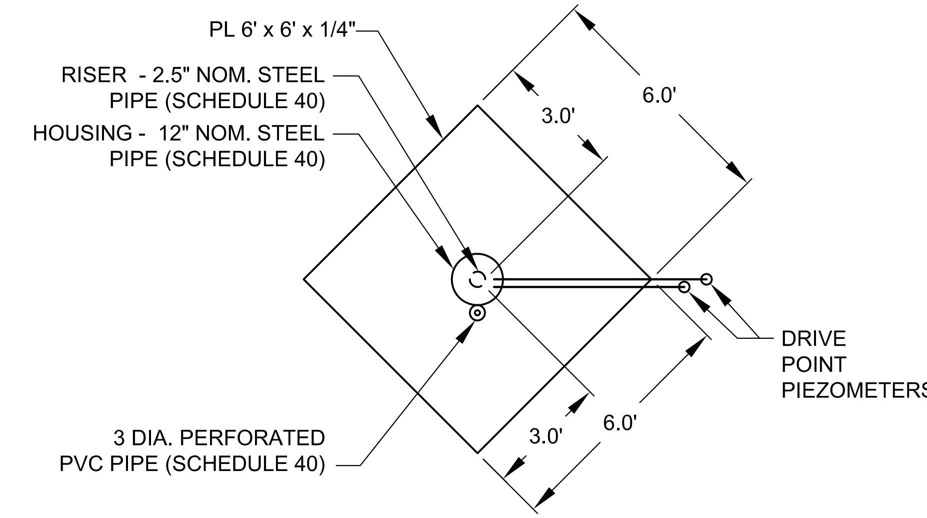
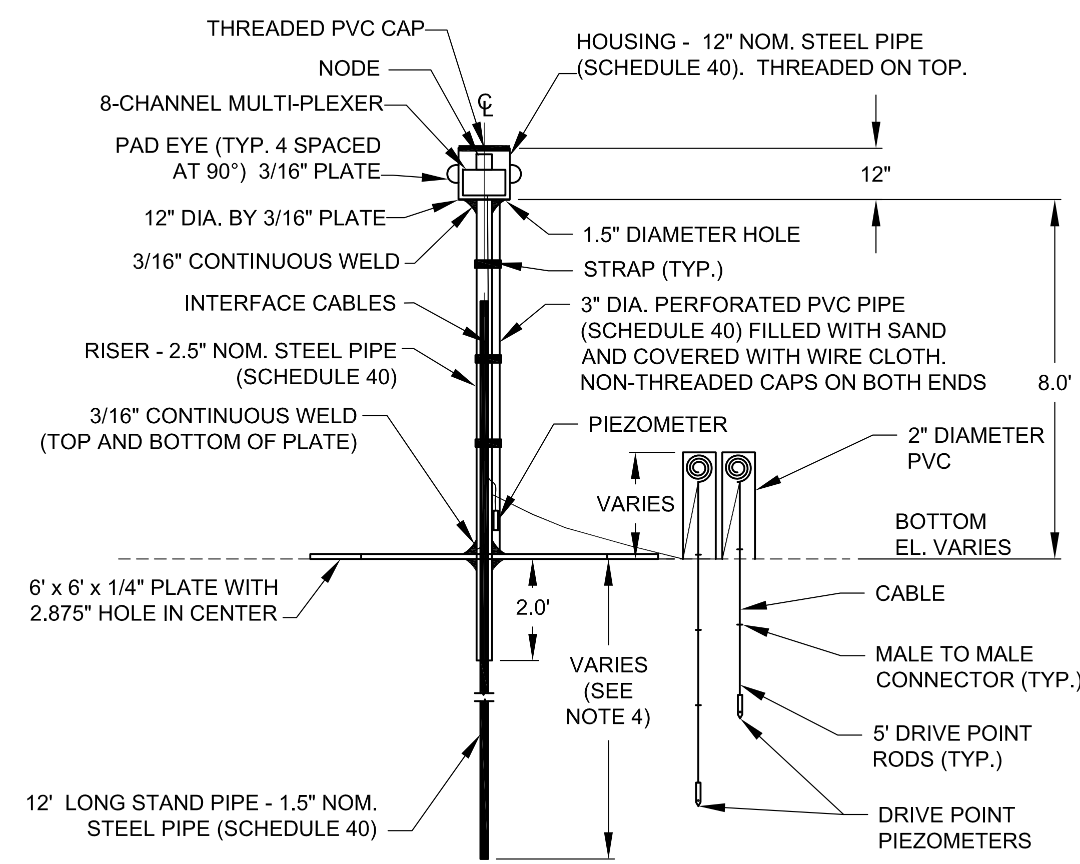


PROFILE VIEW

MARSH CREATION AREA SETTLEMENT PLATE
NTS



PLAN VIEW



PROFILE VIEW

INSTRUMENTED SETTLEMENT PLATE
NTS

NOTES:
1. SETTLEMENT PLATES SHALL BE INSTALLED AT THE LOCATIONS TO BE DETERMINED ACROSS MARSH CREATION AREAS.
2. CONTRACTOR TO DRIVE STAND PIPE BELOW GRADE TO THE DEPTH DETERMINED BY THE ENGINEER IN THE FIELD.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

SETTLEMENT PLATE DETAILS

DESIGNED BY: J. BOUDREAUX, P.E.
APPROVED BY: D. GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: S. FAUST

DATE: OCTOBER 2019

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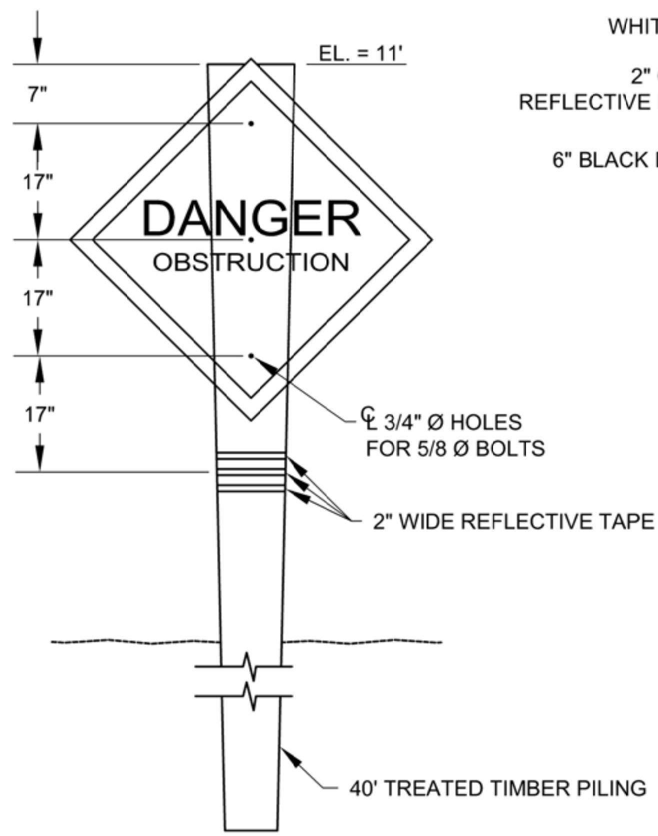
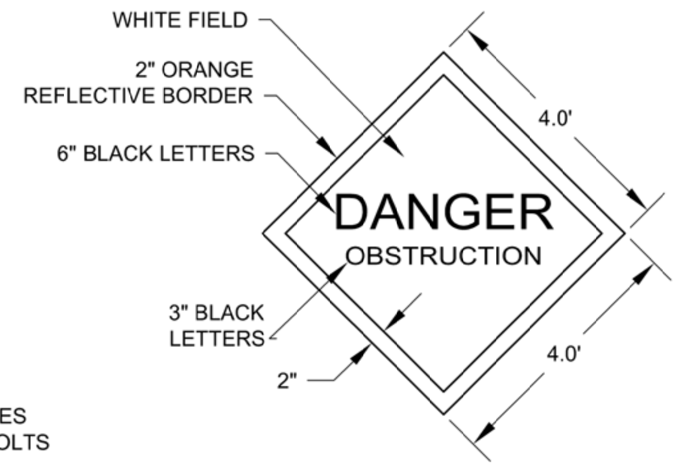
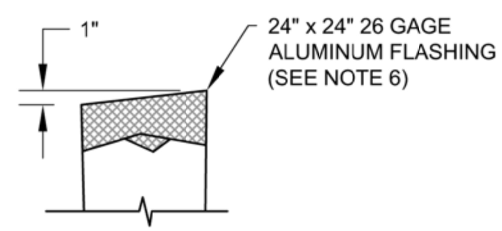


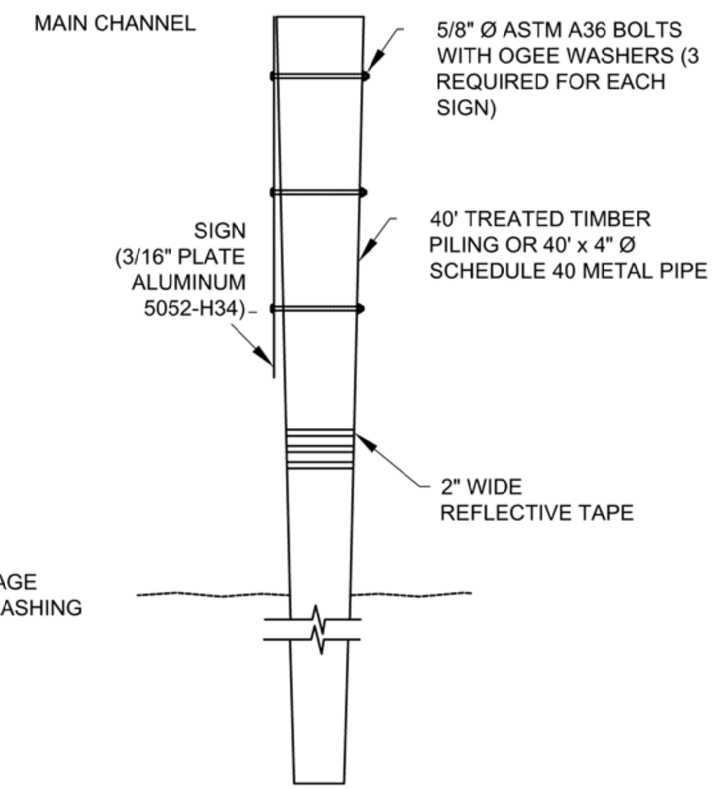
WARNING SIGN ELEVATION



SIGN DETAIL



TYPICAL TIMBER PILE CAP



WARNING SIGN ELEVATION

TEMPORARY WARNING SIGN DETAIL
NTS

NOTES:
1. TEMPORARY WARNING SIGNS, INCLUDING TIMBER PILES, SHALL BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS. THE 2" BORDER ON THE WARNING SIGN WILL BE REFLECTIVE MATERIAL OF ORANGE COLOR. THE LETTERING FIELD WE BE A REFLECTIVE MATERIAL OF WHITE COLOR. THE LETTERING FOR THE WARNING SIGNS WILL BE BLACK. ALL SIGNS MUST MEET U.S. COAST GUARD STANDARDS; IN ACCORDANCE WITH 33 CFR 330.4 (a)(1) WHICH CAN BE DOWNLOADED AT http://www.access.gpo.gov/nara/cfr/waisidx_0233cfr330_02.html
1. NEOPRENE WASHERS SHALL BE PLACED BETWEEN THE SIGN AND THE PILING AT ALL POINTS OF CONTACT.
2. HARDWARE FOR TIMBER CONNECTIONS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH SECTION 811.5 OF THE LOUISIANA STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, AS PUBLISHED BY THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, LATEST EDITION.
3. TIMBER PILES SHALL CONFORM TO SECTIONS 804 AND 1014 OF THE LOUISIANA STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, AS PUBLISHED BY THE LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, LATEST EDITION. PILES SHALL BE TREATED WITH A CREOSOTE SOLUTION CONFORMING TO AWPA P2 TO A MINIMUM RETENTION OF 20 PCF AND CAPPED ACCORDING TO LA DOTD SPECIFICATION 812.06.
4. TIMBER PILINGS SHALL BE 40' IN LENGTH WITH A NOMINAL 12" DIAMETER BUTT AND 7" MINIMUM DIAMETER AT THE TIP.
5. THE TOP OF THE PILES SHALL BE COATED WITH COAL TAR EPOXY PAINT PRIOR TO PLACING CAP. THE PILE CAP SHALL BE ATTACHED USING ALUMINUM OR STAINLESS STEEL NAILS.

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

TEMPORARY WARNING SIGN DETAIL

DESIGNED BY: J. BOUDREAUX, P.E.
APPROVED BY: D. GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

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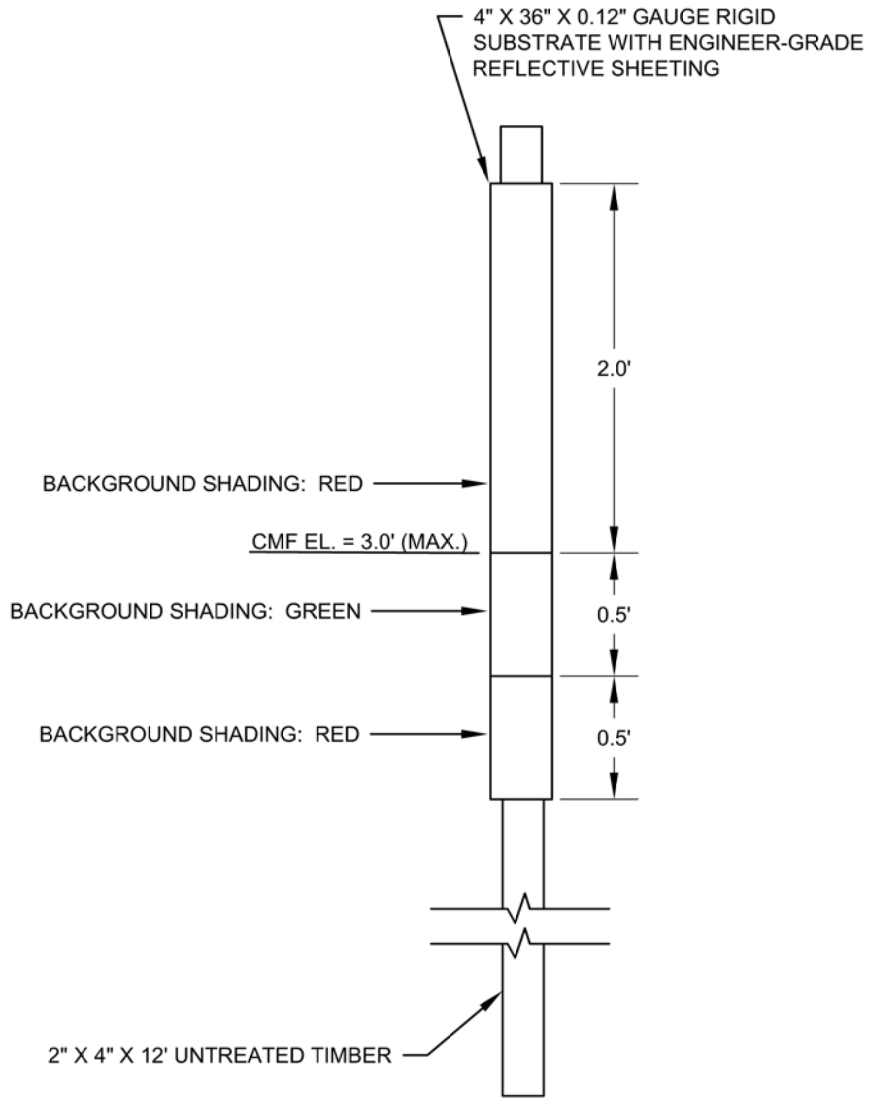
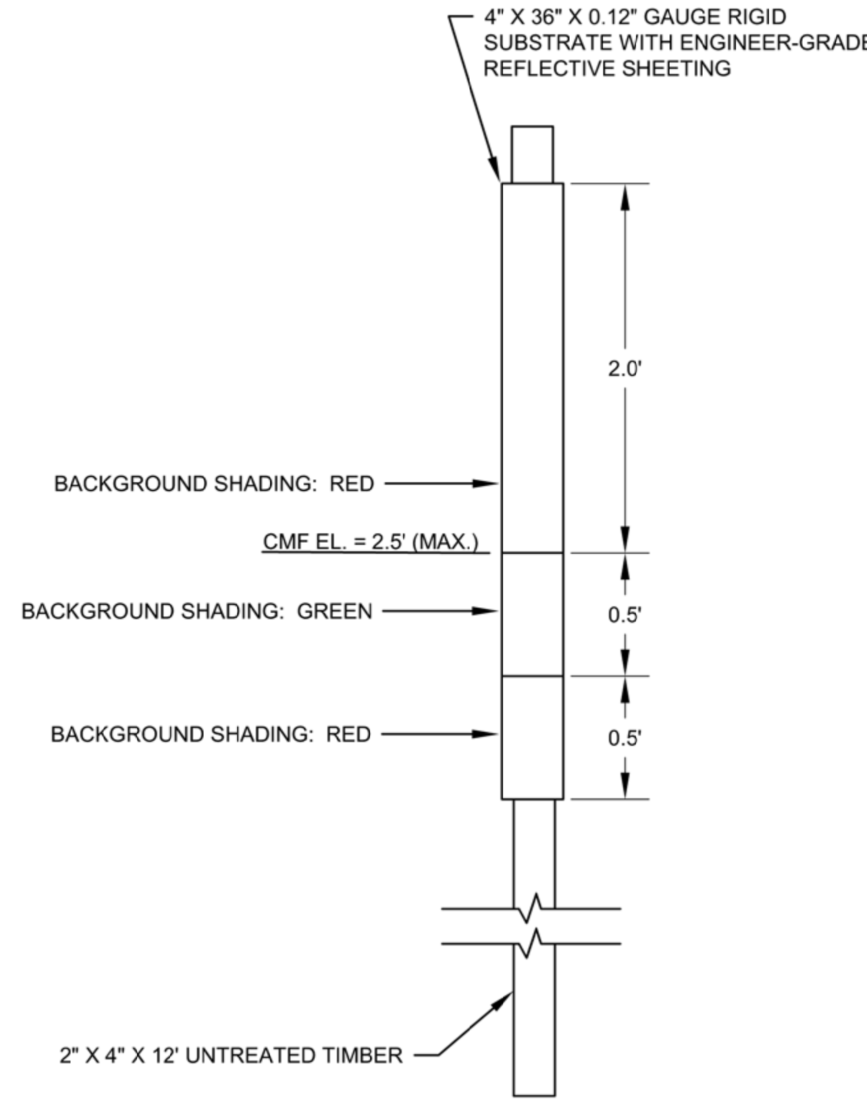
DATE: OCTOBER 2019



GRADE STAKE DETAIL
MARSH CREATION AREAS 1, 2, & 3
NTS



GRADE STAKE DETAIL
MARSH CREATION AREA 4
NTS

REV.	DATE	DESCRIPTION	BY

COASTAL PROTECTION AND RESTORATION AUTHORITY
150 TERRACE AVENUE
BATON ROUGE, LOUISIANA 70802

GRADE STAKE DETAILS

DESIGNED BY: J. BOUDREAUX, P.E.
APPROVED BY: D. GILLEN, P.E.

ISLAND ROAD MARSH CREATION AND NOURISHMENT PROJECT

STATE PROJECT NUMBER: TE-0117
DRAWN BY: S. FAUST

DATE: OCTOBER 2019

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