UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
1201 Elm Street, Suite 500
Dallas, Texas 75270-2102

June 27, 2019

Mr. Charles Villarrubia, Senior Scientist
Planning and Research
Coastal Protection and Restoration
Authority of Louisiana
P.O. Box 44027
Baton Rouge, Louisiana 70804-4027

Dear Mr. Villarrubia:

We have completed our review of the General Quality Assurance Project Plan (QAPP) for the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Cooperative Agreements. I am pleased to inform you that it has been approved. The expiration date is June 27, 2022.

Enclosed is the completed QAPP signature page for your records. In any future correspondence relating to this QAPP, please reference QTRAK #19-306. If you have any questions, please contact me.

Sincerely,

Sondra McDonald

Sondra McDonald, Project Officer
State/Tribal Programs Section

Cc: Andrew Beall
Renee Bennett

State of Louisiana
Coastal Protection and Restoration Authority of Louisiana

General Quality Assurance Project Plan

June 2019

State of Louisiana – Coastal Protection and Restoration Authority of Louisiana
General Quality Assurance Project Plan

APPROVED:

Barbara Schrodt, Acting Chief
State/Tribal Programs Section
EPA Region 6

Date: 6-27-19

Sondra McDonald, Project Officer
EPA Region 6

Date: 6/27/19

Concurrences:

Maury Chatellier, P.E.
Project Management Administrator
QA Manager

Date: 05/13/19

Brian Lezina
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QA Manager

Date: 5/15/19

Rudy Simoneaux, P.E.
Engineering Chief
QA Manager

Date: 05/13/2019

Ignacio Harrouch, P.E.
Operations Chief
QA Manager

Date: 5/13/2019

QAPP prepared by:

Charles Villarrubia, Senior Scientist
Planning and Research

Date: 5/14/2019

Introduction. The purpose of a Quality Assurance Project Plan (QAPP) is to document planning efforts for the collection and analysis of environmental data and to provide a guide for the type and quality of data needed for a specific decision or use. This general QAPP describes the quality assurance and quality control processes the Coastal Protection and Restoration Authority of Louisiana follows in developing and implementing wetland conservation and restoration plans and projects as directed by the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The procedures detailed in this QAPP are in accordance with applicable professional technical standards; the United States Environmental Protection Agency (U.S. EPA) guidance and requirements; and the State of Louisiana, Office of Coastal Protection and Restoration Quality Management Plan. This QAPP was prepared in accordance with the following:

Requirements for Quality Assurance Project Plans for Environmental Data Operations, EPA QA/R-5 (U.S. EPA, 2001).

Guidance for Quality Assurance Project Plans, EPA QA/G-5 (U.S. EPA 2002)

Guidance for Quality Assurance Project Plans for Modeling, EPA QA/G-5M (U.S. EPA 2002)

Guidance for Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4 (U.S. EPA, 2006)

Villarrubia, C., J. Johnson, N. Dedon and L. A. Sharp, 2018. Coastal Protection and Restoration Authority Quality Management Plan, Fiscal Year 2019, Coastal Protection and Restoration Authority. Baton Rouge, LA. 47 pp.

QAPPs vary in their level of complexity and this plan is general in nature. Individual QAPPs specifically identifying project team members and clearly stating project objectives will often be required. These project specific QAPPs supplement this general QAPP and may be very brief. Typical information includes a project description; identification of the individual project team members and their assignments/responsibilities; special data collection and use of existing data; project specific data collection objectives; and any other project specific information deemed necessary by the CPRA Project Manager (PM). The intent of the QAPP is to develop a useful, living document with the appropriate level of detail. A template that may be used for a project specific QAPP is provided in Appendix B.

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1. Project Management

CPRA consists of five Divisions, Executive, Engineering, Operations, Project Management and Planning and Research . The project manager and technical team members are primarily assigned from within the Engineering, Project Management, Operations, and Planning and Research Divisions. The organization charts in Appendix A identify CPRA staff involved in the engineering design and construction of CWPPRA projects.

Additional support to the project team on issues such as real estate, oyster leases, cultural resources, ecological assessments, and post-construction monitoring is provided by other CPRA Divisions, private consultants and academia. The need for these auxiliary resources is determined on a project-by-project basis. The QMP provides organization charts, responsibilities and authorities of these Divisions.

This QAPP is required reading and all CPRA staff are expected to follow and implement the processes and procedures described herein. This general QAPP, in addition to the CPRA QMP is provided to all CPRA employees electronically and updated as needed. In addition to this general QAPP, project specific QAPPs may be developed to provide project specific information. The project specific QAPPs will also be made available to all project team members electronically.

The CPRA Project Manager (PM) will be responsible for developing, distributing, maintaining, and updating the project specific QAPPs and ensuring the plan is available to the project team members. The level of detail of a project specific QAPP will be determined on a project-by-project basis and depends upon the type and complexity of the project. Consultants and academia under contract to CPRA will be responsible for developing project specific QAPPs or may be incorporated into the CPRA project specific QAPP.

A specific PM is assigned from within the CPRA Project Management Division to each project. The PM is the project team leader and oversees all activities associated with the project. The PM is responsible for planning, organizing, budgeting, coordinating, directing, and controlling the combined efforts of the project team including CPRA staff, outside consultants, and academic professionals. The PM also serves as the project's single point-of-contact to outside entities and federal partners including EPA Region 6. Additional PM duties include preparation and/or reviewing permit applications, environmental assessments, and coordination/preparation of annotated comments to state and federal agencies. CPRA PMs are highly trained and experienced professionals; a minimum of seven years of project-related experience is required for the position. Personnel qualifications and training are discussed further in the QMP. Any project specific training or personnel requirements will be identified in the project specific QAPP.

A project specific CPRA Quality Assurance (QA) Officer is also assigned to each project. The QA officer is independent of the project's day-to-day design processes and his/her qualifications are described in Section 3.0 of the QMP.

The Design Unit Team Leaders within the Engineering Branch provide quality control of the design engineers. The unit leaders in the PM Section and Operations Field Office Engineering Section also provide quality control of their staff. An Engineering Manager of the Engineering Division as the QA Manager for CPRA and is ultimately responsible for the quality of all engineering related project tasks. The Engineering Manager is required to possess a minimum of ten years of engineering experience and must also be a licensed Professional Engineer within the State of Louisiana.

Project team members are selected on the basis of their workload and experience. All project team members consist of experienced professionals who possess the degree of specialization and technical competence to perform the required project tasks effectively and efficiently. For example, if an engineer has worked on past barrier island projects, he/she will typically be assigned to any new barrier island projects. CPRA staff members are sufficiently trained to safely, effectively, and efficiently perform their assigned tasks. Additional information regarding personnel qualifications and training is in the QMP, Chapter 3.

The PM uses Oracle Primavera P6 software to assist in planning projects, identify critical paths, establish critical project milestones, and orchestrate overall project efforts.

New projects are assigned to CPRA PMs based upon the type of the project and current workload. Presently, CPRA has a PM (see CPRA organizational chart in Appendix A) that is primarily assigned to EPA sponsored CWPPRA projects and works in conjunction with the Engineering Division in the design phase and works in conjunction with the Operations Division during construction and operations and maintenance phases. CPRA accomplishes project tasks using in-house CPRA staff sometimes supplemented with outside consultants and academia. Once the project reaches the operations and maintenance phase the project is assigned to staff in the field offices. The Section Supervisor determines the project technical needs, tasks, and requirements; assesses the degree of technical difficulty; matches specific project needs with in-house capabilities; and ascertains available contracting resources. The Engineer Manager reviews the CPRA in-house workload and makes a recommendation to the Engineer Division Chief to perform the task in-house or through the use of contracts. The Engineering Division Chief, determines how the task will be accomplished. Portions of the project may be accomplished by contract, or the work may all be accomplished with CPRA in-house resources. Selection of contractors will be in accordance with the requirements discussed in the QMP and the contractor's ability to successfully accomplish the project tasks. For project tasks accomplished in-house, the Engineering Division Engineering Manager, in conjunction with the Design Unit Leaders, assigns an Engineering Division staff engineer to each project. The Engineering Division staff engineer designs the project and serves as the technical liaison within CPRA for the project.

The official project files are housed in either the CPRA file room or electronically on internal network servers and maintained by the PM. Project team members provide project information and official correspondence to the PM in both hardcopy and electronic formats. The PM will ensure project data is archived in an appropriate format in accordance with CPRA standard operating procedures and as discussed in the QMP.

CPRA staff may also retain limited amounts of project specific information not considered to be part of the official project file information and commonly referred to as "desk notes." When outside consultants are part of the project team, the ownership and management of project data is mandated in the scope of work. The PM is responsible for ensuring project information generated by the consultant is provided to CPRA and appropriately archived.

2. Data Generation and Acquisition

CWPPRA Projects have various data needs and project specific Data Quality Objectives (DQOs) are developed by the project team. The project DQOs are qualitative and quantitative statements that describe which data are needed, why the data are needed, and how the data are to be used to support specific decisions and/or meet the project needs. DQOs may also establish numeric limits for the data to allow the data user (or reviewers) to determine whether the data collected are of sufficient quality for their intended use. The project team will determine the specific data requirements for individual projects and sources of data. Project data may be pre-existing; developed by consultants and/or academia; developed in-house by CPRA; or a combination of sources. Typical project data generation involves site-specific field investigations such as geophysical, vegetation, water, and sediment sampling and analyses; surveying; modeling; and monitoring. The Oracle Primavera file developed by the PM and/or consultant will contain information regarding the scheduling of field activities and data collection. All equipment and field measurements are used in accordance with professional standards, manufacturer's instructions, and as discussed in the CPRA QMP.

The PM and project team coordinate with other entities as required to obtain necessary site-specific data for the project. Specific responsibilities and organization charts of other CPRA sections providing support to the project team are discussed in the CPRA QMP. Pre-existing site-specific, project information includes but is not limited to geotechnical, climate, hydrologic, topographic, and bathymetric data; modeling; and monitoring data of existing restoration projects. The CPRA project engineer in conjunction with the project team ensures all in-house generated data, pre-existing data or data collected or developed by others is acceptable for project use; sufficient for environmental, engineering, and design purposes; and supports the project's DQOs. In addition, CPRA has established supplemental procedures for data gathering and design. These guidance documents should be considered part of CPRA's Standard Operating Procedures (SOPs) some of which are attached to this QAPP including Geotechnical Engineering Design Standards (Appendix C), AutoCad Standards (Appendix D) https://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=21477, Geotechnical Scope of Services (Appendix E) and General Guidelines – Exploration for Offshore Sand Searches https://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=1034.

3. Assessment and Oversight

The quality control and assurance processes for the project depend upon whether the data is generated by CPRA specifically for the project; pre-existing information, or developed on behalf of CPRA by others. As Quality Assurance Manager, the CPRA Engineering Division Manager is ultimately responsible for quality and certifies that data collection and/or project design meets the project specific DQOs. The Quality Assurance Officer assigned to each project provides quality assurance for that project. Quality control activities are provided by the Section Leaders. For example, the Design Unit Leaders review all of the design engineer's work and/or data collection activities for conformance with technical standards, and project specific DQOs.

All project data collection is in accordance with established industry standards and protocols, CPRA SOPs, and other relevant guidance documents. These standards and procedures as well as the measurement quality objectives and quality assurance goals are discussed in the QMP. Expected ranges for measurements are listed in the Section 4 of the QMP and the CPRA SOPs. Special quality assurance goals and different ranges, if necessary, will be identified in the project specific QAPP. Data previously collected by CPRA and/or consultants and academia and used in previous projects is considered to have already received sufficient quality control and quality assurance in accordance with CPRA SOPs and QMP requirements and can be used without further consideration or review.

For information generated by consultants, the CPRA PM and project engineer review the contractor's product to ensure conformance with established technical standards, CPRA SOPs, and project specific data quality objectives providing an additional level of quality assurance. As part of the selection criteria, the consultant must have a quality system in-place that at a minimum meets or exceeds the standards of CPRA and industry standards including sufficient quality control and quality assurance.

During the engineering and design phase of CWPPRA projects, an additional level of quality assurance is incorporated into the process from Design Reviews conducted at 30% and 95% levels of design completion. Additional information regarding quality assessment and response is provided in Chapter 9 of the QMP.

4. Data Validation and Usability

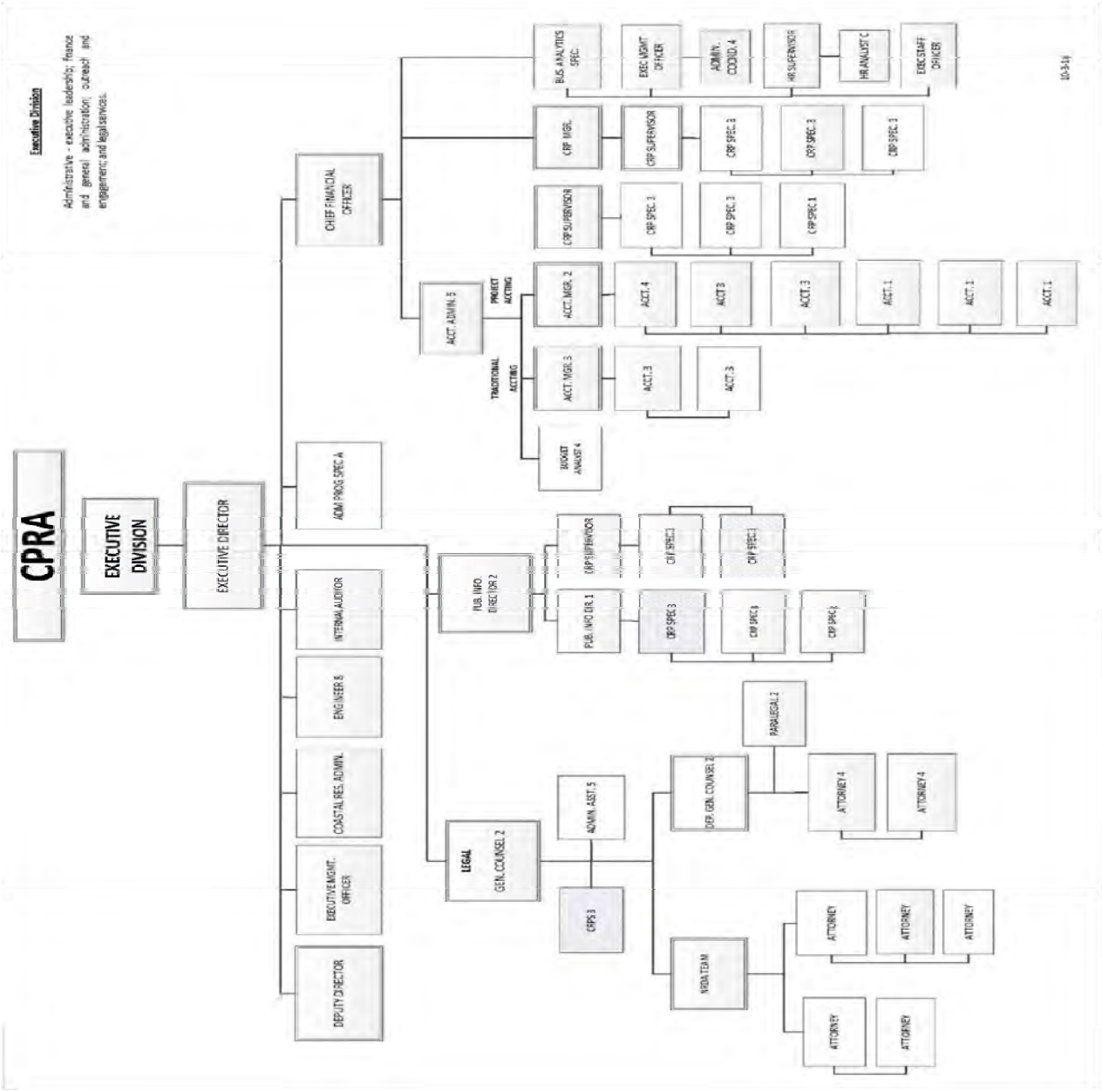
CPRA has established standard operating procedures as discussed in the QMP and attached as appendices regarding data collection and acceptance of data collected by outside sources such as consultants, academia or other federal agencies. Types of data and data sources will be identified in the project specific QAPP. The PM and project team will determine whether existing data or products conform to CPRA SOPs and acceptance criteria as discussed in the QMP.

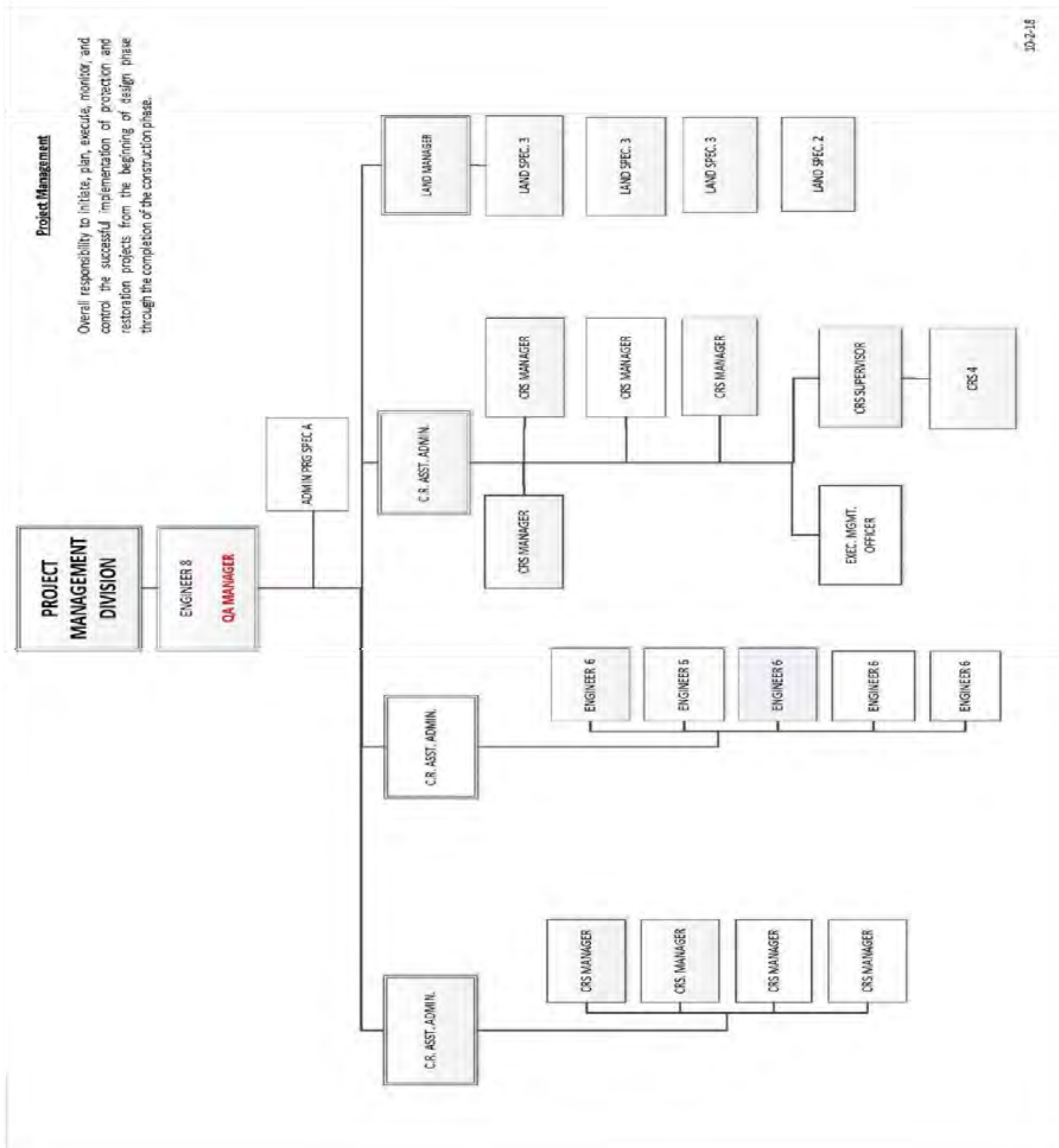
The project team will also determine if data or and/or products support project objectives, and are acceptable for project use and decision-making.

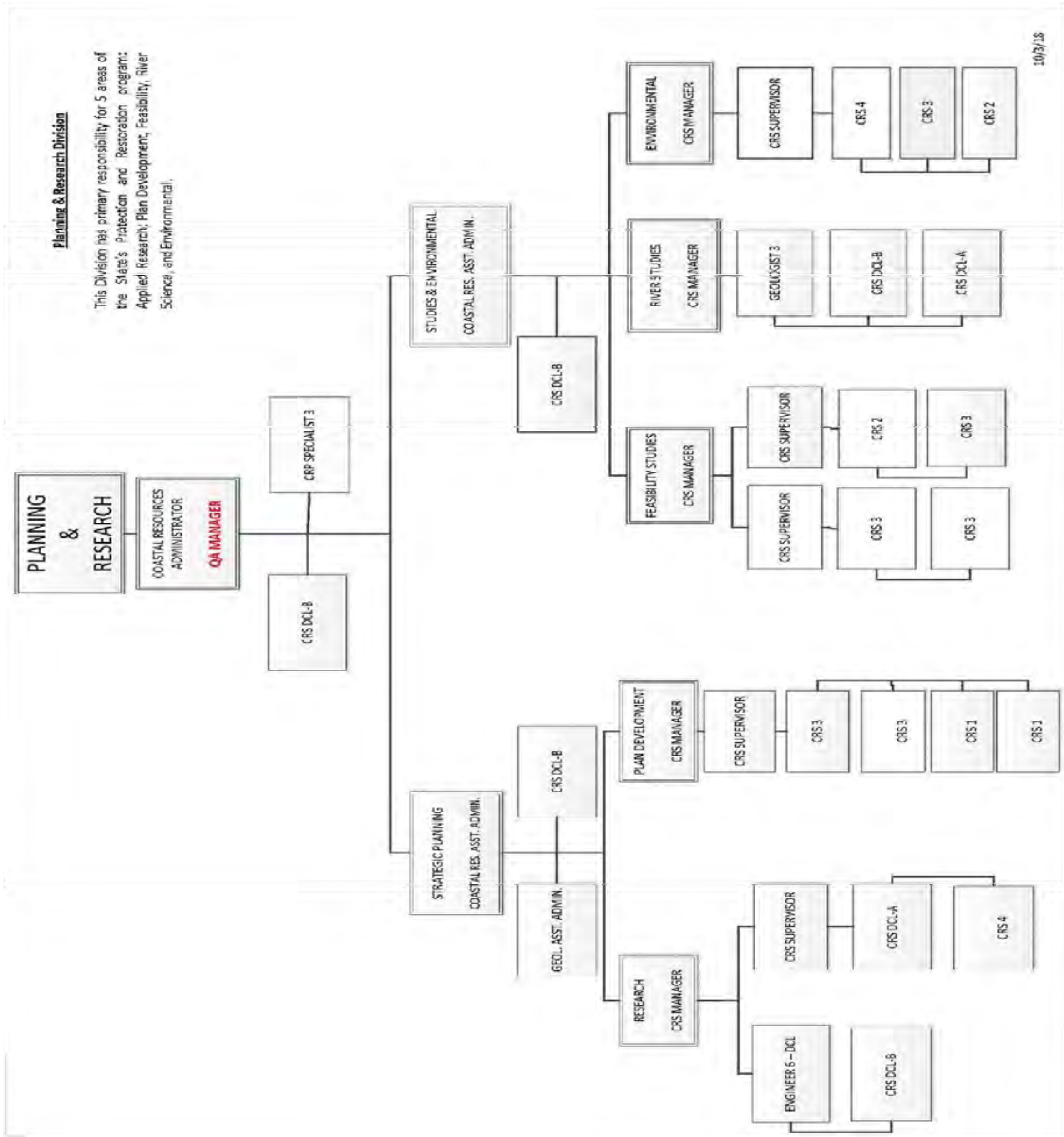
The PM will work with the project team to resolve acceptance issues in consultation with the Section Managers and CPRA Engineering and Operations Chief. If data does not appear to meet performance criteria or project goals, the PM and project team will consult the CPRA Quality Assurance Manager, CPRA Section Managers, and Division Chief for advice and resolution.

Appendix A

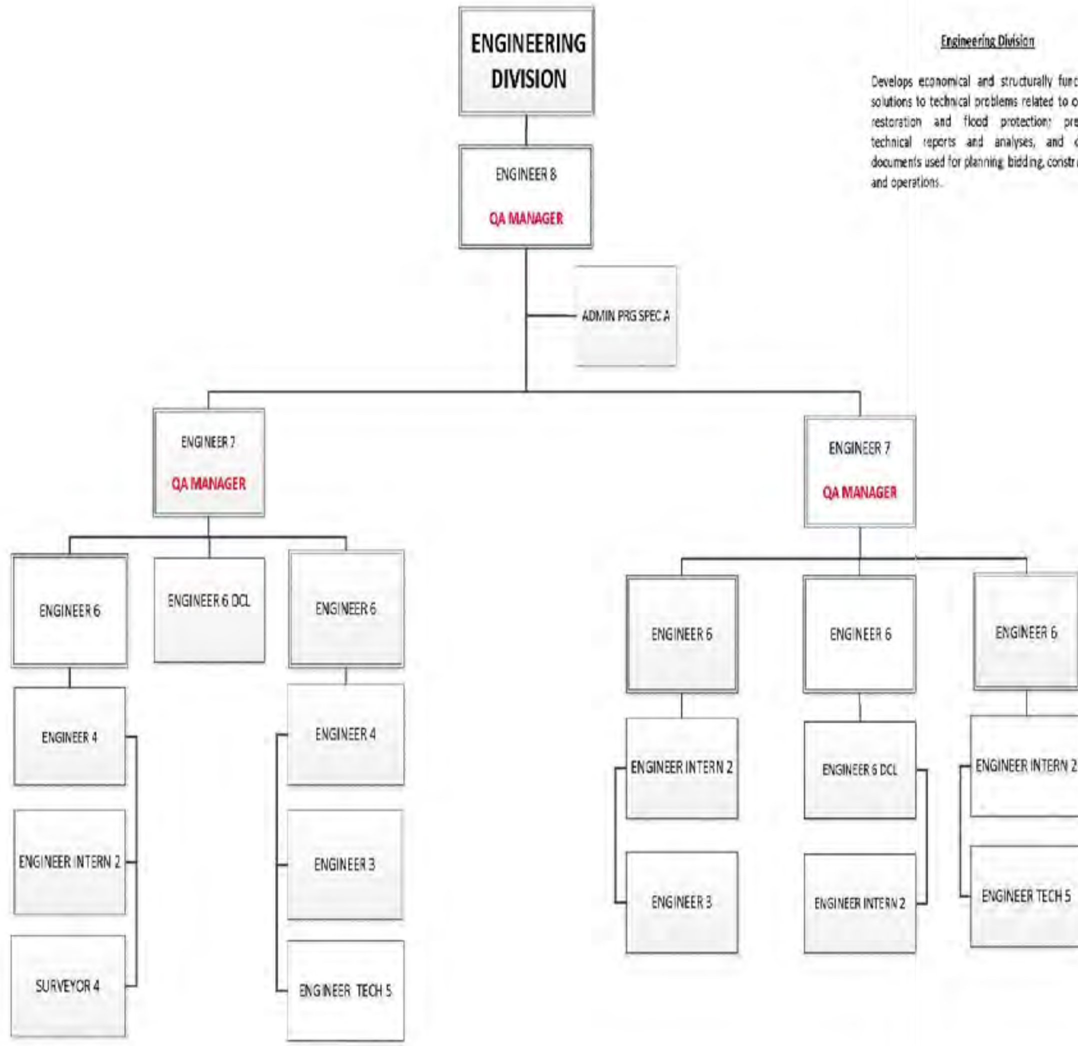
CPRA Organizational Chart


CPRA
EXECUTIVE DIVISION
Executive Division
Administrative - executive leadership, finance and general administration, outreach and entitlements and legal services.
EXECUTIVE DIRECTOR
DEPUTY DIRECTOR
EXECUTIVE MGMT. OFFICER
COASTAL RES. ADMIN.
ENGINEER 5
INTERNAL AUDITOR
ADMI PROG SPEC 4
CHIEF FINANCIAL OFFICER
ACCT. ADMIN. 5
PROJECT ACCTING
TRADITIONAL ACCTING
ACCT. MGR. 2
ACCT. MGR. 3
BUDGET ANALYST 4
ACCT. 4
ACCT. 3
ACCT. 1
CRP MGR.
CRP SUPERVISOR
CRP SPEC. 3
CRP SPEC. 2
CRP SPEC. 1
BUS. ANALYTICS SPEC.
EXEC. MGMT OFFICER
ADMIN. COORD. 4
HR SUPERVISOR
HR ANALYST C
EXEC STAFF OFFICER
PUB. INFO. DIRECTOR 2
PUB. INFO DIR. 1
LEGAL
GEN. COUNSEL 2
ADMIN. ASST. 5
CRP 3
DEP. GEN. COUNSEL 2
PARALEGAL 2
ATTORNEY 4
NRDA TEAM
ATTORNEY


PROJECT MANAGEMENT DIVISION
ENGINEER 8
QA MANAGER
ADMIN PRG SPEC A
Project Management
Overall responsibility to initiate, plan, execute, monitor, and control the successful implementation of protection and restoration projects from the beginning of design phase through the completion of the construction phase.
C.R. ASST. ADMIN.
CRS MANAGER
CRS MANAGER
CRS MANAGER
CRS MANAGER
C.R. ASST. ADMIN.
ENGINEER 6
ENGINEER 5
ENGINEER 6
ENGINEER 6
ENGINEER 6
C.R. ASST. ADMIN.
CRS MANAGER
CRS MANAGER
CRS MANAGER
CRS MANAGER
CRS SUPERVISOR
CRS 4
EXEC. MGMT. OFFICER
LAND MANAGER
LAND SPEC. 3
LAND SPEC. 3
LAND SPEC. 3
LAND SPEC. 2
10-2-18



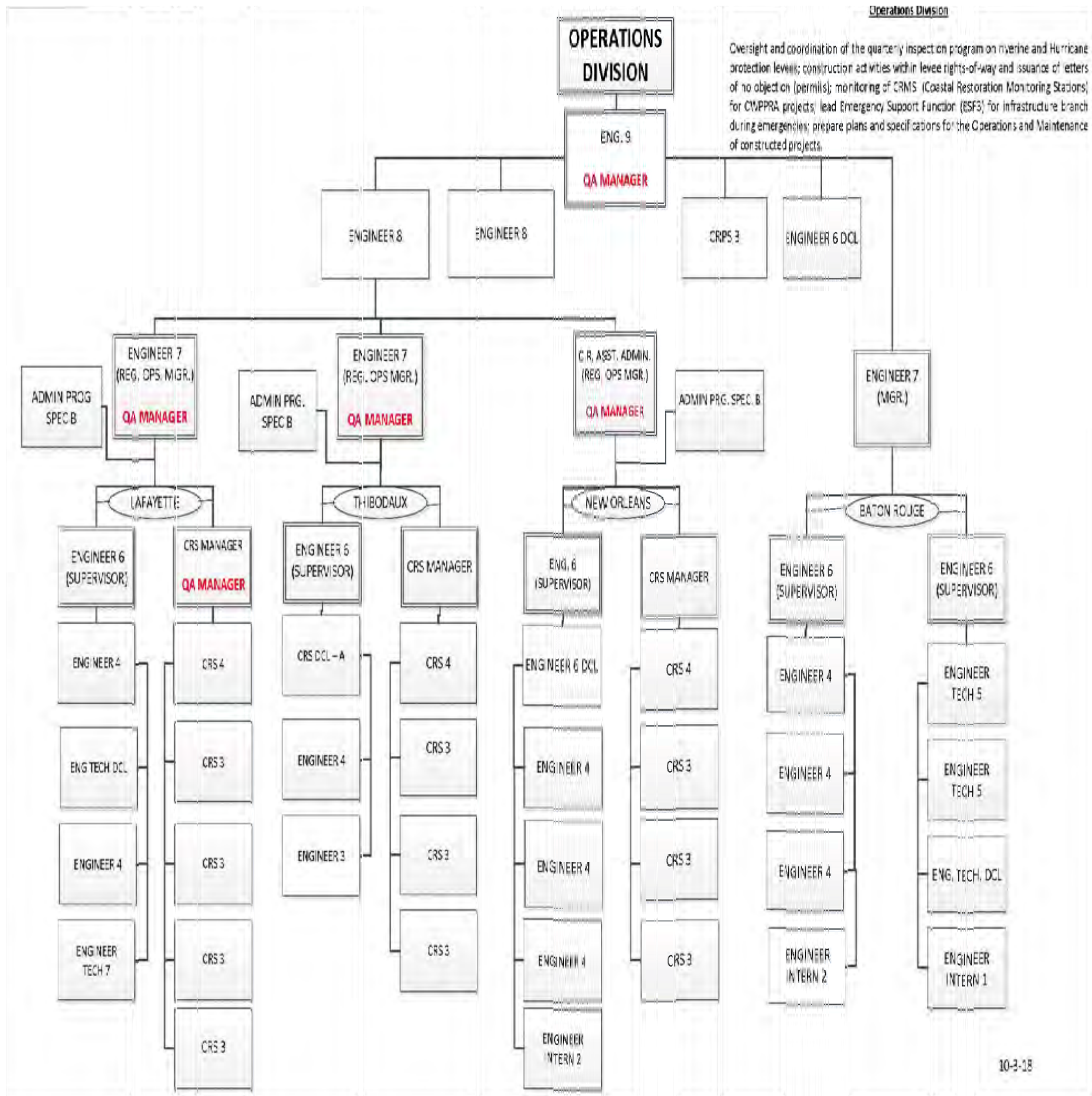
PLANNING & RESEARCH
COASTAL RESOURCES ADMINISTRATOR
QA MANAGER
Planning & Research Division
This Division has primary responsibility for 5 areas of the State's Protection and Restoration program: Applied Research, Plan Development, Feasibility, River Science, and Environmental.
CRS DCL-B
CRP SPECIALIST 3
STRATEGIC PLANNING
COASTAL RES. ASST. ADMIN.
STUDIES & ENVIRONMENTAL
COASTAL RES. ASST. ADMIN.
GEOL. ASST. ADMIN.
CRS DCL-B
CRS DCL-B
RESEARCH
CRS MANAGER
PLAN DEVELOPMENT
CRS MANAGER
FEASIBILITY STUDIES
CRS MANAGER
RIVER STUDIES
CRS MANAGER
ENVIRONMENTAL
CRS MANAGER
ENGINEER 6 – DCL
CRS DCL-B
CRS SUPERVISOR
CRS DCL-A
CRS 4
CRS SUPERVISOR
CRS 3
CRS 3
CRS 1
CRS 1
CRS SUPERVISOR
CRS 3
CRS 3
CRS SUPERVISOR
CRS 2
CRS 3
GEOLOGIST 3
CRS DCL-B
CRS DCL-A
CRS SUPERVISOR
CRS 4
CRS 3
CRS 2
10/3/18



<u>Engineering Division</u>

Develops economical and structurally functional solutions to technical problems related to coastal restoration and flood protection; prepares technical reports and analyses, and design documents used for planning, bidding, construction and operations.

10-3-18


Operations Division
Oversight and coordination of the quarterly inspection program on riverine and Hurricane protection levees; construction activities within levee rights-of-way and issuance of letters of no objection (permits); monitoring of CRMS (Coastal Restoration Monitoring Stations) for CWPPRA projects; lead Emergency Support Function (ESF3) for infrastructure branch during emergencies; prepare plans and specifications for the Operations and Maintenance of constructed projects.
OPERATIONS DIVISION
ENG. 9
QA MANAGER
ENGINEER 8
ENGINEER 8
CRPS 3
ENGINEER 6 DCL
ENGINEER 7 (REG. OPS MGR.)
QA MANAGER
ADMIN PROG SPEC B
ENGINEER 7 (REG. OPS MGR.)
QA MANAGER
ADMIN PRG. SPEC B
C.R. ASST. ADMIN. (REG. OPS MGR.)
QA MANAGER
ADMIN PRG. SPEC. B
ENGINEER 7 (MGR.)
LAFAYETTE
THIBODAUX
NEW ORLEANS
BATON ROUGE
ENGINEER 6 (SUPERVISOR)
ENGINEER 4
ENG TECH DCL
ENGINEER 4
ENGINEER TECH 7
CRS MANAGER
QA MANAGER
CRS 4
CRS 3
CRS 3
CRS 3
CRS 3
ENGINEER 6 (SUPERVISOR)
CRS DCL – A
ENGINEER 4
ENGINEER 3
CRS MANAGER
CRS 4
CRS 3
CRS 3
CRS 3
ENG. 6 (SUPERVISOR)
ENGINEER 6 DCL
ENGINEER 4
ENGINEER 4
ENGINEER 4
ENGINEER INTERN 2
CRS MANAGER
CRS 4
CRS 3
CRS 3
CRS 3
ENGINEER 6 (SUPERVISOR)
ENGINEER 4
ENGINEER 4
ENGINEER 4
ENGINEER INTERN 2
ENGINEER 6 (SUPERVISOR)
ENGINEER TECH 5
ENGINEER TECH 5
ENG. TECH. DCL
ENGINEER INTERN 1
10-3-18

Appendix B
Project Specific QAPP template

Project Name

Brief Project Description *(mandatory - very brief 2-3 sentences)*

Project Team *(mandatory - simple project organization chart or list by name all project team members in particular identify the following)*

Name:	Responsibility	Contact Information:
	Project Manager	
	Project Engineer	
	Project Quality Assurance Officer -	
	Consultant PM and staff (if applicable)	
	Academia (if applicable)	

(also identify any special training, expertise, and/or requirements for project – i.e. hydrodynamic modeling expertise)

Data Collection *(mandatory - brief description of any data collection or use of existing data associated with project such as surveying, soil sampling, water measurements, etc., map may be used to show locations, sources of existing data should be identified)*

Data Quality Objectives *(mandatory - clearly state the reasons for collecting the data such as field surveys to verify and/or ground truth existing data, soil sampling and analysis to confirm the geotechnical properties of soils for proper foundation design.)*

Special Quality Assurance Goals and/or Different Ranges *(optional - identify if different than industry standards, Standard Operating Procedures, or as defined in CPRA's QMP Section 4.1.3 i.e. acceptable ranges for results from modeling – water elevations within 0.5 foot or 0.5 inch?)*

Any additional methods to ensure quality data specific to project or special needs *(optional catch all for any project specific special and/or unique requirements/considerations)*
(this plan should be signed and dated by key project personnel in order to acknowledge understanding project goals, data needs/requirements, and any unusual project conditions - as a minimum the following signatures)

_____
Project Manager Date

_____
Project Engineer Date

_____
Project Quality Assurance Officer Date

Concurrence:

_____
CPRA Quality Assurance Manager

Appendix C
Geotechnical Engineering Design Standards

Existing geological and geomorhological literature and reports should be reviewed and analyzed prior to developing the subsurface investigation plan for the proposed project. The coastal geological processes are discussed in detail in the Corps of Engineers Coastal Engineering Manual (CEM), Part IV, Coastal Geology. The CEM is available on the USACE website: https://www.publications.usace.army.mil/USACE-Publications/Engineer-Manuals/u43544q/636F617374616C20656E67696E656572696E67206D616E75616C20/

Existing geotechnical data is available on the CPRA website: https://cims.coastal.louisiana.gov/default.aspx Refer to Exploration for Offshore Sand Searches (EOSS) https://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=1034 for further details pertaining to barrier island restoration projects.

Subsurface Investigation (Deep Soil Borings)

The subsurface investigation data for the area of consideration should be used to determine geotechnical engineering design soil parameters required for the geotechnical analyses. These soil parameters generally consist of soil classification, cohesion, phi angle (internal friction angle, ø), consolidation coefficients, moisture content, atterburg limits, and unit weight. The shear strength of clay soil is determined from the compressive strength test, (unconfined or triaxial) and usually presented in psf as the cohesion. The phi angle, ø, is used for sandy or granular material and may be obtained from either the direct shear test, or from the adjusted field blow counts determined by the Standard Penetration Test (SPT).

General requirements for soil boring layouts are shown in Figure A.

Type of System	Boring Location	*Boring Depth	Boring Spacing
Steel Sheeting Wall	@ C.L.	30’ – 50’	As Required
Rock Shoreline Protection	@ C.L.	20’ – 40’	1000’ – 2000’
Earthen Terraces	@ C.L.	20’ – 30’	As Required
Marsh Creation & Containment Dike	@ C.L.	20’ – 40’	As Required
Gulf Rock Breakwaters	@ C.L.	25’ – 50’	500’ – 1000’
☼*Barrier Island Restoration*	1000’ Grid	Based on geophysical data evaluation	1000’ Grid

Figure A: *The boring depths and layout distances may vary due to topography, cultural constraints, and confidence level of the geotechnical engineer. ☼ See (EOSS) for further details.

Completed soil borings will be entered into the CPRA database which may be used for future projects and accessible through the CPRA website, https://cims.coastal.louisiana.gov/default.aspx.

Soil Testing
Samples representative of the various strata shall be classified using the unified classification system and shall be subjected to the following soil strength tests. The strength tests shall include the miniature vane (ASTM D-4648), unconfined compression (ASTM D-2166), and triaxial compression (ASTM D-2850). The classification tests shall include Atterberg Limits (ASTM D-4318) and grain size distribution (LA DOTD TR-407). Consolidation (ASTM D-2435) tests shall also be conducted as required. Additional information required includes organic content, moisture content, and dry and wet unit weights. Alternative testing methods may be required which adequately apply to the project soil conditions and engineering requirements.

Samples from the cohesive soils will be taken with a three-inch diameter Shelby tube sampler (ASTM D-1587), while the cohesionless soils will be sampled with a split spoon sampler (ASTM D-1586). All samples should be taken at minimum intervals of five (5) feet and will be sealed in the tubes in the field and logged on a chain of custody form for transportation to the laboratory. At the laboratory, the samples will be extruded, classified, and logged before testing.

Offshore Geotechnical Investigation- Sand Searches
The laboratory testing requirements for barrier island restoration projects should follow the general guidelines specified in General Guidelines - Exploration for Offshore Sand Searches (EOSS)) https://cims.coastal.louisiana.gov/RecordDetail.aspx?Root=0&sid=1034.

Engineering Geotechnical Design Parameters
The soil parameters obtained from the field and laboratory testing results shall be used to calculate the structural integrity of the proposed coastal protection system throughout the design life chosen. This shall be accomplished by evaluating the bearing capacity, global slope stability, dewatering characteristics of fill material, consolidation settlement of underlying soil layers, regional subsidence rates, and borrow material characteristics for the given coastal protection system.

Bearing Capacity Analyses
The bearing capacity is the ability of the underlying soil to safely carry the load or pressure placed on the soil due to the structure. The ultimate bearing capacity of the foundation soil should be determined using conventional soil mechanics methodologies. A minimum bearing capacity safety factor of 1.5 is generally acceptable in soft soil conditions. Depending upon the accuracy of the soil data and geotechnical engineer's experience in this area, the engineer may choose to reduce this safety factor to 1.2. The bearing capacity calculations should be presented in a legible manner and shown in the geotechnical report.

Slope Stability Analyses
Slope stability analyses should be run using both the circular type analyses and the sliding block analyses for the cross sections shown in the plans. Global slope stability analyses should be performed to determine the adequate side slopes, and minimum berm offset distance between the borrow area and toe of the proposed structure. These results should be presented graphically and in a table depicting the results used for final design.

Dewatering of Fill Material

The dewatering time is dependant on the type of soil used for fill and the salinity levels in the water. For a more granular type material, settling velocities are commonly calculated using Stoke's Law (ASTM D422). For finer clayey materials, a column test is recommended.

Consolidation Settlement Analyses

Settlement analyses should be computed near the centerline of the rock structure, earthen terrace, or containment dike using the corresponding consolidation parameters. Settlement analyses should also be determined in marsh creation areas as deemed necessary by the engineer. Settlement analyses should be performed using the proposed typical section with several section heights for a 25 year consolidation period. The settlement results should be presented in a time versus total settlement curve extrapolated out from year 0 to year 25 for each section height analyzed.

Subsidence

Subsidence rates of .05 feet/year have been calculated using data from Grand Isle and used for the design of projects BA-35 and BA-38 and include the effects of sea level rise. These values should be used cautiously and primarily in Terrebonne, Barataria, Breton Sound, and Mississippi River basins.

Geosynthetics

A geosynthetic is a planer product manufactured from polymeric material used with soil, rock, or other geotechnical engineering related material as an integral part of a man-made structure or system. The materials used to manufacture geosynthetics are almost entirely from the plastics industry. Geosynthetic materials perform five main functions: separation, reinforcement, filtration, drainage, and a liquid barrier. Primarily, the reinforcement and separation parameters of the geosynthetics are used for coastal protection systems. The primary types of geosynthetics used in coastal applications are the woven, nonwoven, and geogrid. A woven geotextile fabric is primarily used when high tensile strengths are required as reinforcement under rock structures. Woven geotextiles also perform as a separator depending on the site materials. Non woven geotextiles are primarily used as a separator between two different types of materials or different stone sizes. Geogrids are used for reinforcement only.

Product specific information for several types of geosynthetic manufacturers may be located at the following web site.
http://www.mirafi.com

Geotechnical Investigation Scope of Services Development

The geotechnical investigation scope of services should be developed describing the specific services required for each specific project. Example Geotechnical Investigation Scopes are shown in Appendix E.

Geotechnical Investigation Report

The results of the field and laboratory work shall be presented in a written geotechnical investigation report containing a description of the laboratory methodology, laboratory test results, field vane shear test results, detailed boring logs, subsoil profiles, location map of borings, the basis for all calculations, time/settlement graphs for each proposed structure height

(extrapolated to 25 years), stability analyses safety factor table of results, and any other graphs, tables or figures to best represent the results of calculations and recommendations. All boring logs shall indicate the sample depth, elevation, soil strength parameters, moisture content, dry or wet unit weight, atterberg limits, soil classification, and other laboratory testing deemed necessary. The geotechnical investigation report must be stamped and signed by a registered professional engineer holding a current license from the Louisiana State Board of Registration for Professional Engineers and Land Surveyors. A geotechnical investigation report outline example is shown in Appendix E. Example geotechnical investigation reports may be obtained on a shared drive accessible by all CPRA personnel and on the CPRA database: https://cims.coastal.louisiana.gov/Default.aspx.

Appendix D
Coastal Protection and Restoration Authority
Engineering Division
AutoCAD Standards

COASTAL PROTECTION AND RESTORATION AUTHORITY

AutoCAD Standards

1. All construction plan drawings are to be half sized (11" x 17") and drawn to scale.
2. All permit drawings are to be on 8.5” x 11” paper and drawn to scale.
3. All aerials shall be referenced to NAD83, Louisiana State Coordinate System South Zone, and elevations referenced to NAVD 88.
4. Permit drawings and final stamped plans must be printed in monochrome with grey scaled aerial photography.
5. Show coordinate system on plan sheets with aerials.
6. Plot drawings from paper space.
7. Use text font Arial.

CPRA’s standard blocks, layers, text styles, dimension styles, and title blocks are located in the Consultant Source Template.dwg. The standard title sheet templates are located in Consultant Title Sheet.dwt. CPRA’s linetype code can be found in CPRA Linetypes.lin file. **Please see the following page.**

For assistance contact:
Kristi Cantu (225)342-4477
kristi.cantu@la.gov
Shane Faust (225) 342-4599
shane.faust@la.gov

COASTAL PROTECTION AND RESTORATION AUTHORITY
AutoCAD Standards
August 10, 2011

Blocks
(Blocks can be found in the Contractor Source Template.dwg)

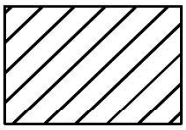
- Baseline
- Benchmark
- Boring
- Buoy
- Centerline
- Control Point
- Gage
- Earthen Plug
- Gate
- Pole
- Rock Dike
- Rock Plug
- Settlement Plate
- Sign
- Terrace
- Water Level
- Weir

Linetypes
(Linetype code is included in OCPR Linetypes.lin)

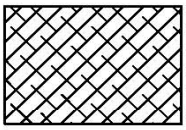
- Existing Bottom
- Match Line
- Overhead Utility (OHL)
- Oyster Lease (OYS)
- Pipeline (PL)
- Proposed Feature
- Rail Road (RR)
- Submerged Utility (SUB)

Hatches

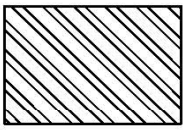
Fill/Marsh Creation (ANSI 31)



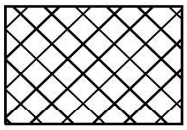
Marsh Nourishment (ANSI 38)



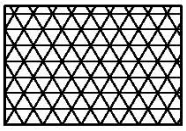
Alternate Fill (Steel)



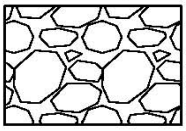
Borrow (ANSI 37)



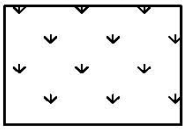
Alternate Borrow (Net3)



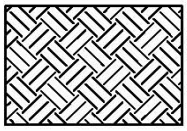
Rip-Rap (Gravel)



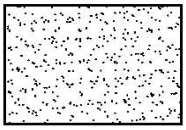
Existing Marsh (Grass)



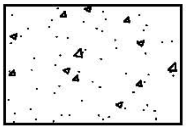
Earthen Containment (Earth)



Sand (AR-Sand)



Concrete (AR-Conc)



Appendix E
Geotechnical Scope of Services

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

SCOPE OF SERVICES FOR
GEOTECHNICAL INVESTIGTION AND ENGINEERING SERVICES

CAMINADA HEADLANDS BACK BARRIER MARSH CREATION PROJECT (BA-171)
LAFOURCHE, LA

April 2015

1.0 INTRODUCTION

The Caminada Headlands Back Barrier Marsh Creation Project (BA-171) is funded under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) in Priority Project List 23. The Coastal Protection and Restoration Authority (CPRA), in partnership with the Environmental Protection Agency (EPA), have been authorized to execute Phase I (Engineering and Design) of BA-171. The objective of this project is to create, maintain, and nourish existing deteriorating wetlands through hydraulic dredging.

2.0 LOCATION

The BA-171 Project is located in Lafourche Parish, Louisiana, east of the city of Port Fourchon, adjacent to the Caminada Headlands as shown in Appendix A. Approximate coordinates for the center of the project are 29°7’41.35” N and 90°9’19.66” W (NAD 83).

3.0 DESCRIPTION

Approximately 430 acres of marsh will be created and nourished within the Caminada Headlands Back Barrier March Creation Project area. This scope of services involves geotechnical investigation within the in-shore fill area of the project.

4.0 SCOPE OF WORK

This scope of services involves the geotechnical investigation, laboratory testing, and geotechnical engineering associated with the evaluation of the in-situ soils the fill area. In addition, the scope also involves the utilization of previously collected geotechnical information of the borrow area to provide the necessary geotechnical engineering recommendations for the design and construction of the entire project (fill area design). The geotechnical firm, hereinafter referred to as "Contracting Party", shall perform all subsurface investigations and geotechnical analyses necessary for the Caminada Headlands Back Barrier Marsh Creation Project as outlined in the following subsections:

4.1 Permission and Access

The Contracting Party shall be required to contact the landowners and pipeline companies and secure permission for access prior to performing any fieldwork in any part of the project area. Rights of entry to privately owned property must be adhered to by all CPRA contractors. Failure to follow this CPRA policy will be considered grounds for termination of the contract. Access to the Caminada Headlands Back Barrier Marsh Creation project area shall be obtained by the Contracting Party by contacting the following five (5) individuals:

Ms. Amanda Phillips
Edward Wisner Donation
P.O. Box 52204
New Orleans, LA 70152
(504) 210-1152

Mr. Jay Caillouet
Caillouet Land Corporation
P.O. Box 292
Thibodaux, LA 70302
(985) 665-2123

Ms. Cindy Gardner LeBlanc
LOOP, LLC
137 Northpark Blvd.
Covington, LA 70433
cgleblanc@loopllc.com

Mr. Neil (Adam) Higginbotham
Chevron Pipeline Company
Gulf Coast Crude and Products,
Fourchon Team
165 Chevron Road
Golden Meadow, LA 70357
NEHI@chevron.com
(985) 396-3508

Mr. Ryan E. Crider
Plains All-American
Belle Chasse District
recrider@paalp.com
(504) 393-6282

4.2 Coastal Use Permit

CPRA has secured a Coastal Use Permit necessary to complete this work. A copy of the Coastal Use Permit can be found in Appendix B.

4.3 Navigable Waterway Hazard Notification

The Contracting Party shall be responsible for notification and coordination with the USACE and any Levee Board agencies if the borings are within the jurisdictional foot print that requires any such coordination. Additionally, if the drilling activities are expected to interfere with navigation, the Contracting Party shall be responsible for notification, coordination and addressing with appropriate actions of all such potential navigational interferences with the U.S. Army Corps of Engineers (USACE) and the U.S. Coast Guard. CPRA shall be kept abreast of any relevant communications and courses of action, and shall be provided a copy of all official written documentation.

4.4 Migratory Bird Abatement Plan

The Caminada Headland is habitat to various migratory and threatened and endangered bird species including the Piping Plover and Red Knot. Certain bird species are protected by the U.S. Fish and Wildlife Service (USFWS). The Migratory Bird Treaty Act prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the U.S. Department of the Interior. While the Act has no provision for allowing unauthorized take, the Service realizes that some birds may be harassed, harmed, or killed due to Projects even if all reasonable measures to protect birds are implemented. The USFWS's Office of Law Enforcement (LE) carries out its mission to protect migratory birds through investigations and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to minimize their impacts on migratory birds, and by encouraging others to enact such programs. As such, USFWS's LE focuses their resources on investigating and prosecuting individuals and companies that take migratory birds without regard for their actions or without consideration of Service conservation and/or impact minimization measures to avoid take. The nesting period for various bird species is noted on the table below.

To minimize impacts to migratory birds, the Contracting Party shall employ personnel familiar with protected birds to allow for easy identification of birds encountered during the execution of work under this Contract.

If any evidence of nests or eggs of any protected bird species listed below are found within the Work Area, the Contracting Party shall immediately cease work in the vicinity of the nest and notify the CPRA Project Manager.

Breeding Periods for Louisiana Coastal Birds

Species	Breeding Period
Tri-colored Heron	February 15 to August 1
Reddish Egret	March 1 to September 1
Great Egret	February 15 to August 1
Snowy Egret	March 15 to August 1
Black-crowned Night-Heron	March 1 to September 1
White and Glossy Ibis	April 1 to September 1
Roseate Spoonbill	April 1 to August 15
Brown Pelican	November 1 to September 1
Black Skimmer	May 1 to September 15
American Oystercatcher	April 1 to September 15
Wilson's Plover	April 1 to August 1
Snowy Plover	April 1 to August 1
Killdeer	March 15 to September 1
Willet	April 15 to August 1
Black-necked Stilt	April 15 to August 15

Species	Breeding Period
Laughing Gull	April 1 to August 1
Gull-billed Tern	May 1to August 1
Caspian Tern	May 1 to September 15
Royal Tern	April 1 to September 1
Sandwich Tern	April 1 to September 15
Forster's Tern	March 15 to August 1
Least Tern	April 15 to September 15
Clapper Rail	April 15 to September 1
Seaside Sparrow	March 15 to July 31

In the event that shorebird nesting (I.E., courtship and/ or mating) is observed or discovered in the project area, the Contractor shall notify USFWS and the CPRA Project Manager and employ the following abatement measures.

4.4.1 Passive measures such as the placement of filter cloth or orange fencing material on the beach may deter birds from nesting. If unsuccessful, other measures such as dogs or continual human presence may be used. More aggressive methods of hazing (I.E., cannons, flares) could also be used if necessary.

4.4.2 Timing, persistence, organization, and diversity of abatement measures are crucial in deterring shorebirds from establishing nesting colonies. All abatement measures shall be conducted by wildlife biologists who are familiar with shorebird ecology and are familiar with the proposed abatement methods. All abatement techniques/methods shall be coordinated with USFWS and CPRA prior to use.

4.4.3 To increase the effectiveness of the nesting prevention program, a combination of abatement measures shall be employed. Additionally, the types of abatement measures, as well as their spatial and temporal deployment, shall be changed frequently to reduce the chances that shorebirds become habituated to the abatement methods.

Results of all monitoring and minimization measures shall be recorded and summarized in the Final Geotechnical Data Report.

4.5 Soil Borings

1. A total of nine (9) 3 inch rotary wash borings shall be performed in the marsh creation project area. All borings shall be taken to a depth of approximately thirty (30) feet. The approximate coordinates (LA State Plane NAD 83 South Zone) of the rotary wash boring locations are shown in Appendix A, Sheet 1, "Marsh Creation Area Boring Layout". These boring locations and depths have been chosen to collect the most appropriate information required to meet the project objectives. These locations should be reviewed by the Contracting Party. The Contracting Party shall put forth its greatest effort not to destroy or damage any marsh vegetation when accessing these areas.

2. A magnetometer survey of all soil boring locations will be provided by CPRA to the Contracting Party prior to their mobilization. The boring locations have been staked out by CPRA. Prior to performing any changes to the locations or depths of the boring locations, CPRA should be notified.

3. Global Positioning System (GPS) data shall be collected at all sample locations using a hand-held GPS or similar device. The locations shall be identified by geodetic coordinates (Latitude and Longitude) using the North American Horizontal Datum of 1983. Elevations (NAVD88) of the mudline and water level shall also be collected. The Contracting Party shall put forth its best effort to obtain water level elevation for each day of work. This information shall be shown in table form on the boring plan map and each individual boring log in the final report.

4.6 Drilling and Sampling Requirements for Rotary Wash Borings

Samples from the cohesive soils shall be taken with a three-inch diameter Shelby tube sampler (ASTM D-1587), while the non-cohesive soils shall be sampled with a split spoon sampler (ASTM D-1586). All samples will be taken continuously to the depths noted in the Section 4.3, and shall be sealed in the tubes in the field, unless otherwise authorized by CPRA. Field boring logs shall be generated during the drilling activities and a chain of custody form shall be prepared for transportation of the samples to the laboratory.

The Contracting Party shall perform rotary wash drilling and piston or Shelby tube and split spoon sampling to collect geotechnical samples as shown in Appendix A, Sheet 1. The Contracting Party shall provide and use bentonite slurry for rotary drilling with side or upward discharging bits for advancing the borehole. The Shelby tube head shall have o-ring and ball-valve features to enhance sample recovery and minimize disturbance. Piston sampling shall be performed if recovery is less than 80% and for 5-inch sampling (if requested). The Contracting Party shall grout the casing according to Louisiana Administrative Code, (Title 70, Part XIII), LDEQ, and LADOTD procedures with cement-bentonite (bentonite mixed first).

The Contracting Party shall use 3 inch diameter, 30 inch long, clean, undamaged, **seamless, thin-walled Shelby tubes or approved equivalent (i.e. round, smooth seamed).** Split-spoon sampling shall be performed in sands. The Contracting Party shall alternate between split-spoon sampling and Shelby tube sampling in silts. If requested, CPRA may decide to allow sample extrusion in the field provided the contracting party's procedures are adequately described and approved by CPRA. If allowed, sample extrusion in the field or lab shall be performed by pushing the sample out the top of the tube with a hydraulic piston and collecting the sample with a clean, dry split PVC sleeve or equivalent. Cleaning equipment and brushes shall be available to clean the tubes between uses, if extrusion is allowed in the field.

Track or buggy-mounted or barge-mounted equipment (water) access shall be required for drilling and support equipment. A marsh buggy rig or approved alternate rotary wash drilling methods shall be required for marsh areas. All equipment to be used shall be approved by the landowner prior to mobilization.

The Contracting Party shall have available a contingency plan for any accidental oil spills from equipment, such as a plastic sheet, absorbent materials, floating containment, or other methods to collect the spill. Hydraulic lines of all equipment shall not have nicks. Assume that all natural drill cuttings can be "spread" across the site.

The Contracting Party's health and safety plan under which its personnel will be working during the field activities shall be provided to CPRA prior to mobilization for their files. However, CPRA will not be responsible for the Contracting Party's health and safety program. The project site is expected to be uncontaminated (clean). If the contractor's personnel suspect unusual subsurface conditions, CPRA shall be contacted immediately and drilling operations should cease.

The Contracting Party shall provide solid-stem auger stock and multiple (in case of breakage) 4-inch casings or other appropriate diameter(s) of various lengths (3, 5, 10 feet, etc.) when the investigations involve terrestrial borings. The Contracting Party shall proceed with continuous 3-inch diameter **seamless, thin-walled Shelby tube** (30 inches long) sampling in 2-foot pushes and solid-stem auger hole advancement until the apparent water table is reached, then advance with rotary wash. Begin with sampling, and then use a casing and rotary wash drilling immediately if the water table is expected to be encountered upon initiating the drilling activities. If the water table is obviously below the existing ground surface, allow for 15 minutes observation and recording the water level once the apparent water table is reached before proceeding to the next sample.

The Contracting Party shall provide clean, undamaged, round, 3-inch thin-walled Shelby tubes with crimped ends. Crimped, seamless (or smoothed seamed), 3-inch, thin-walled Shelby tubes shall have an inside clearance ratio of no less than 1%. If the Contracting Party plans on using inside clearance ratios greater than 1.5% the Contracting Party shall notify CPRA prior to mobilization for approval. The area ratio of the thin-walled Shelby tubes shall be approximately 10% (+/- 1%). For instance, a Shelby tube with outside, inside, and crimped diameters equal to 3 inches, 2.87 inches, and 2.84 inches will satisfy both the inside clearance and area ratio criteria. Other combinations can also meet the criteria. Submit tube specifications for review. See relevant references below.

The Contracting Party shall be responsible for obtaining all utility clearances. If appropriate, the Contracting Party shall provide a probe rod to perform probings in a circumferential pattern (far enough from the sampling area to minimize disturbance) around the boring locations to clear the boring locations.

The Contracting Party shall provide costs for a minimum 3-person crew. At least one person in the crew shall be qualified (minimum of 2 years experience) to log the borehole according to ASTM/Unified Classification methods.

The drill stem shall be clearly marked every foot, or otherwise allow for provisions to determine the depth, so that the depth and pushed distance can be tracked. The Contracting Party shall wash the drill-hole clean with adequate drilling mud prior to sampling to minimize "fall-in". After pushing the Shelby tube, the contractor shall wait an adequate period of time for the soil to swell within the tube, and then shall twist the drill stem to separate the end of the tube from the in-situ soil prior to retrieval of the Shelby tube.

The sampling schedule for the rotary wash sampling shall be followed. This guidance will be primarily based on field conditions (i.e. migratory and nesting birds). Additionally, the proposal should contain provisions for additions-deductions for borings and boring depths.

The sampling mechanisms (ball-valves, o-rings, connections, etc.) shall be checked and cleaned between sample collection intervals to ensure they are in good working order to promote quality sampling and sampling recovery. Sample recovery lengths shall be recorded on the field logs, ignoring any obvious fall-in. Fall-in shall be removed from the top of the tubes and the inside of the tube shall be cleaned and dried prior to sealing the tubes with soil seals (Acker 120872 or approved equivalent), and plastic caps. At the laboratory, the samples shall be extruded, the recovery length recorded, classified, and logged before testing.

Unless field extrusion is allowed by CPRA, once samples have been removed from the boreholes, they must be sealed within the sampling tube prior to shipment to the laboratory for extrusion, classification, and testing. Hydraulically activated sample jacks shall be used to extrude the samples from the tubes. Mechanical and pneumatically activated sample jacks shall not be used to extrude the samples. All tubes shall be identified and labeled immediately to ensure correct orientation and to accurately identify the samples. Transmittal forms shall be completed and securely fastened to each tube. Sample tubes shall be shipped to the testing laboratory such that they are not allowed to roll around in the shipping vehicle, nor should they be dropped or otherwise roughly handled. Samples shall be protected from extreme temperatures and exposure to moisture. Samples should be extruded as soon as possible (no later than 3 days) once received at the laboratory testing facility. After wrapping the samples in thin aluminum foil, placing them in a plastic bag, and isolating the samples so "denting" or "bending" does not occur, the samples shall be kept in an air-tight container. The Contracting Party shall inform the testing laboratory that all samples remaining after testing, including tested samples, shall remain at the testing laboratory until CPRA requests their disposal or they are collected by the CPRA. If the testing laboratory must dispose of the

samples, the laboratory must obtain CPRA consent at least two weeks prior to disposal.

4.7 Soil Testing and Classification

Samples representative of the various strata shall be classified using the Unified Classification System and shall be subjected to the following soil tests:

Marsh Creation Project Area:

1. Field vane (ASTM D-2573) and/or miniature vane (ASTM D-4648) strength tests.
2. Unconfined compression (ASTM D-2166) and unconsolidated undrained (UU) triaxial compression (ASTM D-2850) tests.
3. Consolidation tests (ASTM D-2435)
4. Atterberg limits (ASTM D-4318)
5. Grain size distribution (LA DOTD TR-407)

Additional information required includes organic content, moisture content, and dry and wet unit weights. CPRA will entertain any alternate testing methods that the Contracting Party may suggest which adequately apply to the project soil conditions and engineering requirements. Approval from CPRA on any alternate testing methods must be obtained from CPRA prior to the submission of the proposal of work.

4.8 Engineering Services

The soil parameters obtained from the field and laboratory testing results shall be used to plan and design the project and to determine the structural integrity of 430 acres of newly created and nourished marsh, the earthen levees that will be constructed for containment, and the water bottom of the Gulf of Mexico. The Contracting Party shall provide the information listed in the following subsections for each specific project feature:

1. Earthen Containment Levees Design (see Figure 1)

    - Maximum construction elevation (NAVD 88) considering desired marsh elevation and expected fill properties.
    - Acceptable side slopes.
    - Acceptable crown width.
    - Consolidation during construction (about 1 year).
    - Time to settle to average marsh elevation (marsh elevation will provided by CPRA upon completion of bathymetric and topographic investigation).
    - Five (5) settlement curves, including immediate and consolidation settlement due to self-weight compaction, subsurface soils, and

subsidence/sea level rise. Elevations shall be analyzed to correlate with differing marsh fill heights (elevations will be provided by CPRA).

- Slope stability evaluations to determine minimum berm width and side slopes and geotextile requirements (if any).
- Construction sequencing recommendations.
- Bearing capacity.

*Analysis should be performed with and without fill slurry in place.

2. Fill Area Settlement and Consolidation Analysis

- Long term settlement analysis using Primary Consolidation, Secondary Compression, Desiccation of Dredged Fill (PSDDF) will be provided by another CPRA consultant.
- Five (5) settlement curves over the 20 year project life for different fill heights accounting for consolidation of subsurface soils and self-consolidation of the dredged material. The maximum fill height should be 1.0 ft. below the maximum construction elevation for the containment levees. The minimum fill height should be at or above average marsh elevation (ft NAVD 88). Average marsh elevation information will be provided to the Contracting Party by CPRA. The plots should show top of fill material elevation (NAVD 88) versus time. Provide example calculations for at least one of the curves.
- Cut to fill ratio for construction.
- De-watering recommendations for fill material.

3. Borrow Area Design

- Borrow Area design (side slopes) will be provided to the Contracting Party by CPRA for their use in the design of Tasks #1 and 2 listed above.

4.9 Presentation of Results

1. The results of the field and laboratory work shall be presented in one written geotechnical investigation data report containing a description of the field investigation and laboratory methodology, laboratory test results, field and/or mini-vane shear test results, field boring logs, final detailed boring logs, subsoil profiles, actual field location map of borings. All final boring logs shall indicate the sample depth, water depth, elevation, soil shear strength parameters, moisture content, dry or wet unit weight, Atterberg limits, soil classification, and references to consolidation curves with coefficients of consolidation, and other laboratory testing deemed necessary.

   The basis for all calculations, time/settlement graphs for marsh elevation (extrapolated to 20 years), stability analyses including shapes and locations of critical failure surfaces and the safety factors listed in a table, and any other

graphs of parameters (versus depth and/or elevation) and tables or figures to best present the results of calculations and other recommendations shall be presented in a geotechnical engineering report.

2. Coordination with landowners shall begin immediately upon receiving the Notice to Proceed. Field operations shall begin within ten (10) days of receiving the Notice to Proceed. The DRAFT final report shall be transmitted approximately thirty (30) working days after the initiation of the field operations. If this schedule cannot be met, provide an acceptable schedule after discussions with CPRA, and include this schedule for the activities and the estimated delivery date in the proposal for the work. One progress report is required from the Contracting Party approximately halfway through the duration of this contract. The progress report and preliminary data should be forwarded to Amanda Taylor, as it is developed, at the following address:

   Amanda Taylor, E.I.
   Coastal Protection and Restoration Authority
   P.O. Box 44027
   Baton Rouge, LA 70804-4027
   (225) 342-9419

4.10 Personnel and Equipment Requirements

1. The Contracting Party shall provide the necessary field personnel, engineers, office staff, and equipment to accomplish the work required by this scope of services.

2. All geotechnical investigations accomplished under this Scope of Services shall be performed under the supervision of a registered engineer licensed by the Louisiana State Board of Registration for Professional Engineers and Land Surveyors. The Contracting Party shall provide CPRA access to the field locations, drilling activities, and laboratory test facility.

3. All engineering work performed under this Scope of Services shall be certified and performed by or under the direct supervision of a registered professional civil engineer with specialized training, expertise, and experience in geotechnical engineering, holding a current license from the Louisiana State Board of Registration for Professional Engineers and Land Surveyors.

4. The Contracting Party shall provide the necessary instruments, vehicles, and other equipment to accomplish the services required by CPRA.

5.0 DELIVERABLES

1. Daily progress reports shall be submitted to CPRA during the field investigation. These reports shall include a brief description of the daily

activities, weather conditions, equipment, personnel, water levels, and any other pertinent information.

2. Weekly progress reports shall be submitted to CPRA during lab testing and engineering analysis.

3. Four (4) paper copies of the geotechnical investigation data report (GIDR) shall be submitted to CPRA prior to beginning the engineering analyses. The GIDR shall include the following:

    - Map(s) showing the location of the project, project features, and all borings (including vibracore soil boring information being provided to the Contracting Party by CPRA);
    - Coordinates (Latitude and Longitude), mudline, and water level elevations at each boring;
    - Water depth for each boring;
    - Final boring logs;
    - Drill rig description;
    - Sample size and conditions;
    - Drilling/sampling/laboratory testing description;
    - Lengths of recovery by sample;
    - Interpreted geotechnical subsurface profiles;
    - Results of low temperature testing (50 to 60°C for 48 hours to measure the water content, then followed by testing at standard ASTM temperature for the final results) for determination of water content for organic soils (if any exist for the project);
    - Square root of time interpretation of Coefficients of Consolidation (including square root time plots in digital or hardcopy form);
    - Excel spreadsheet (hardcopy and digital formats) including all lab data with plots depicting various parameters by depth/elevation (by borings and/or groups of borings with relevance to project permutations used in the design);
    - Stress-Strain curves for all shear strength testing;
    - Raw and “Interpreted-Field” one-dimensional consolidation curves showing the assumed in-situ effective stress, the interpreted maximum previous past pressure, values of reload, virgin and rebound slopes of the void ratio/log of effective stress curves (graphical and tabular form); and
    - Other necessary information.

4. Four (4) paper copies of the geotechnical engineering report (GER) including the following:

    - Project Description;
    - Description of site and subsurface conditions;

- Interpretations of the stratigraphy of the soils (soil type and shear strength) at the site;
- Verification of bearing capacities and slope stability evaluations;
- Detailed boring logs which show the sample depth, water depth, soil shear strength parameters, moisture content, dry or wet unit weight, Atterberg limits, soil classification, and references to consolidation curves with coefficients of consolidation;
- Verification of time rate of settlement of the marsh fill, subsurface soils and containment dikes;
- Calculations performed on all elements of the work; and
- Other recommendations.

5. One copy of the Migratory Bird Abatement Plan including abatement measures used and results of the monitoring and minimization measures.

6. One copy of the calculations package for all elements of the work, including but not limited to all field logs/field notes, lab setup sheets, final geotechnical calculations performed to design the proposed new marsh and the earthen levees to be constructed as listed under Engineering Services.

7. An electronic copy of the geotechnical investigation report (logs inclusive) and soil boring logs (exclusive of the GIDR) and the geotechnical engineering report on compact disk (CD) in PDF format. Each boring log should be contained in a separate PDF and AutoCAD file.

6.0 REFERENCES

ASTM D3441 – Standard Test Method for Deep, Quasi-Static, Cone and Friction-Cone Penetration Tests of Soils

ASTM D1586 – Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils

ASTM D1587 – Standard Practice for Thin-Walled Tube Geotechnical Sampling of Soils

ASTM D2488 – Practice for Description and Identification of Soils (Visual Manual Procedure)

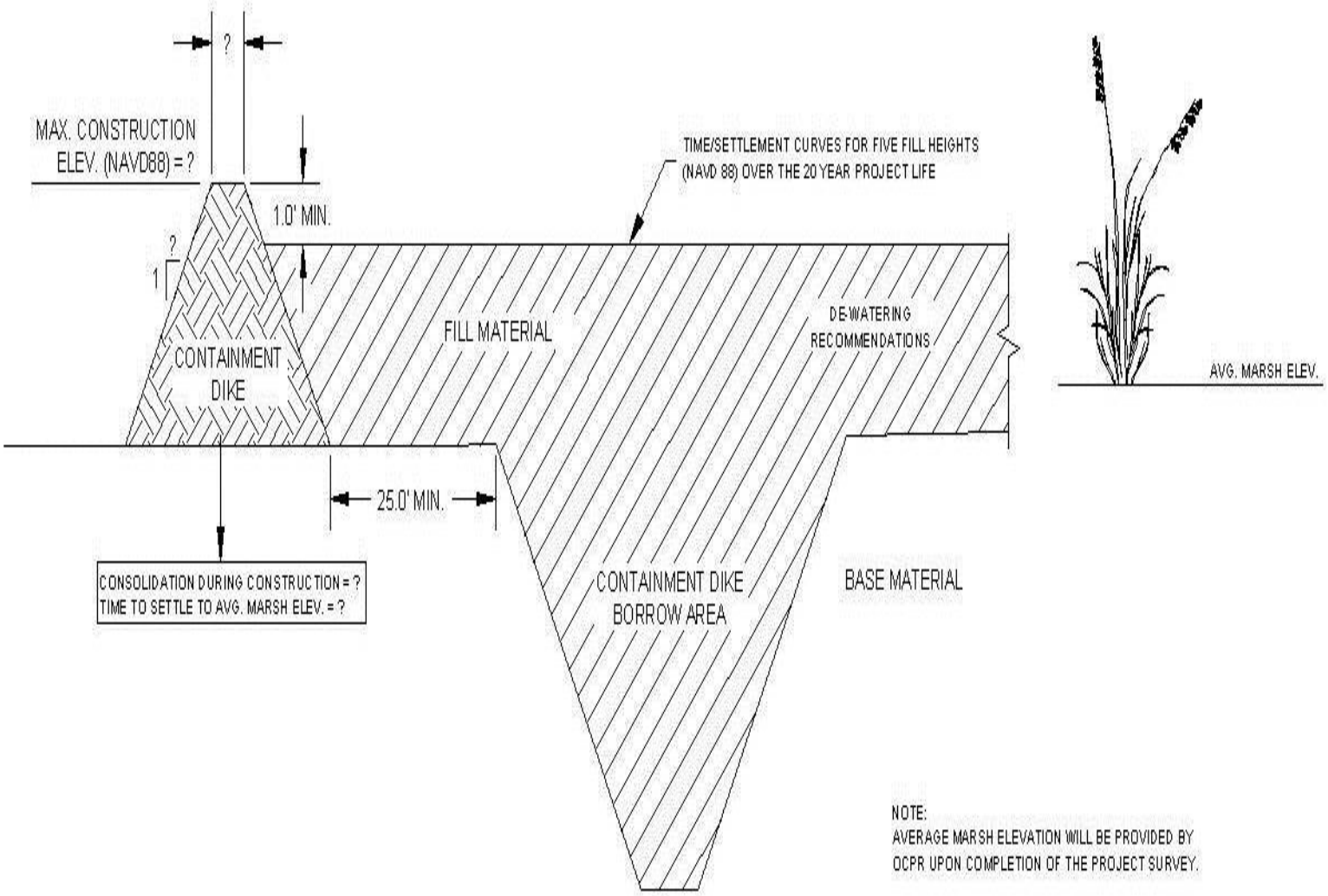
ASTM D2573 – Standard Test Method for Field Vane Shear Test in Cohesive Soils

ASTM D4220 – Practices for Preserving and Transporting Soil Samples

ASTM Methods for Laboratory Testing of Soils

Rules, Regulations, and Standards for Plugging Abandoned Water Wells and Holes, Louisiana Department of Transportation and Development.

FIGURE 1: Typical Marsh Creation Diagram



APPENDIX A: Boring Locations

APPENDIX B: Coastal Use Permit

BOBBY JINDAL
GOVERNOR

SCOTT A. ANGELLE
SECRETARY

RECEIVED
2014 SEP 10 A 8:22
CPRA

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES
OFFICE OF COASTAL MANAGEMENT

September 5, 2014

LOUISIANA COASTAL PROTECTION AND
RESTORATION AUTHORITY
P.O. BOX 44027
BATON ROUGE, LA 70804
Attn: Justin Merrifield

RE: Coastal Use Permit P20141082

Dear Mr. Merrifield:

You were recently issued Coastal Use Permit Number P20141082. A requirement of this permit is that this office be notified of the commencement date of work on this project. Enclosed is a postage paid business reply card with the permit number written on the card. Upon commencement of the project, simply write the date of commencement on the card, sign it and drop it in the mail. If you are an agent and not responsible for this notification, please ensure the proper individual is given this correspondence.

Alternately, you can transmit the information through the commencement notification feature of the online permit system or simply notify Ms. Jessica Diez at (800) 267-4019 or (225) 342-7268, email jessica.diez@la.gov. Please be prepared to provide an exact or approximate date construction began when you call.

If you have any questions please do not hesitate to contact this office. Thank you for your cooperation in this matter.

Very Truly Yours,

Christine Charrier
Program Manager

Enclosure

Post Office Box 44487 • Baton Rouge, Louisiana 70804-4487
617 North Third Street • Sixth Floor • Suite 618 • Baton Rouge, Louisiana 70802
(225) 342-7591 • Fax (225) 342-9439 • http://www.coastal.louisiana.gov
An Equal Opportunity Employer

PROJECT COMMENCEMENT NOTIFICATION
OFFICE OF COASTAL MANAGEMENT
L.A. DEPT. OF NATURAL RESOURCES
P. O. BOX 44487
BATON ROUGE, LA 70804-4487

CW

COASTAL USE PERMIT # P20141082

APPLICANT LA CPRA

DATE PERMITTED WORK STARTED ON SITE: _____
MONTH/DAY/YEAR

Please enter in space provided the date on which approved work under your permit began, sign and return to this office within three (3) working days after that date.

IF YOU HAVE ANY QUESTIONS,
PLEASE WRITE OR TELEPHONE THIS OFFICE, 1-800-267-4019

_____
Signature

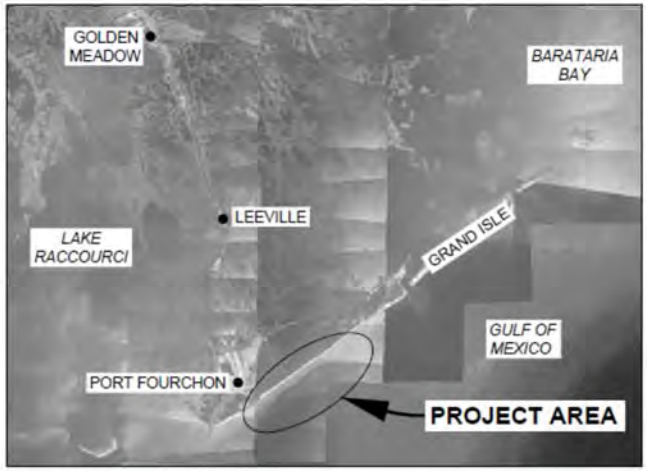
INDEX TO SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	VIBRACORE LAYOUT
3	TYPICAL SECTION
4	NOTES

STATE OF LOUISIANA
COASTAL PROTECTION AND RESTORATION AUTHORITY

CAMINADA HEADLANDS BACK BARRIER MARSH CREATION

BA-171
LAFOURCHE PARISH PROJECT



ENVIRONMENTAL SERVICES

APPLICATION BY: COASTAL PROTECTION & RESTORATION AUTHORITY P.O. BOX 44027 BATON ROUGE, LA 70804	COASTAL PROTECTION & RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801		CAMINADA HEADLANDS BACK BARRIER MARSH CREATION PROJECT	TITLE SHEET
			STATE PROJECT NUMBER: BA-171	DATE: AUGUST 2014
DRAWN BY: K. CANTU	DESIGNED BY: A. TAYLOR, E.I.	APPROVED BY: S. HAYNES, P.E.	FEDERAL PROJECT NUMBER:	SHEET 1 OF 4

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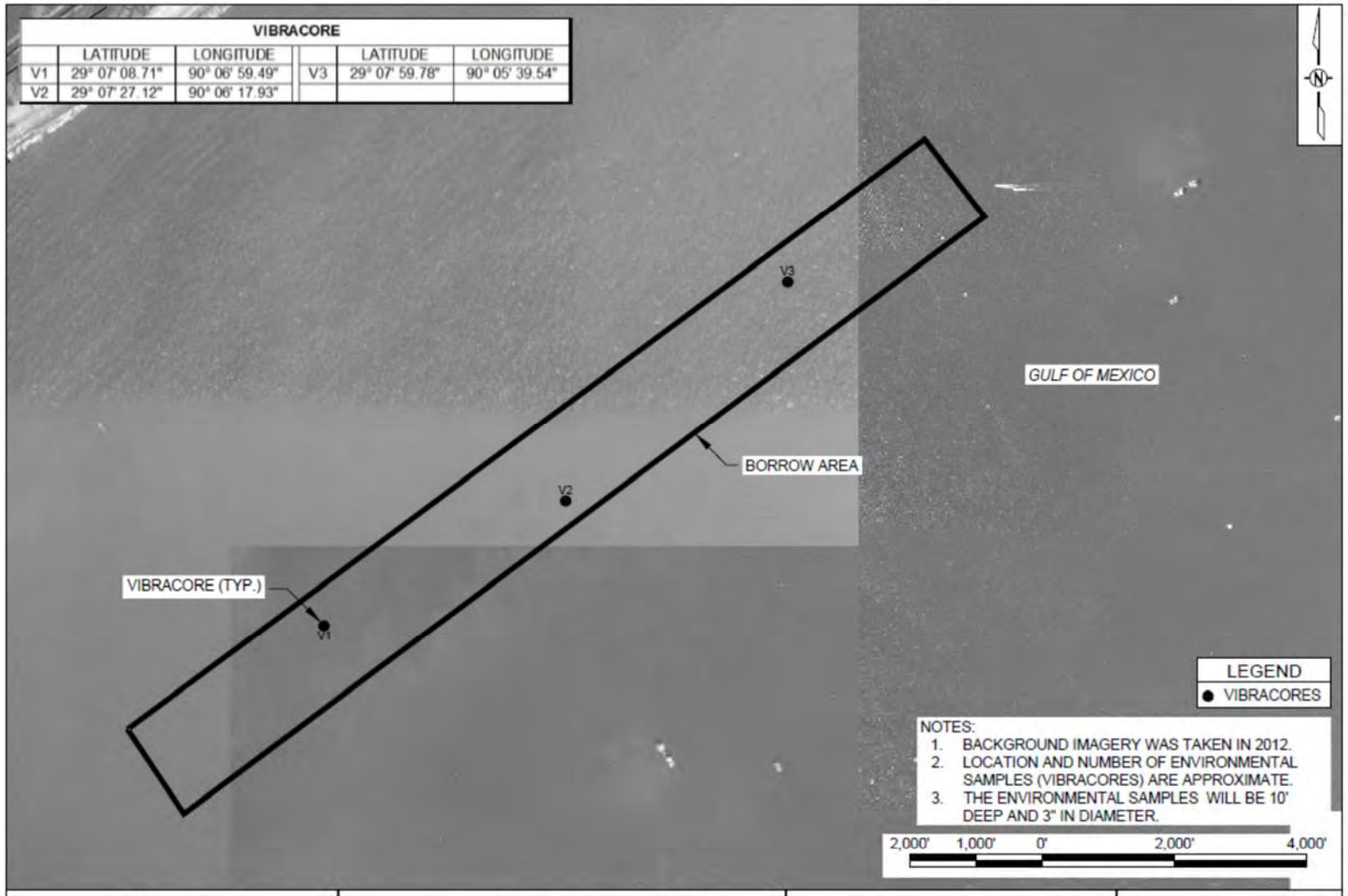
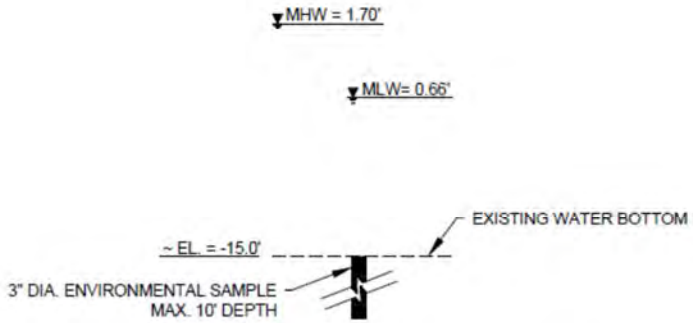

VIBRACORE
LATITUDE LONGITUDE
V1 29° 07' 08.71" 90° 06' 59.49"
V2 29° 07' 27.12" 90° 06' 17.93"
V3 29° 07' 59.78" 90° 05' 39.54"
N
V3
GULF OF MEXICO
BORROW AREA
V2
VIBRACORE (TYP.)
V1
LEGEND
VIBRACORES
NOTES:
1. BACKGROUND IMAGERY WAS TAKEN IN 2012.
2. LOCATION AND NUMBER OF ENVIRONMENTAL SAMPLES (VIBRACORES) ARE APPROXIMATE.
3. THE ENVIRONMENTAL SAMPLES WILL BE 10' DEEP AND 3" IN DIAMETER.
2,000' 1,000' 0' 2,000' 4,000'
APPLICATION BY:
COASTAL PROTECTION & RESTORATION AUTHORITY
P.O. BOX 44027
BATON ROUGE, LA 70804
COASTAL PROTECTION & RESTORATION AUTHORITY
450 LAUREL STREET
BATON ROUGE, LOUISIANA 70801
CAMINADA HEADLANDS BACK BARRIER MARSH CREATION
VIBRACORE LAYOUT
STATE PROJECT NUMBER: BA-171
DATE: AUGUST 2014
DRAWN BY: K. CANTU
DESIGNED BY: A. TAYLOR, E.I.
APPROVED BY: S. HAYNES, P.E.
FEDERAL PROJECT NUMBER:
SHEET 2 OF 4
G:\Users\CED\BASINS\BA\BA-171 Caminada Headlands Back Barrier Marsh Creation\DRAWINGS - AUTOCAD\Permit Drawings\8.2014 Environmental Services\Mod 1\02 Sample Layout.dwg



TYPICAL BORROW AREA ENVIRONMENTAL SAMPLE (VIBRACORE) SECTION
NOT TO SCALE

APPLICATION BY: COASTAL PROTECTION & RESTORATION AUTHORITY P.O. BOX 44027 BATON ROUGE, LA. 70804	COASTAL PROTECTION & RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801		CAMINADA HEADLANDS BACK BARRIER MARSH CREATION	TYPICAL SECTION
			STATE PROJECT NUMBER: BA-171	DATE: AUGUST 2014
DRAWN BY: K. CANTU	DESIGNED BY: A. TAYLOR, E.I.	APPROVED BY: S. HAYNES, P.E.	FEDERAL PROJECT NUMBER:	SHEET 3 OF 4

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BA-171 SCOPE OF SERVICES FOR GEOTECHNICAL INVESTIGATION

1. THE PIPING PLOVER (CHARADRIUS MELODUS) MAY OCCUR WITHIN ONE MILE OF THE PROJECT AREA. THIS SPECIES IS FEDERALLY LISTED AS THREATENED WITH ITS CRITICAL HABITAT DESIGNATED ALONG THE LOUISIANA COAST. PIPING PLOVERS WINTER IN LOUISIANA FEEDING AT INTERTIDAL BEACHES, MUDFLATS, AND SAND FLATS WITH SPARSE EMERGENT VEGETATION. PRIMARY THREATS TO THIS SPECIES ARE DESTRUCTION AND DEGRADATION OF WINTER HABITAT, HABITAT ALTERATION THROUGH SHORELINE EROSION, WOODY SPECIES ENCROACHMENT OF LAKE SHORELINES AND RIVERBANKS, AND HUMAN DISTURBANCE OF FORAGING BIRDS. FOR MORE INFORMATION ON PIPING PLOVER CRITICAL HABITAT, VISIT THE U.S. FISH AND WILDLIFE WEBSITE: HTTP://ENDANGERED.FWS.GOV.

2. OUR DATABASE ALSO INDICATES THE OCCURRENCE OF SNOWY PLOVER (CHARADRIUS ALEXANDRINUS) IN YOUR PROJECT AREA. THIS SPECIES HOLDS A STATE RANK OF S1B, S2N AND IS CONSIDERED CRITICALLY IMPERILED IN LOUISIANA. THE SNOWY PLOVER WINTERS ALONG THE GULF COAST AND CAN BE FOUND YEAR ROUND IN SOUTHWEST LOUISIANA. THIS SPECIES OCCURS ON BEACHES, DRY MUD OR SALT FLATS, AND THE SANDY SHORES OF RIVERS, LAKES, AND PONDS, AND NESTS WHERE VEGETATION IS SPARSE OR ABSENT. A MAJOR THREAT TO THE SNOWY PLOVER IS THE ALTERATION OF COASTAL HABITAT. WE RECOMMEND THAT YOU TAKE THE NECESSARY PRECAUTIONS TO PROTECT THE CRITICAL HABITAT OF THIS SPECIES. IF YOU HAVE ANY QUESTIONS OR NEED ADDITIONAL INFORMATION, PLEASE CALL MICHAEL SEYMOUR AT 225-763-3554.

3. OUR DATABASE INDICATES THE PRESENCE OF BIRD NESTING COLONIES WITHIN ONE MILE OF THIS PROPOSED PROJECT. PLEASE BE AWARE THAT ENTRY INTO OR DISTURBANCE OF ACTIVE BREEDING COLONIES IS PROHIBITED BY THE LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES (LDWF). IN ADDITION, LDWF PROHIBITS WORK WITHIN A CERTAIN RADIUS OF AN ACTIVE NESTING COLONY.

4. NESTING COLONIES CAN MOVE FROM YEAR TO YEAR AND NO CURRENT INFORMATION IS AVAILABLE ON THE STATUS OF THESE COLONIES. IF WORK FOR THE PROPOSED PROJECT WILL COMMENCE DURING THE NESTING SEASON, CONDUCT A FIELD VISIT TO THE WORKSITE TO LOOK FOR EVIDENCE OF NESTING COLONIES. THIS FIELD VISIT SHOULD TAKE PLACE NO MORE THAN TWO WEEKS BEFORE THE PROJECT BEGINS. IF NO NESTING COLONIES ARE FOUND WITHIN 400 METERS (700 METERS FOR BROWN PELICANS) OF THE PROPOSED PROJECT, NO FURTHER CONSULTATION WITH LDWF WILL BE NECESSARY. IF ACTIVE NESTING COLONIES ARE FOUND WITHIN THE PREVIOUSLY STATED DISTANCES OF THE PROPOSED PROJECT, FURTHER CONSULTATION WITH LDWF WILL BE REQUIRED. IN ADDITION, COLONIES SHOULD BE SURVEYED BY A QUALIFIED BIOLOGIST TO DOCUMENT SPECIES PRESENT AND THE EXTENT OF COLONIES. PROVIDE LDWF WITH A SURVEY REPORT WHICH IS TO INCLUDE THE FOLLOWING INFORMATION:
   A. QUALIFICATIONS OF SURVEY PERSONNEL
   B. SURVEY METHODOLOGY INCLUDING DATES, SITE CHARACTERISTICS, AND SIZE OF SURVEY AREA
   C. SPECIES OF BIRDS PRESENT, ACTIVITY, ESTIMATES OF NUMBER OF NESTS PRESENT, AND GENERAL VEGETATION TYPE INCLUDING DIGITAL PHOTOGRAPHS REPRESENTING THE SITE.
   D. TOPOGRAPHIC MAPS AND ARCVIEW SHAPEFILES PROJECTED IN UTM NAD83 ZONE 15 TO ILLUSTRATE THE LOCATION AND EXTENT OF THE COLONY.

   PLEASE MAIL SURVEY REPORTS ON CD TO: LA. DEPT. OF WILDLIFE & FISHERIES
   P.O. BOX 98000
   BATON ROUGE, LA 70898-9000

5. TO MINIMIZE DISTURBANCE TO COLONIAL NESTING BIRDS, THE FOLLOWING RESTRICTIONS ON ACTIVITY SHOULD BE OBSERVED:
   A. FOR COLONIES CONTAINING NESTING WADING BIRDS (I.E., HERONS, EGRETS, NIGHT-HERONS, IBIS, ROSEATE SPOONBILLS, ANHINGAS, AND/OR CORMORANTS), ALL PROJECT ACTIVITY OCCURRING WITHIN 300 METERS OF AN ACTIVE NESTING COLONY SHOULD BE RESTRICTED TO THE NON-NESTING PERIOD (I.E., SEPTEMBER 1 THROUGH FEBRUARY 15).
   B. FOR COLONIES CONTAINING NESTING GULLS, TERNS, AND/OR BLACK SKIMMERS, ALL PROJECT ACTIVITY OCCURRING WITHIN 400 METERS (700 METERS FOR BROWN PELICANS) OF AN ACTIVE NESTING COLONY SHOULD BE RESTRICTED TO THE NON-NESTING PERIOD (I.E., SEPTEMBER 16 THROUGH APRIL 1).

6. NO OTHER IMPACTS TO RARE, THREATENED OR ENDANGERED SPECIES OR CRITICAL HABITATS ARE ANTICIPATED FROM THE PROPOSED PROJECT. NO STATE OR FEDERAL PARKS, WILDLIFE REFUGES, WILDLIFE MANAGEMENT AREAS OR SCENIC RIVERS ARE KNOWN AT THE SPECIFIED SITE OR WITHIN ¼ MILE OF THE PROPOSED PROJECT.

7. THE LOUISIANA NATURAL HERITAGE PROGRAM (LNHP) REPORTS SUMMARIZE THE EXISTING INFORMATION KNOWN AT THE TIME OF THE REQUEST REGARDING THE LOCATION IN QUESTION. LNHP REPORTS SHOULD NOT BE CONSIDERED FINAL STATEMENTS ON THE BIOLOGICAL ELEMENTS OR AREAS BEING CONSIDERED, NOR SHOULD THEY BE SUBSTITUTED FOR ON-SITE SURVEYS REQUIRED FOR ENVIRONMENTAL ASSESSMENTS. IF AT ANY TIME LNHP TRACKED SPECIES ARE ENCOUNTERED WITHIN THE PROJECT AREA, PLEASE CONTACT OUR BIOLOGIST AT 225-765-2643.

APPLICATION BY: COASTAL PROTECTION & RESTORATION AUTHORITY P.O. BOX 44027 BATON ROUGE, LA. 70804	COASTAL PROTECTION & RESTORATION AUTHORITY 450 LAUREL STREET BATON ROUGE, LOUISIANA 70801		CAMINADA HEADLANDS BACK BARRIER MARSH CREATION	NOTES
			STATE PROJECT NUMBER: BA-171	DATE: AUGUST 2014
DRAWN BY: K. CANTU	DESIGNED BY: A. TAYLOR, E.I.	APPROVED BY: S. HAYNES, P.E.	FEDERAL PROJECT NUMBER:	SHEET 4 OF 4

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