Version: January 21, 2020

Biological Evaluation Form

Deepwater Horizon Oil Spill Restoration

U.S. Fish and Wildlife Service & National Marine Fisheries Service

This form will be filled out by the Implementing Trustee and used by the regulatory agencies. The form will provide information to initiate informal Section 7 consultations under the Endangered Species Act (ESA) and may be used to document a No Effect determination or to initiate pre-consultation technical assistance.

It is recommended that this form also be completed to inform and evaluate additional needs for compliance with the following authorities: Migratory Bird Treaty Act (MBTA), Marine Mammal Protection Act (MMPA), Coastal Barrier Resources Act (CBRA), Bald and Golden Eagle Protection Act (BGEPA) and Section 106 of the National Historic Preservation Act (NHPA).

Further information may be required beyond what is captured on this form. Note: if you need additional space for writing, please attach pages as needed.

For assistance, please contact the compliance liaisons
USFWS: Erin Chandler at erin_chandler@fws.gov
NMFS: Christy Fellas at christina.fellas@noaa.gov

A. Project Identification

Federal Action Agency(one or more):USFWS ☒ NOAA ☒ EPA ☐ USDA ☐

Implementing Trustee(s): The Louisiana Coastal Protection and Restoration Authority (CPRA)

Contact Name: Chris Barnes Phone: 225-342-9036 Email: chris.barnes@la.gov

Project Name: PO-0174 Biloxi Marsh Living Shoreline Alternative

DIVER ID# Click to enter text TIG: Louisiana TIG Restoration Plan # 6

B. Project Phase and Supporting Documentation

Please choose the box which best describes the project status, as proposed in this BE form:

Planning/Conceptual ☐ Construction/Implementation ☒ Engineering & Design ☒

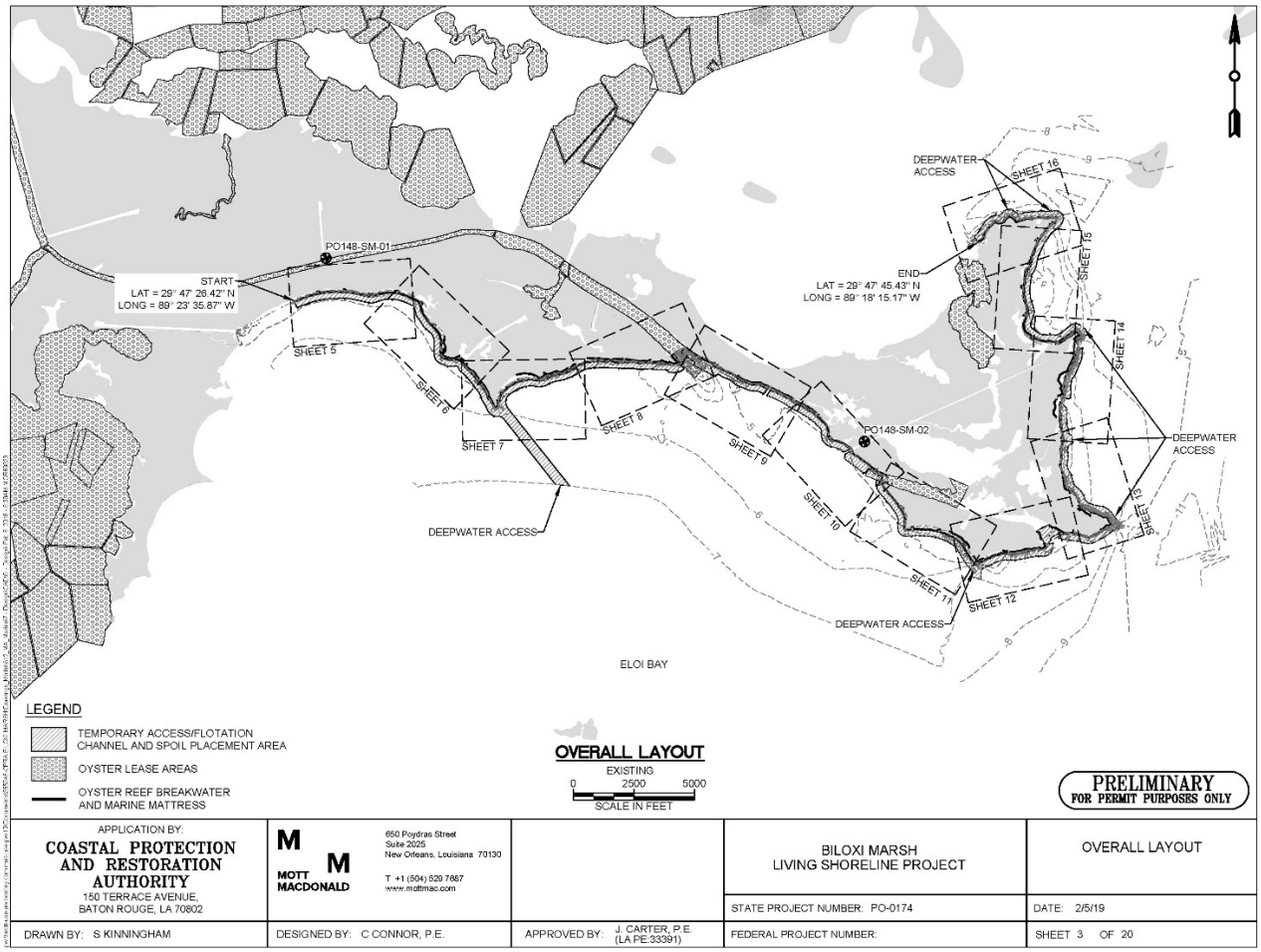
If "Engineering & Design" was selected, please describe the level of design that has been completed and is available for review:

Data collection activities and a coastal engineering analysis have been conducted. A draft Alternatives Development and Analysis document was submitted September 14, 2019. The 30% design milestone should be achieved in March of 2020 and final design by May of 2020. Construction permit applications were submitted in December 2018; CPRA has received authorization from OCM and continues coordination with USACE to secure permits. CPRA submitted a coastal use permit (C.U.P.) in December 2018 and on August 14, 2019, CPRA received the C.U.P./Consistency Determination application from the LDNR Office of Coastal Management.

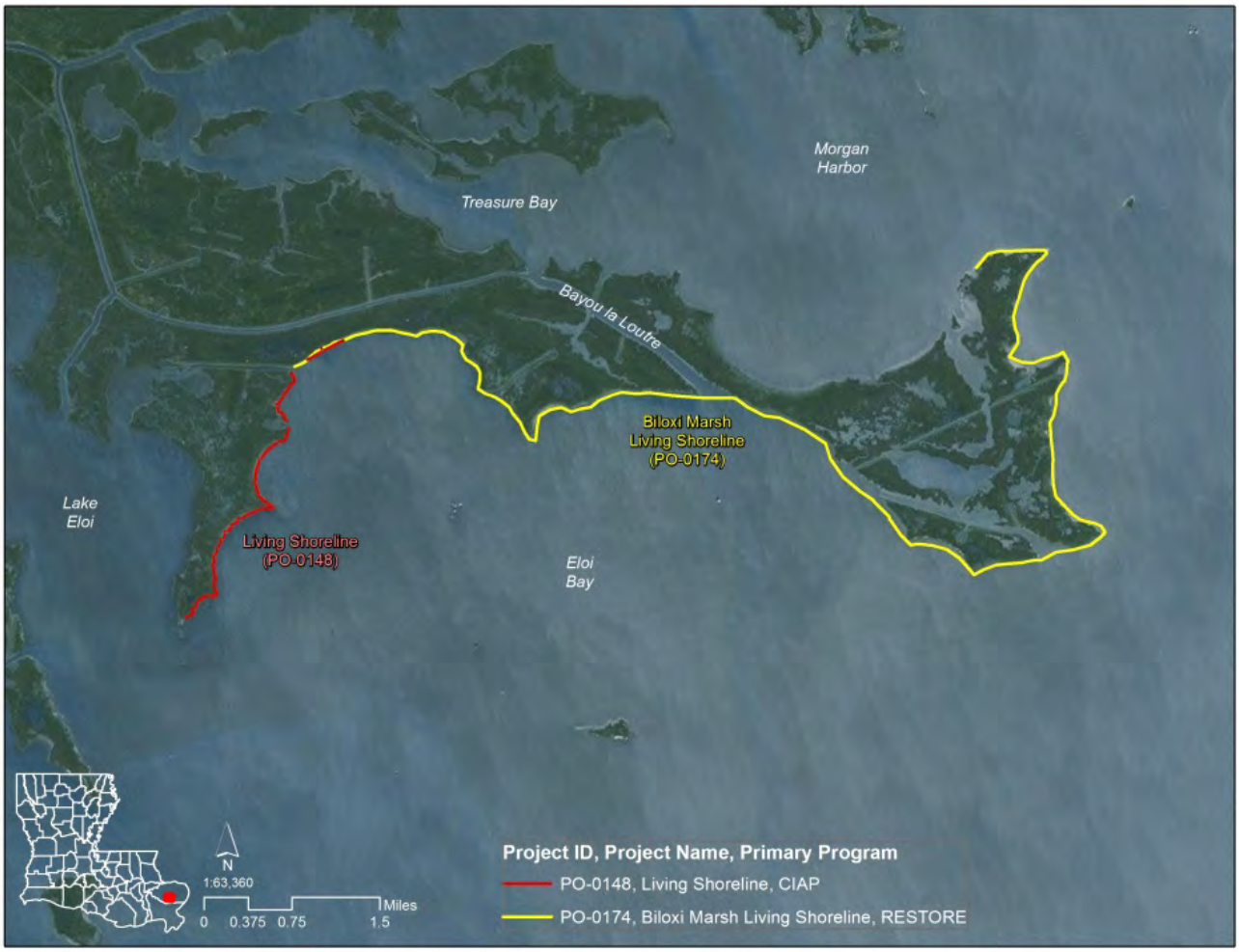
Supporting Documentation

Please attach any maps, aerial photographs, or design drawings that will support the information in this BE form. Examples of such supporting documentation include, but are not limited to:

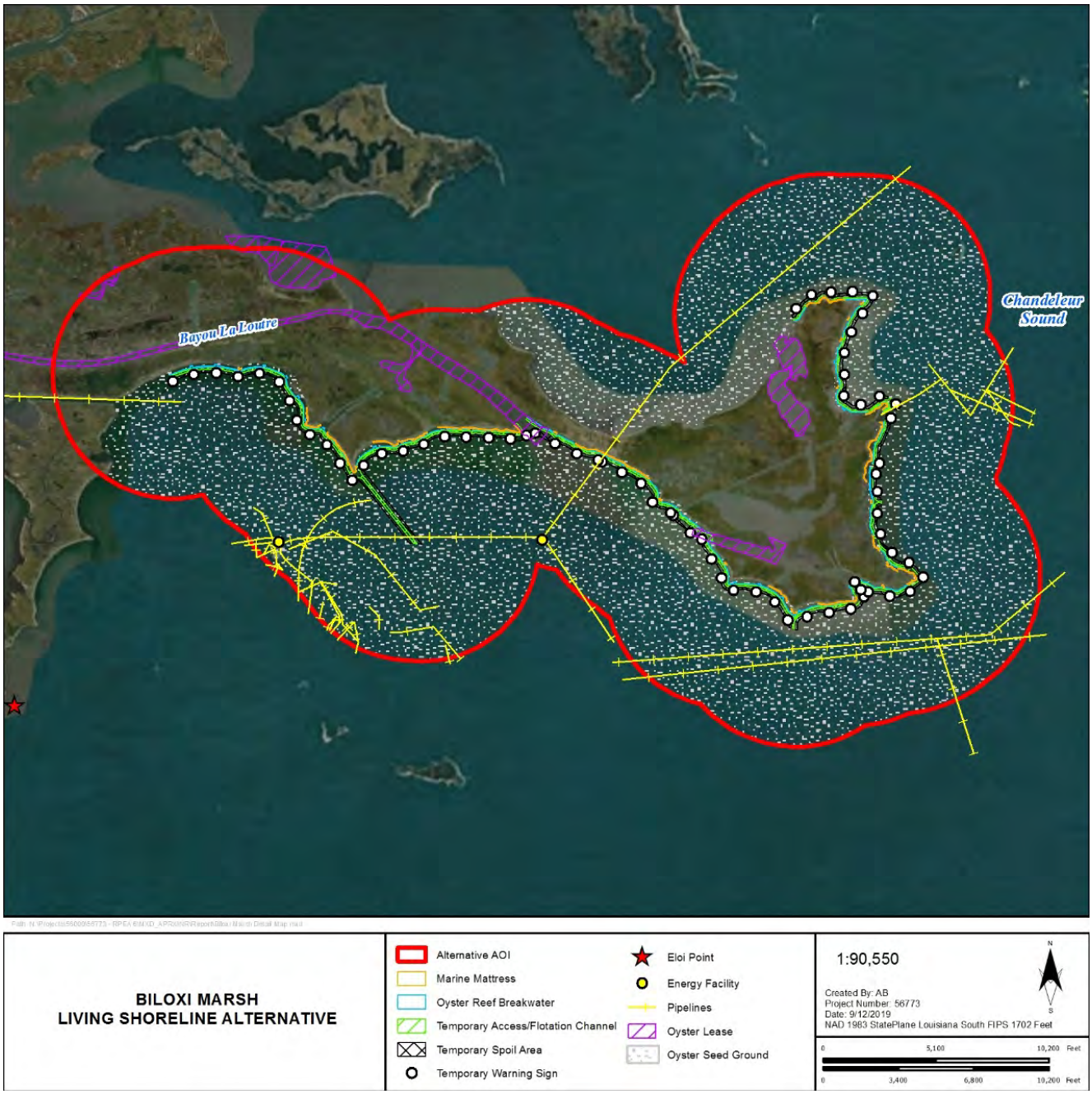
- Plan view of design drawings
- Aerial images of project action area and surrounding area
- Map of project area with elements proposed (polygons showing proposed construction elements)
- Map of action area with critical habitat units or sensitive habitats overlayed



Preliminary Permit Drawing for the Biloxi Marsh Living Shoreline Proposed Project.



Aerial image of the Proposed Project footprint shown in yellow.



Aerial image of the action area indicating locations of existing infrastructure.

C. Project Location

I. State and County/Parish of action area

St. Bernard Parish, Louisiana

II. Latitude/Longitude for action area (Decimal degrees and datum [e.g., 27.71622°N, 80.25174°W NAD83) [online conversion: https://www.fcc.gov/encyclopedia/degrees-minutes-seconds-tofrom-decimal-degrees]

29.783185° N, 89.354931° W NAD83

D. Existing Compliance Documentation

NEPA Documents

Are there any existing draft or final NEPA analyses (not PDARP/PEIS) that cover all or part of this project?

YES☒ NO☐

Permits

Have any federal permits been obtained for this project, if so which ones and what is the permit number(s)?

YES☐ NO☒ Permit Number and Type:

Have any federal permits been applied for but not yet obtained, if so which ones and what is the permit number(s)?

YES☒ NO☐ Permit Number and Type:2013-01344-EG

If yes to any question above, please provide details in the text box (i.e. link to the NEPA document, or name of the document, year, lead federal agency, POC, copy of the permit or permit application, etc.). This is needed to check for consistency of the project scope across different sources and to facilitate the NEPA analysis. If you do not have a link, email the documents to the TIG representative for the Trustee designated as lead federal agency for the restoration plan.

Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Final Environmental Impact Statement. 2012. New Orleans District US Army Corps of Engineers. Available at: https://www.mvn.usace.army.mil/Portals/56/docs/environmental/MRGO/MRGOEcosystemRestorationFinalEnvironmentalImpactStatementJune2012compressed.pdf

Joint Permit Application submitted December 17. 2018 to OCM/USACE; signed C.U.P. No.: P20181324 received August 14, 2019. See imbedded permit. USACE NO district will issue a programmatic General permit (PGP) for Biloxi and Golden Triangle Proposed Projects.

TIG RP/EA is currently being drafted and will be reviewed by the LA TIG several times prior to finalization of the document.

Any documentation or information provided will be very helpful in moving your project forward.

Name of Person Completing this Form: Ashley Lawson, Meggan Dugan, Caitlin Glymph
Name of Project Lead: Micaela Coner
Date Form Completed: 2/27/2020
Date Form Updated: 2/27/2020

E. Description of Action Area

Provide a description of the existing environment (e.g., topography, vegetation type, soil type, substrate type, water quality, water depth, tidal/riverine/estuarine, hydrology and drainage patterns, current flow and direction), and land uses (e.g., public, residential, commercial, industrial, agricultural). Describe all areas that may be directly or indirectly affected by the action.

If CH is not designated in the area, then describe any suitable habitat in the area

a. Waterbody

If applicable. Name the body of water, including wetlands (freshwater or estuarine), on which the project is located. If applicable, please describe water quality, depth, hydrology, current flow, and direction of flow.

The Biloxi Marsh Living Shoreline action area is located in southeast St. Bernard Parish, Louisiana along the shoreline of Bayou La Loutre. The action area extends from Eloi Bay to Morgan Harbor on the north side of the peninsula and is open to the Chandeleur and Breton Sound. The western portion of the action area contains the boundary of the Bayou La Loutre Mississippi River Gulf Outlet to Eloi Bay (subsegment 042003), an estuarine segment of the Mississippi River, and Eloi Bay (subsegment 042206), an estuary (LDEQ 2004). The eastern portion of the action area is located in Eloi Bay and the Morgan Harbor (subsegment 042205), which is also an estuary. The action area is characterized by low brackish and salt marshes with an erosional shoreline. Water elevations in the alternative area range from approximately 1.1 to -0.5 ft (NAVD88). In addition, the action area hydrology and water quality have been influenced by oil and gas infrastructure and activities and levee construction and maintenance. Despite these on-going conditions, the water quality in the action area meets LDEQ's (2017) water quality standards. In 2018, Bayou La Loutre (subsegment 042003), Eloi Bay (subsegment 042206), and Morgan Harbor (subsegment 042205) were listed as fully supporting PCR, SCR, FWP, and OYS and had no water quality impairments (LDEQ 2019). Water quality measurements taken during a Biological Oyster Assessment (T. Baker Smith, LLC. 2019) for this area documented the following:
Average surface salinity: 9.2 ppt
Average bottom salinity: 9.4 ppt
Average surface temp: 31.2° C
Average bottom temp: 21.0° C

Does the project area include a river or estuary?

YES☒ NO☐

If yes, please approximate the navigable distance from the project location to the marine environment.

The action area is located within the marine environment and extends from Eloi Bay to Morgan Harbor on the north side of the peninsula and is open to the Chandeleur and Breton Sounds.

b. Existing Structures

If applicable. Describe the current and historical structures found in the action area (e.g., buildings, parking lots, docks, seawalls, groynes, jetties, marina). If known, please provide the years of construction.

The action area is uninhabited and only accessible by boat; however, there are two energy facilities located within the action area. The action area is crisscrossed with pipelines, manmade canals, and levee construction and maintenance. A Louisiana Intrastate Gas Co. natural gas pipeline also crosses the action area (see figure above).

c. Seagrasses & Other Marine Vegetation

If applicable. Describe seagrasses found in action area. If a benthic survey was done, provide the date it was completed and a copy of the report. Estimate the species area of coverage and density. Attach a separate map showing the location of the seagrasses in the action area.

The waters behind the Chandeleur Islands contain the only extensive areas of submerged seagrass meadows in Louisiana (Coastal Environments, 2012). The Chandeleur Islands are 20 to 30 miles east of Eloi Bay; therefore, seagrass meadows are not expected in the action area.

Brackish marsh submerged aquatic vegetation (SAV) communities are composed primarily of water celery (*Vallisneria americana*), widgeon grass (*Ruppia maritima*), southern naiad (*Najas guadalupensis*), and horned pondweed (*Zannichellia palustris*). Widgeon grass is the main submerged aquatic plant in the action area (LDFW 2019a). Brackish SAV communities grow in sand/mud bottom substrates in shallow, protected waters with low turbidity. Based on known conditions these communities may be present within the action area.

Other brackish marsh vegetation that may be present in the action area include blackrush (*Juncus roemerianus*), glasswort (*Salicornia* spp.), oystergrass (*Spartina alterniflora*), saltgrass (*Distichlis spicata*), saltwort (*Batis maritima*), and wiregrass (*Spartina patens*) (Coastal Environments, 2012).

d. Mangroves

If applicable. Describe the mangroves found in action area. Indicate the species found (red, black, white), the species area of coverage in square footage and linear footage along project shoreline. Attach a separate map showing the location of the mangroves in the action area.

Black mangrove (*Avicennia germinans*) occurs in a few areas within the Biloxi Marsh; therefore, black mangrove may be present within the action area. In 2016, The St. Bernard Parish Government worked with Nichols State University to develop a black mangrove program and since the initiation of the program, over 3,150 black mangrove trees have been planted in Biloxi Marsh (SBPG 2019).

e. Corals

If applicable. Describe the corals found in action area. If a benthic survey was done, provide the date it was completed and a copy of the report. Estimate the species area of coverage and density. Attach a separate map showing the location of the corals in the action area. Click here to enter text.

Not applicable; corals are not expected to be in the saline marsh action area.

f. Uplands

If applicable. Describe the current terrestrial habitat in which the project is located (e.g. pasture, forest, meadows, beach and dune habitats, etc.).

The action area consists of saline marsh habitat; however, scrub habitat may also be present along old natural levees (Coastal Environments, 2012).

g. Marine Mammals

Please select the following marine mammals that could be present within the project area:

Dolphins YES☒ NO☐
Whales YES☐ NO☒
Manatees YES☒ NO☐

If applicable. Indicate and describe the species found in the action area. Use NMFS' Stock Assessment Reports (SARs) for more information, see http://www.nmfs.noaa.gov/pr/sars/region.htm

Common bottlenose dolphins (*Tursiops truncatus truncatus*; Northern GOM BSE stock) frequent estuarine areas for feeding and may be present within the action area.

West Indian manatees (*Trichechus manatus*) are common in shallow coastal waters as they feed on submerged vegetation. While there are no extensive areas of submerged vegetation in the action area, widgeon grass is present and could provide limited foraging habitat for West Indian manatee.

h. Soils and Sediments

If applicable. Indicate topography, soil type, substrate type.

The action area is underlain by marsh deposits from the Holocene Age, consisting of undifferentiated clays and layers of interdelta deposits of sandy soils. Within Bayou La Loutre are natural levee and point bar deposits consisting of silts and sands. Surface soils in the marsh area are part of the Scatlake series (Coastal Environments, 2012 Plate 8). The USDA describes the Scatlake series as consisting of very deep, very poorly drained, very slowly permeable fluid mineral soils that are continuously saturated with saline water. These soils formed in unconsolidated saline clayey and organic sediments within the saline marsh areas along the Gulf Coast. The nearshore elevations range from approximately -2.0 to -6.0 feet NAVD88.

i. Land Use

If applicable. Indicate existing or previous land use activities (agriculture, dredge disposal, etc).

This area has been historically used for oil and gas exploration, transport, and collection. There are two facilities located within the action area (See Section E(b)). The area is uninhabited and only accessible by boat.
Commercial and recreational fishing activities are known to occur in the action area. Public oyster leases and oyster seeding grounds are also present within the action area.

j. Essential Fish Habitat

If applicable. Describe any designated Essential Fish Habitat within the project area

The Gulf of Mexico Fishery Management Council delineated Essential Fish Habitat (EFH) for federally managed species in coastal Louisiana. The Project Site is within Eco-Region 3, and contains a variety of estuarine habitat types designated as EFH including: open water, emergent saline and brackish marsh, submerged aquatic grass beds, oyster reef, sand/shell bottom, and mud/soft bottom. The National Marine Fishery Service (NMFS) also manages highly migratory species (e.g., sharks) for which EFH is identified by geographical area rather than habitat type.

Eleven species with designated EFH are likely to be within the Biloxi Marsh Project Area, including shrimp (two species), fish (four species), and sharks (five species). The following table lists the federally managed species found within the Biloxi Marsh Project Area. No Habitat Areas of Particular Concern (HAPC) or EFH Areas Protected from Fishing (EFHA) were identified within the action area.

Common Name	Scientific Name
REEF FISH	
gray (mangrove) snapper	*Lutjanus griseus*
lane snapper	*Lutjanus synagris*
Spanish mackerel	*Scomberomorus maculatus*
SHRIMP	
brown shrimp	*Farfantepenaeus aztecus*
white shrimp	*Litopenaeus setiferus*

SHARKS	
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*
black-tipped shark	*Carcharhinus limbatus*
bull shark	*Carcharhinus leucas*
finetooth shark	*Carcharhinus isodon*
scalloped hammerhead shark	*Sphyrna lewini*
RED DRUM	
red drum	*Sciaenops ocellatus*

F. Project Description

I. *Describe the Proposed Action/Project Objectives: What are you trying to accomplish and how with this project? Describe in detail the construction equipment and methods** needed; long term vs. short term impacts; duration of short term impacts; dust, erosion, and sedimentation controls; restoration areas; if the project is growth-inducing or facilitates growth; whether the project is part of a larger project or plan; and what permits will need to be obtained.*

Attach a separate map showing project footprint, avoidance areas, construction accesses, staging/laydown areas.

***If construction involves overwater structures, pilings and sheetpiles, boat slips, boat ramps, shoreline armoring, dredging, blasting, artificial reefs or fishery activities, list the method here, but complete the next section(s) in detail.*

The purpose of this Proposed Project is to create bioengineered, marsh-fringing oyster reefs to promote the formation of self-sustaining living shoreline protection structures, reduce wave erosion, provide oyster habitat, and prevent further marsh degradation. The goal of the project is to install 9 to 11 miles (and no more than 12.5 miles) of reef breakwaters, marine mattresses, and/or rock revetment along the eastern shore of Biloxi Marsh. Bioengineered oyster reefs would be created by placing a manufactured product, or products, off the shoreline to establish a living breakwater structure.

The goals of the Proposed Project are to:

1. provide shoreline protection by using living shoreline products to attenuate wave energy
2. stimulate oyster growth in the project area.

Eastern oysters (*Crassostrea virginica*) are vital to Louisiana's coastal ecosystems as they provide aquatic habitat as well as filter large volumes of water during feeding. In general, if the physical environment is conducive to oyster growth, oysters need only a hard surface on which to attach. The Biloxi Marsh system is an important storm buffer for the Lake Pontchartrain Basin, including the Greater New Orleans Metropolitan Area and North Shore communities. The marshes are experiencing high rates of shoreline erosion caused by wind driven wave action.

Specific bioengineered oyster reef products have not yet been identified; however, oyster reef breakwaters would be constructed from materials such as concrete, steel, mesh, geogrid, piles, rock, floating platforms, oyster shell, or similar materials (Mott MacDonald 2019). See embedded alternative detail sheets. The oyster reef breakwater would be constructed on the edge (approximately 0-400 feet) off the existing shoreline. The oyster reef breakwater would range from 8-35 feet wide at the base of the breakwater. The height of the breakwater would ultimately be determined so that it maximizes project performance over the 9 to 11 miles (and no more than 12.5 miles) of living shoreline structures. To facilitate construction of the breakwater, a temporary access channel may be dredged approximately 20 feet from the breakwater on the seaward side along the length of the project area. Where stumps are present within the areas identified for dredging and/or breakwater placement, it is likely that the stumps would be excavated individually, and the void backfilled with a granular fill. Permanent navigation signs would be placed in accordance with United States Coast Guard standards.

Based on modeling conducted for preliminary engineering analysis, the Proposed Project is estimated to reduce land loss by over 50% where the reef breakwater structures are placed, which would reduce the average shoreline erosion rate to -5.5 feet annually. Once met, the Proposed Project will save approximately 6 to 7.3 acres per year over the 9 to 11 miles (and no more than 12.5 miles) of breakwater structure constructed. (Mott MacDonald 2019).

Access to the project site will be through existing navigable waterways. Construction activities will take place from the water. To facilitate construction of the breakwater, a temporary access channel may be dredged, where necessary, approximately 20 feet from the oyster reef breakwater along the length of the project area along the seaward side of the breakwater. The temporary access channel would be excavated using barge-mounted bucket excavators and associated crews. All excavated material would be placed into a designated location for temporary spoils, approximately 20 feet from the temporary access channel on the seaward side of the access channel. The temporary spoils would be backfilled into the temporary access channel at the completion of the Proposed Project.

Construction methods for the Biloxi Marsh Proposed Project would involve using an excavator to either excavate or backfill the footprint of the oyster reef breakwater with upland fill or gravel. Individual stumps may be removed. Geotextile fabric would be placed over the fill prior to placing the oyster reef breakwater.

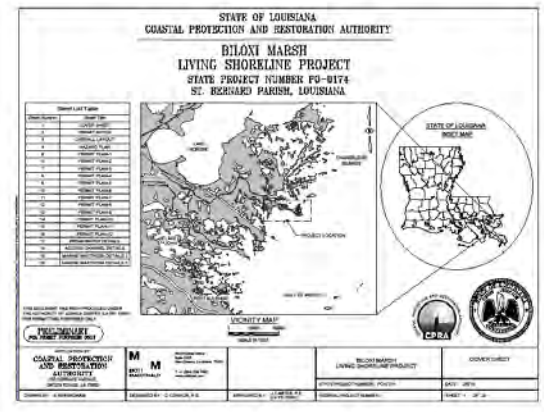
Marsh buggy and other track equipment would be limited to those 18 feet in width and confined to the project footprint. All equipment would be mobilized and demobilized by barge. Fully loaded drafts of all vessels would not exceed 7 feet at the lowest point on all vessels. Other construction machinery would include work boats and crew boats, quarters barge generators, welding machines, and miscellaneous vehicles.

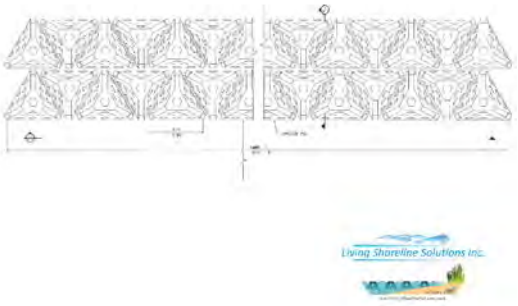
Oyster lease areas would be buffered by 150 feet to avoid impacts during construction. If unfeasible, oyster leases within the 150-foot buffer would be acquired and extinguished prior to construction. CPRA is the only entity with the authority to extinguish oyster leases. The total estimated construction duration is 25 months.

Equipment:
-Marsh buggy
-Dragline/excavator
-Barge mounted bucket dredge
-Tugboat
-Barge mounted backhoe/crane

Planned excavation: 2,040,044 y^3
Planned fill: 3,231,625 y^3
Oyster reef breakwater/marine mattress: 767,560 y^3
Total area of wetlands and/or waterbottoms filled and/or excavated: 1,150.80 acres

Please see embedded PDF files with the Preliminary Permit Drawings and Alternative Detail Sheets





II. *Construction Schedule (What is the anticipated schedule for major phases of work? Include duration of in-water work.)*
The estimated construction duration would be 25 months, and in-water work would be occurring throughout this time period.
Proposed Start Date: 8/1/2020

Proposed Completion Date: 8/1/2023

III. *Specific In-Water and/or Terrestrial Construction Methods*

Please check yes or no for the following questions related to in-water work and overwater structures

Does this project include in-water work?	YES☒	NO☐
Does this project include terrestrial construction?	* YES☒	NO☐
Does this project include construction of an overwater structure?	YES☐	NO☒
Will fishing be allowed from this overwater structure?	YES☐	NO☒
Will wildlife observation be allowed from this overwater structure?	YES☐	NO☒
Will boat docking be allowed from this overwater structure?	YES☐	NO☒
Will fishing be allowed from this overwater structure?	YES☐	NO☒

* May include marine mattress placement

If this is a fishing pier, please provide the following information: public or private access to pier, estimated number of people fishing per day, plan to address hook and line captures of protected species, specific operating hours/open 24 hours, artificial lighting of pier (if any), number of fish cleaning stations, and number of pier attendants (if any).

Not applicable; not a fishing pier.

Construction: Provide a detailed account of construction methods. It is important to include step-by-step descriptions of how demolition or removal of structures is conducted and if any debris will be moved and how. Describe how construction will be implemented, what type and size of materials will be used and if machines will be used, manual labor, or both. Indicate if work will be done from upland, barge, or both.)

iii. *Use of "Dock Construction Guidelines"?* http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/dockkey2002.pdf

iv. *Type of decking: Grated – 43% open space; Wooden planks or composite planks – proposed spacing?*

v. *Height above Mean High Water (MHW) elevation?*

vi. *Directional orientation of main axis of dock?*

vii. *Overwater area (sq ft)?*

b. *Pilings & Sheetpiles: If this project includes installation of pilings or sheets, please provide answers to questions 1-11 listed below*

Table info applies to navigation pilings only:

1. *Method of pile installation*	Vibratory hammer
2. *Material type of piles used*	steel pipe piles
3. *Size (width) of piles/sheets*	16 inch diameter, ½ wall thickness
4. *Total number of piles/sheets*	~ 126
5. *Number of strikes for each single pile*	N/A (vibratory hammer to be used) Duration: Est. 10-15 minutes per pile using vibratory hammer
6. *Number of strikes per hour (for a single pile)*	Specifications not yet determined
7. *Expected number of piles to be driven each day*	~11
8. *Expected amount of time needed to drive each pile (minutes of driving activities)*	Est. 10-15 minuted per pile
9. *Expected number of sequential days spent pile driving*	~12 days to complete including barge repositioning, setup and breakdown between piles
10. *Whether pile driving occurring in-water or on land*	In water
11. *Depth of water where piles will be driven*	Varies from 4-9 ft, piles are 65 ft long (top elevation of +14 NAVD88 and bottom elevation of -51 ft NAVD88)

Metal and/or timber piles may be required for the installation of temporary and/or permanent navigational aids, in accordance with United States Coast Guard requirements. Temporary warning signs are anticipated to be pile-mounted or buoy-mounted dayboards placed at approximately 1,000-foot increments along the temporary spoil placement areas and USCG approved NAVAIDS warning vessel operators of the breakwater would be installed permanently via pile driving in key locations. The method of installation and quantity of the temporary warning signs has not been determined.

The EcoBale is a pile supported product which may be selected for construction (see attachments for product design sheets). The 12-inch diameter timber pile design for EcoBale is installed employing a push method using a side grip driver attached to an excavator. Hammering and vibration are not required. Number of product piles and location of product would be determined by the contractor during the bid process.

c. *Marinas and Boat Slips (Describe the number and size of slips and if the number of new slips changes from what is currently available at the project. Indicate how many are wet slips and how many are dry slips. Estimate the shadow effect of the boats - the area (sqft) beneath the boats that will be shaded.)*

Not applicable; not a marina or boat slip.

d. *Boat Ramp (Describe the number and size of boat ramps, the number of vessels that can be moored at the site (e.g., staging area) and if this is a public or private ramp. Indicate the boat trailer parking lot capacity, and if this number changes from what is currently available at the project.)*

Not applicable; not a boat ramp.

e. *Shoreline Armoring (This includes all manner of shoreline armoring (e.g., riprap, seawalls, jetties, groins, breakwaters, etc.). Provide specific information on material and construction methodology used to install the shoreline armoring materials. Include linear footage and square footage. Attach a separate map showing the location of the shoreline armoring in the action area.*

Artificial reef products are anticipated to be installed along the shoreline in continuous breakwater segments that are anticipated to be no longer than 1,000 feet and no wider than 35 feet. These products may include breakwater structures, as well as marine mattresses and rock revetments, as needed. Gaps between breakwaters will be required for recreational and animal passage and are anticipated to be between 100 and 500 feet in length. Additional structures may be positioned landward or seaward to provide gap protection. The landward toe of the breakwaters is anticipated to be installed at an elevation of approximately -3.0 feet NAVD88, but this may vary between -2.0 feet NAVD88 and -6.0 feet NAVD88.

f. *Dredging or digging (Provide details about dredge type (hopper, cutterhead, clamshell, etc.), maximum depth of dredging, area (ft2) to be dredged, volume of material (yd3) to be produced, grain size of material, sediment testing for contamination, spoil disposition plans, and hydrodynamic description (average current speed/direction)). If digging in the terrestrial environment, please describe fully with details about possible water jetting, vibration methods to install pilings for dune walk-over structure, or other methods. If using devices/methods/turtle relocation dredging to relocate sea turtles, then describe the methods here.*

Construction activities will take place from the water. The nearshore elevations in the action area range from approximately -2.0 to -6.0 feet (NAVD88). If necessary, a temporary flotation channel will be dredged for access. Lines for floating objects tethered to the sea floor would ensure that all in-water lines be made of materials such as stiff cable or plastic-coated lines and any ropes need to be thick, heavy, and taut lines that do not loop or entangle, and are installed in a manner to minimize the risk of entanglement of protected species. The temporary access channel would be excavated using barge-mounted bucket excavators and associated crews. Where stumps are present within the areas identified for dredging and/or breakwater placement, it is likely that the stumps would be excavated individually, and the void backfilled with a granular fill. All excavated material would be placed into a designated location for temporary spoils, approximately 20 feet from the temporary access channel on the seaward side of the access channel. The temporary spoils would be

backfilled into the temporary access channel at the completion of the project. Light load, low draft equipment will be used to minimize dredging. Access channels will be backfilled at completion of the activities.
Planned excavation: 2,040,044 yd^3
Planned fill: 3,231,625 yd^3
Oyster reef breakwater/marine mattress: 767,560 yd^3
Total acres of wetlands and/or waterbottoms filled and/or excavated: 1,150.80 acres

g. *Blasting (Projects that use blasting might not qualify as "minor projects," and a Biological Assessment (BA) may need to be prepared for the project. Arrange a technical consultation meeting with NMFS Protected Resources Division to determine if a BA is necessary. Please include explosive weights and blasting plan.)*

Not applicable; no blasting is planned.

h. *Artificial Reefs (Provide a detailed account of the artificial reef site selection and reef establishment decisions [i.e., management and siting considerations, stakeholder considerations, environmental considerations, long term maintenance plan (periodic clean-up of lost fishing gear/debris]), deployment schedule, materials used, deployment methods, as well as final depth profile and overhead clearance for vessel traffic. For additional Information and detailed guidance on artificial reefs, please refer to the artificial reef program websites for the particular state the project will occur in.*

Up to 12.5 miles of oyster reef breakwaters would be constructed using artificial reef products which use materials such as concrete, steel, mesh, geogrid, piles, rock, floating platforms, oyster shell, or similar materials. See attached alternative detail sheets at the end of this document. In-water lines for floating platforms would be made of materials such as stiff cable or plastic-coated lines and any ropes would be thick, heavy, and taut lines that do not loop or entangle, and are installed in a manner to minimize the risk of entanglement of protected species. The height of the breakwater would ultimately be determined so that it maximizes project performance over the 9 to 11 miles (and no more than 12.5 miles) of living shoreline structures. Artificial reef products are anticipated to be installed along the shoreline (0-400 ft off existing shoreline) in continuous breakwater segments that are anticipated to be no longer than 1,000 feet and no wider than 35 feet. Gaps between breakwaters will be required for recreational and wildlife passage and are anticipated to be between 100 and 500 feet in length. Additional structures may be positioned landward or seaward to provide gap protection. The landward toe of the breakwaters is anticipated to be installed at an elevation of approximately -3.0 feet NAVD88, but this may vary between -2.0 feet NAVD88 and -6.0 feet NAVD88.

i. *Fishery Activities (Describe any use of gear that could entangle or capture protected species. This includes activities that may enhance fishing opportunities (e.g. fishing piers) or be fishery/gear research related (e.g. involve trawl gear, gillnets, hook and line gear, crab pots etc)).*

Not applicable; no fishery activities are planned.

G. NOAA Species & Critical Habitat and Effects Determination Requested

If your project occurs in a location that does not contain any listed NOAA species or designated Critical Habitats, please check the box below. If this box is checked, you may skip Section G. and proceed to Section H.

☐This project occurs in a location that does not contain any listed NOAA species or designated Critical Habitats.

☐ESA effects have been accounted for under an existing consultation.

1. List all species, critical habitat, proposed species and proposed critical habitat that may be found in the action area. Species that do not currently occur in the action area (but are listed on county species lists) do not need to be listed in drop downs.

2. Attach a separate map identifying species/critical habitat locations within the action area. For information on species and critical habitat under NMFS jurisdiction, visit: http://sero.nmfs.noaa.gov/protected_resources/section_7/threatened_endangered/Documents/gulf_of_mexico.pdf.

Identify if Gulf sturgeon are in marine or in freshwater in your Species and/or Critical Habitat list to determine which federal agency will perform the analysis (e.g. Gulf sturgeon CH - marine). Identify if sea turtles are in water or on land in your Species and/or Critical Habitat list to determine which federal agency will perform the analysis (e.g. Loggerhead sea turtle CH - terrestrial).

Species and/or Critical Habitat	**CH Unit** (if applicable)	**Location** (Sea turtles and Gulf Sturgeon only)	**Determinations** (see definitions below)	**For "No Effect", please select justification.**
Gulf Sturgeon (T)	N/A, outside CH	Marine	May Affect, Not Likely to Adversely Affect	Choose an item.
Loggerhead Sea Turtle	N/A, outside CH	Marine	May Affect, Not Likely to Adversely Affect	Choose an item.
Green Sea Turtle (T)	N/A, outside CH	Marine	May Affect, Not Likely to Adversely Affect	Choose an item.
Leatherback Sea Turtle (E)	N/A, outside CH	Marine	No Effect	No suitable habitat in action area
Hawksbill Sea Turtle (E)	N/A, outside CH	Marine	No Effect	No suitable habitat in action area
Kemp's Ridley Sea Turtle (E)	N/A, outside CH	Marine	May Affect, Not Likely to Adversely Affect	Choose an item.

The nearshore habitats in the action area do not provide suitable foraging habitat for hawksbill or leatherback sea turtles; therefore, it is unlikely these species would be present (LDWF 2019c; Love et al. 2013; NatureServe 2016; NOAA 2019).

Determination Definitions

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat.

NLAA = may affect, not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response requested is concurrence with the not likely to affect determination. This conclusion is appropriate when effects to the species or critical habitat will be wholly beneficial, discountable, or insignificant. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact, while discountable effects are those that are extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. If the Services concur in writing with the Action Agency's determination of "is not likely to adversely affect" listed species or critical habitat, the section 7 consultation process is completed.

LAA = may affect, likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response requested for listed species is formal consultation for action with a likely to adversely affect determination, with a biological opinion as the concluding document. This conclusion is reached if any adverse effect to listed species or critical habitat may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable or insignificant. In the event the overall effect of the proposed action is beneficial to the listed species or critical habitat, but may also cause some adverse effect on individuals of the listed species or segments of the critical habitat, then the determination is "likely to adversely affect." Any LAA determination requires formal section 7 consultation and will require additional information.

Critical Habitat No Destruction = When the proposed action will not diminish the value of critical habitat.

H. USFWS Species & Critical Habitat and Effects Determination Requested

If your project occurs in a location that does not contain any listed USFWS species or designated Critical Habitats, please check the box below. If this box is checked, you may skip Section G. and proceed to Section H.

☐This project occurs in a location that does not contain any listed USFWS species or designated Critical Habitats.

☐ESA effects have been accounted for under an existing consultation.

1. List all species, critical habitat, proposed species and proposed critical habitat that may be found in the action area. Species that do not currently occur in the action area (but are listed on county species lists) do not need to be listed in drop downs.

2. Attach a separate map identifying species/critical habitat locations within the action area. For information on species and critical habitat under NMFS jurisdiction, visit:
http://sero.nmfs.noaa.gov/protected_resources/section_7/threatened_endangered/Documents/gulf_of_mexico.pdf.

Identify if Gulf sturgeon are in marine or in freshwater in your Species and/or Critical Habitat list to determine which federal agency will perform the analysis (e.g. Gulf sturgeon CH - marine). Identify if sea turtles are in water or on land in your Species and/or Critical Habitat list to determine which federal agency will perform the analysis (e.g. Loggerhead sea turtle CH - terrestrial).

Species and/or Critical Habitat	**CH Unit** (if applicable)	**Location** (Sea turtles and Gulf Sturgeon only)	**Determinations** (see definitions below)	**For "No Effect", please select justification.**
Gulf Sturgeon	N/A, outside CH	Riverine/Freshwater	No Effect	No suitable habitat in action area
West Indian Manatee	N/A, outside CH	Choose an item.	May Affect, Not Likely to Adversely Affect	Select Most Appropriate
Loggerhead Sea Turtle	N/A, outside CH	Terrestrial	No Effect	No suitable habitat in action area
Leatherback Sea Turtle	N/A, outside CH	Terrestrial	No Effect	No suitable habitat in action area
Green Sea Turtle	N/A, outside CH	Terrestrial	No Effect	No suitable habitat in action area
Kemp's Ridley	N/A, outside CH	Terrestrial	No Effect	No suitable habitat in action area
Hawksbill Sea Turtle	N/A, outside CH	Terrestrial	No Effect	No suitable habitat in action area
Red Knot	N/A, outside CH	Choose an item.	No Effect	No suitable habitat in action area
Piping Plover	N/A, outside CH	Choose an item.	No Effect	No suitable habitat in action area

The red knot and piping plover both have ranges that extend across the Action Area. These species could potentially be present in the action area but would not be affected by the Proposed Project because the beach/dune habitats they prefer for foraging, overwintering (red knot), and nesting (piping plover) is not present in the project area.

Determination Definitions

NE = no effect. This determination is appropriate when the proposed action will not directly, indirectly, or cumulatively impact, either positively or negatively, any listed, proposed, candidate species or designated/proposed critical habitat.

NLAA = may affect, not likely to adversely affect. This determination is appropriate when the proposed action is not likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat or there may be beneficial effects to these resources. Response requested is concurrence with the not likely to affect determination. This conclusion is appropriate when effects to the species or critical habitat will be wholly beneficial, discountable, or insignificant. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or habitat. Insignificant effects relate to the size of the impact, while discountable effects are those that are extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. If the Services concur in writing with the Action Agency's determination of "is not likely to adversely affect" listed species or critical habitat, the section 7 consultation process is completed.

LAA = may affect, likely to adversely affect. This determination is appropriate when the proposed action is likely to adversely impact any listed, proposed, candidate species or designated/proposed critical habitat. Response requested for listed species is formal consultation for action with a likely to adversely affect determination, with a biological opinion as the concluding document. This conclusion is reached if any adverse effect to listed species or critical habitat may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable or insignificant. In the event the overall effect of the proposed action is beneficial to the listed species or critical habitat, but may also cause some adverse effect on individuals of the listed species or segments of the critical habitat, then the determination is "likely to adversely affect." Any LAA determination requires formal section 7 consultation and will require additional information.

Critical Habitat No Destruction = When the proposed action will not diminish the value of critical habitat.

I. Effects of the proposed project to the species and actions to reduce impacts

NOTE: Species selected as "No Effect" with justification in table do not need to be addressed in Section I or J.

I. *Explain the potential beneficial and adverse effects to each species listed above. Describe what, when, and how the species will be impacted and the likely response to the impact. Be sure to include direct, indirect, and cumulative impacts and where possible, quantify effects.*

If species are present (or potentially present) and will not be adversely affected describe your rationale. If species are unlikely to be present in the general area or action area, explain why. This justification provides documentation for your administrative record, avoids the need for additional correspondence regarding the species, and helps expedite review.

The Gulf sturgeon, West Indian manatee, and five species of sea turtles were all listed as being potentially present in the action area by the USFWS Information for Planning and Consultation (IPaC) database (USFWS 2019a).

Gulf Sturgeon (*Acipenser oxyrhynchus desotoi*)

Direct and Indirect Impacts: The Gulf sturgeon can occur in river systems and nearshore bays and estuaries depending upon the life stage of the species and season (NOAA Fisheries 2016a). In Louisiana, the Gulf sturgeon is found in the Pearl, Bouge Chitto and Tchefuncte rivers in St. Tammany and Washington Parishes and is suspected to also occur in any large river in the Lake Pontchartrain drainage area (LDWF 2019b). As the action area contains estuarine and marine habitats, the Proposed Project would have the potential to impact adult and sub-adult Gulf sturgeon while overwintering and foraging. Gulf sturgeon feed on a variety of bottom dwelling marine organisms, including amphipods, isopods, lancelets, polychaetes, and other marine worms (USFWS 2019b). The action area is located within historical Gulf sturgeon range but outside of designated critical habitat in Lake Borgne and Lake Pontchartrain; however, there is a potential for individuals to be present within the action area. Gulf sturgeon could be impacted by dredge and artificial reef placement activities that result in temporary localized turbidity and short-term habitat alteration caused by dredging activity. Noise related to construction and human activity may also disturb Gulf sturgeon. Other impacts include collision with vessels/barges, and increased risk of entanglement with debris that may catch on anchor management systems. These fish are highly mobile; therefore, individuals disturbed by effects from construction activities would likely move to another area. Long-term impacts such as downstream turbidity, pollution, or habitat loss are not anticipated due to the localized and temporary nature of the Proposed Project activities and the implementation of the Gulf Sturgeon BMPs to reduce and avoid potential impacts to this species. As the long-term effects associated with the Proposed Project are anticipated to be beneficial to ecological

conditions of benthic environments in the action area, the overall impacts of the Proposed Project could benefit foraging habitat for this species.

Impact avoidance measures for the Proposed Project will include:

- Operate dredge equipment in a manner to avoid risks to Gulf sturgeon (e.g., disengage pumps when the cutter head is not in the substrate; avoid pumping water from the bottom of the water column).
- Implement NMFS Sea Turtle and Smalltooth Construction Conditions (revised March 23, 2006) and NMFS Measures for Reducing Entrapment Risk to Protected Species (revised May 22, 2012), as they are protective of Gulf sturgeon as well.
- In-water lines for floating platforms would be made of materials such as stiff cable or plastic-coated lines and any ropes would be thick, heavy, and taut lines that do not loop or entangle, and would be installed in a manner to minimize the risk of entanglement of protected species.

Cumulative Impacts: No potential adverse, cumulative impacts on Gulf Sturgeon are anticipated if the avoidance measures are implemented.

West Indian Manatee (*Trichechus manatus*)

Direct and Indirect Impacts: Habitats suitable to support marine vegetation may be present within the action area that could attract the West Indian manatee. However, no known occurrences of this species has been documented within the action area; thus, occurrences of this species is rare and there is a low probability the species would occur in the action area (LDWF 2019b; NatureServe 2016). However, manatees moving between areas of suitable habitat may occur within the action area.

Proposed Project in-water work includes dredging and spoil placement for the temporary access channel, and placement of artificial reef structures. These activities will result in temporary localized turbidity and construction noise that may result in avoidance behaviors. Other impacts include collision with vessels/barges, and increased risk of entanglement with debris that may catch on anchor management systems. Standard Manatee Conditions BMPs will be implemented to reduce and avoid potential impacts to this species. Adherence to the protection measures would help ensure that any manatee present in the action area would not be adversely affected. The disturbance to the manatee would be temporary, limited to project construction and would result in temporary displacement as individuals would likely move to another area for foraging or resting purposes.

Impact avoidance measures for the Proposed Project will include:

- All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973.
- All construction personnel are responsible for observing water-related activities for the presence of manatee(s).
- Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign would be placed where it is visible to the vessel operator.
- Siltation barriers, if used, would be made of material in which manatees could not become entangled, and would be properly secured and monitored.
- If a manatee is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels will operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed.
- Any manatee sighting would be immediately reported to the USFWS and the Louisiana Department of Wildlife and Fisheries (LDWF) Natural Heritage Program.

- To prevent entrapment of manatee inside of dredged material receiving areas that have dikes or other retention features that enclose an area of open water, the area would be inspected for the presence of manatee(s): 1) before complete closure of the confining features; and 2) again before material is discharged in to the receiving area. Any manatee that is sighted would be allowed to leave the area before work resumes.
- In-water lines for floating platforms would be made of materials such as stiff cable or plastic-coated lines and any ropes would be thick, heavy, and taut lines that do not loop or entangle, and would be installed in a manner to minimize the risk of entanglement of protected species.

Cumulative Impacts: With the implementation of BMPs and avoidance measures to reduce the potential for impacts to West Indian manatee, the likelihood for cumulative impacts to this species is low. The temporary increase in potential for disturbance or strikes of individual manatees from human noise and activity and/or habitat impacts associated with construction activities may still contribute to a minor increase in adverse effects, when combined with existing levels of disturbance and human noise and activity. Long-term beneficial impacts would result as the oyster reef would become a self-sustaining and valuable habitat for many estuarine species and benefit the water quality in the area. The beneficial impacts to the ecosystem could result in improved conditions for SAV, which may provide additional forage for the species.

Sea Turtles

Three species of sea turtles may possibly occur in the action area (USFWS 2019a), and include the loggerhead, Kemp's Ridley, and green sea turtle species. Due to the absence of suitable nesting beach habitats and the absence of any records of nesting for these species, these species are not expected to occur in terrestrial habitats within the Proposed Project action area (LDWF 2019b; Love et al. 2013; NatureServe 2016; NOAA 2019).

Direct and Indirect Impacts: The loggerhead, green and Kemp's Ridley sea turtles may be present within the Proposed Project action area and it is located within the known ranges of these species (LDWF 2019b; NatureServe2016). The Proposed Project's in-water work may result in temporary increases in turbidity and construction noise that may result in temporary avoidance behaviors. Sea turtles would likely avoid or move away from construction activities. Other impacts include collision with vessels/barges and/or entrapment during fill activities, and increased risk of entanglement with debris that may catch on anchor management systems. Sea turtle BMPs will be implemented to reduce and avoid impacts to these species. The construction of the artificial oyster reef would improve benthic habitat and water quality and could benefit to foraging habitat for sea turtles in the area.

Impact avoidance measures for the Proposed Project will include:

- Implement the following in-water work guidelines:
    - NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions (revised March 23, 2006);
    - NMFS's Measures for Reducing Entrapment Risk to Protected Species (revised May 22, 2012); and
    - NMFS's Vessel Strike Avoidance Measures and Reporting for Mariners (revised February 2008).
- In-water lines for floating platforms would be made of materials such as stiff cable or plastic-coated lines and any ropes would be thick, heavy, and taut lines that do not loop or entangle, and would be installed in a manner to minimize the risk of entanglement of protected species.
- If implemented, WAD devices will have a cast tongue and groove bottom affixed with stainless steel straps to prevent sea turtle entry into the product. See attached product detail sheet and representative photos.

Cumulative Impacts: With the implementation of BMPs and avoidance measures to reduce the potential for impacts to sea turtle foraging habitat, the likelihood for cumulative impacts to these species is low. The temporary increase in potential for disturbance or strikes of individual sea turtles from human noise and activity and/or habitat impacts associated with construction activities may still contribute to an increase in adverse effects, when combined with existing levels of disturbance and human noise and activity.

II. *Explain the actions to reduce adverse effects to each species listed above. For each species for which impacts were identified, describe any conservation measures (e.g. BMPs) that will be implemented to avoid or minimize the impacts. Conservation measures are designed to avoid or minimize effects to listed species and critical habitats or further the recovery of the species under review. Conservation*

measures are considered part of the proposed action and their implementation is required. Any changes to, modifications of, or failure to implement these conservation measures may result in a need to reinitiate this consultation.

Frequently Recommended BMPs: This checklist provides standard BMPs recommended by NOAA and USFWS. Please select any BMPs that will be implemented:

☒	**USFWS Standard Manatee In Water Conditions**
☒	**NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions**[1]
☒	**NMFS Measures for Reducing the Entrapment Risk to Protected Species**[1]
☒	**NFMS Vessel Strike Avoidance Measures and Reporting for Mariners**[1]

Additional BMPs or Conservation Measures

Chapter 6 of the PDARP included an important appendix (6.A) of best practices, see information starting on page 6-173. http://www.gulfspillrestoration.noaa.gov/sites/default/files/wp-content/uploads/Chapter-6_Environmental-Consequences_508.pdf

Use the box below to indicate which best management practices or conservation measures you'll be using in your project (that were not listed in Section I above)

Additional practices and measures have not yet been identified.

J. Effects to critical habitats and actions to reduce impacts

NOTE: Species selected as "No Effect" with justification in table do not need to be addressed in Section I or J.

I. *Explain the potential beneficial and adverse effects to critical habitat listed above. Describe what, when, and how the critical habitat will be impacted and the likely response to the impact. Be sure to include direct, indirect, and cumulative impacts to physical and biological features, and where possible, quantify effects (e.g. acres of habitat, miles of habitat).*

Describe your rationale if designated or proposed critical habitats are present and will not be adversely affected.

Not applicable. The action area is not located within any designated critical habitat. See image below.

[1] Documents can be found here: http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/index.html

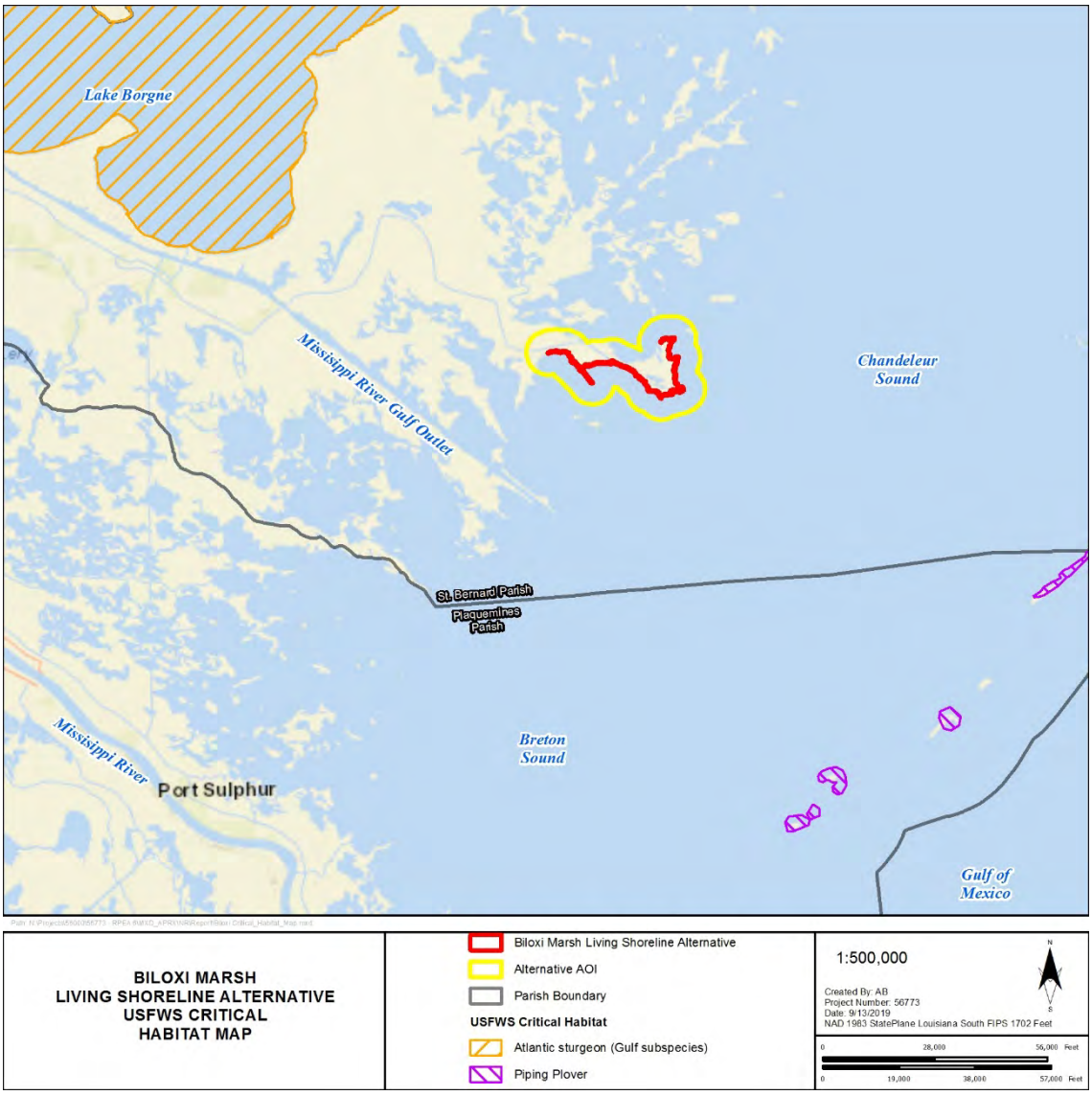


Image showing the Biloxi Marsh Action Area in relation to designated Critical Habitats.

II. *Explain the actions to reduce adverse effects to critical habitat listed above. For critical habitat for which impacts were identified, describe any conservation measures (e.g. BMPs) that will be implemented to avoid or minimize the impacts. Conservation measures are designed to avoid or minimize effects to listed species and critical habitats or further the recovery of the species under review. Conservation measures are considered part of the proposed action and their implementation is required. Any changes to, modifications of, or failure to implement these conservation measures may result in a need to reinitiate this consultation.*

Not applicable. The action area is not located within any designated critical habitat. See image above.

K. Marine Mammals

I. The Marine Mammal Protection Act prohibits the taking (including disruption of behavior, entrapment, injury, or death) of all marine mammals (e.g.,whales, dolphins, manatees). However, the MMPA allows limited exceptions to the take prohibition if authorized, such as the incidental (i.e., unintentional but not unexpected) take of marine mammals. The following questions are designed to allow the

Agencies to quickly determine if your action has the potential to take marine mammals. If the information provided indicates that incidental take is possible, further discussion with the Agencies is required.

Is your activity occurring in or on marine or estuarine waters? ☐NO ☒YES

If yes, is your activity likely to cause large-scale, ecosystem level impacts to the quality (e.g. salinity, temperature) of marine or estuarine waters? ☒NO ☐YES

II. If Yes, describe activities further using checkboxes. Does your activity involve any of the following:

NO	YES	ACTIVITY
☒	☐	*a) Use of active acoustic equipment (e.g., echosounder) producing sound below 200 kHz*
☐	☒	*b) In-water construction or demolition*
☒	☐	*c) Temporary or fixed use of active or passive sampling gear (e.g., nets, lines, traps; turtle relocation trawls)*
☒	☐	*d) In-water Explosive detonation*
☒	☐	*e) Aquaculture*
☐	☒	*f) Restoration of barrier islands, levee construction or similar projects*
☒	☐	*g) Fresh-water river diversions*
☒	☐	*h) Building or enhancing areas for water-related recreational use or fishing opportunities (e.g. fishing piers, bridges, boat ramps, marinas)*
☐	☒	*i) Dredging or in-water construction activities to change hydrologic conditions or connectivity, create breakwaters and living shorelines, etc.*
☒	☐	
☒	☐	*k) Use of floating pipeline during dredging activities*

III. If you checked "Yes" to any of the activities immediately above or the activity could impact the quality of marine or estuarine waters, please describe the nature of the activities in more detail or indicate which section of the form already includes these descriptions. See the NOAA Acoustic Guidance for more information: http://www.nmfs.noaa.gov/pr/acoustics/faq.htm

Access to the project site will be through existing navigable waterways. Construction activities will take place from the water and may require the dredging of a temporary access channel approximately 20 feet from the footprint of the artificial reef structures and removal and backfilling of individual stumps. Light load, low draft equipment will be used to minimize dredging. Access channels will be backfilled at completion of the activities. Marine mattresses are intended to prevent further erosion of the wetland shoreline. Artificial reef products are anticipated to be installed along the shoreline in continuous breakwater segments that are anticipated to be no longer than 1,000 feet and no wider than 35 feet. Gaps between breakwaters will be required for recreational and wildlife passage and are anticipated to be between 100 and 500 feet in length. Additional structures may be positioned landward or seaward to provide gap protection. The landward toe of the breakwaters is anticipated to be installed at an elevation of approximately -3.0 feet NAVD88, but this may vary between -2.0 feet NAVD88 and -6.0 feet NAVD88.

IV. *<u>Frequently Recommended BMPs for marine mammals (manatees are covered in Section I above)</u>: This checklist provides standard BMPs recommended by NOAA. Please select any BMPs that will be implemented:*

☐	NMFS Southeast U.S. Marine Mammal and Sea Turtle Viewing Guidelines[2]

[2] Documents can be found here: http://sero.nmfs.noaa.gov/protected_resources/outreach_and_education/index.html

☒	NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions[3]
☒	NMFS Measures for Reducing the Entrapment Risk to Protected Species[3]
☒	NMFS Vessel Strike Avoidance Measures and Reporting for Mariners[3]
☐	Reproducing and posting outreach signs: Dolphin Friendly Fishing Tips sign, Don't Feed Wild Dolphins sign[3]

If not listed above, please describe any additional BMPs or conservation measures that may be be implemented for marine mammals.
Additional practices and measures have not yet been identified.

L. Bald Eagles

Are bald eagles present in the action area? ☐NO ☒YES
If YES, the following conservation measures should be implemented:

1. If bald eagle breeding or nesting behaviors are observed or a nest is discovered or known, all activities (e.g., walking, camping, clean-up, use of a UTV, ATV, or boat) should avoid the nest by a minimum of 660 feet. If the nest is protected by a vegetated buffer where there is *no* line of sight to the nest, then the minimum avoidance distance is 330 feet. This avoidance distance shall be maintained from the onset of breeding/courtship behaviors until any eggs have hatched and eaglets have fledged (approximately 6 months).
2. If a similar activity (e.g., driving on a roadway) is closer than 660 feet to a nest, then you may maintain a distance buffer as close to the nest as the existing tolerated activity.
3. If a vegetated buffer is present and there is no line of sight to the nest and a similar activity is closer than 330 feet to a nest, then you may maintain a distance buffer as close to the nest as the existing tolerated activity.
4. In some instances, activities conducted at a distance greater than 660 feet of a nest may result in disturbance. If an activity appears to cause initial disturbance, the activity shall stop and all individuals and equipment will be moved away until the eagles are no longer displaying disturbance behaviors.

Will you implement the above measures? ☐NO ☒YES

If these measures cannot be implemented, then you must contact the Service's Migratory Bird Permit Office.
Texas – (505) 248-7882 or by email: permitsR2MB@fws.gov
Louisiana, Mississippi, Alabama, Florida – (404) 679-7070 or by email: permitsR4MB@fws.gov

M. Request approval for use of NMFS PDCs for this project

Complete this section only if your project qualifies for streamlined ESA consultation under the ESA Framework Programmatic Biological Opinion completed by NMFS on February 10, 2016. To be eligible for streamlined ESA consultation with NMFS, you must implement all Project Design Criteria (PDCs) applicable to your project. Check "yes" for PDC categories that apply to the proposed project, and request PDC checklist from NMFS.

NO	YES	ACTIVITY
☒	☐	**Oyster Reef Creation and Enhancement**
☒	☐	**Marine Debris Removal**
☒	☐	**Construction of Living Shorelines**
☒	☐	**Marsh Creation and Enhancement**
☒	☐	**Construction of Non-Fishing Piers**

N. Submitting the BE Form

We request that all BE forms and consultation materials be placed on Sharepoint for review. Upon receipt, we will conduct a preliminary review and provide any comments and feedback, including any requests for modifications or additional information. If

[3] Documents can be found here: http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/index.html

modifications or additional information is necessary, we will work with you until the Biological Evaluation form is considered complete. Once complete, we will use the Biological Evaluation form to initiate appropriate consultations.

Questions may be directed to:

NMFS ESA § 7 Consultation Christy Fellas, National Oceanic Atmospheric Administration Email: Christina.Fellas@noaa.gov Phone: 727-551-5714	**USFWS ESA § 7 Consultation** Erin Chandler, Department of the Interior Email: Erin_Chandler@fws.gov Phone: 470-361-3153

REFERENCES

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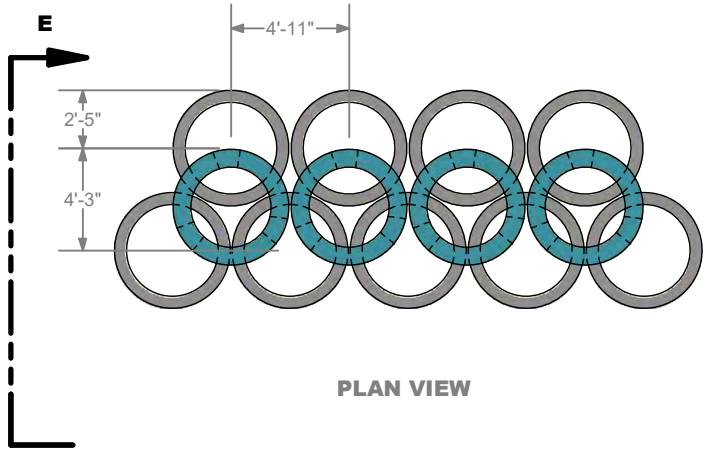
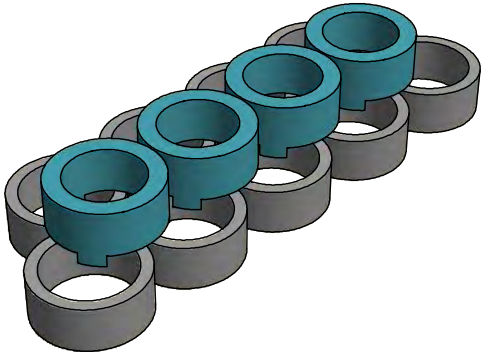
Product Design Sheets

1) Oysterbreak
2) Shorejax
3) Ecobale
4) Wave Attenuation Device (WAD)

CONFIGURATION 2 (2 FLOOR UNITS WITH 1 TOP UNIT)

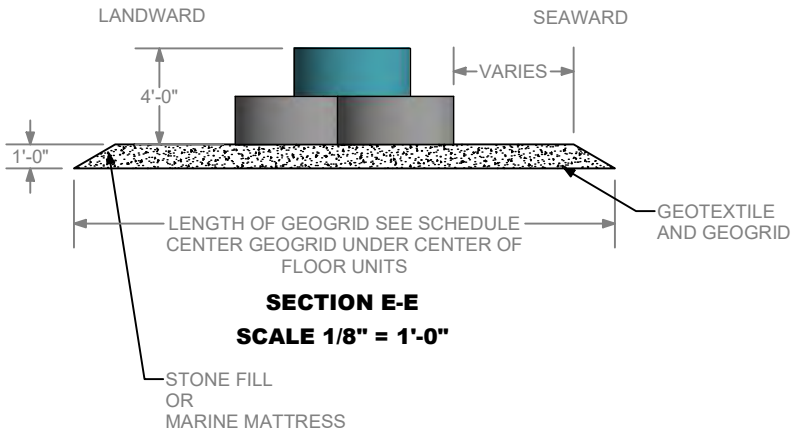


PLAN VIEW



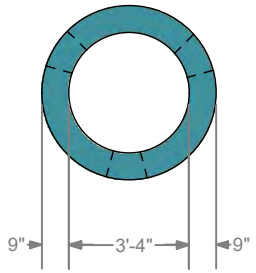
GEOGRID SCHEDULE

Length of Geogrid (ft)	Boring location I.D.
36.0	NB03
21.0	NB04, NB12, NB16, NB18
24.0	NB09
34.0	NB11

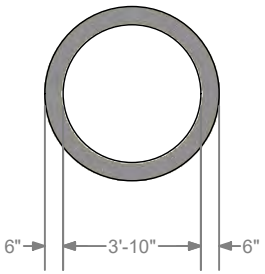


SECTION E-E

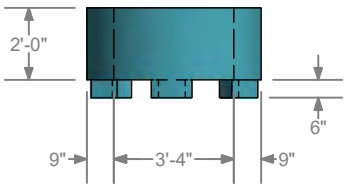
SCALE 1/8" = 1'-0"



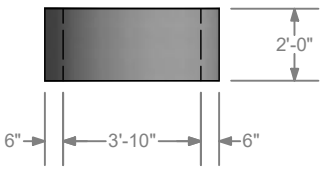
PLAN VIEW
(TOP UNIT)



PLAN VIEW
(BASE UNIT)



ELEV. VIEW
20.3128 cu.ft.



ELEV. VIEW

OYSTERBREAK ARMOR UNITS
MAY BE EITHER OYSTERKRETE
OR CONSOLIDATED CONCRETE
DEPENDING ON PROJECT NEEDS

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
TOP UNIT	2,046	2,202	1,074	1,230	9.61
FLOOR UNIT	1,390	1,496	730	836	9.61

WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

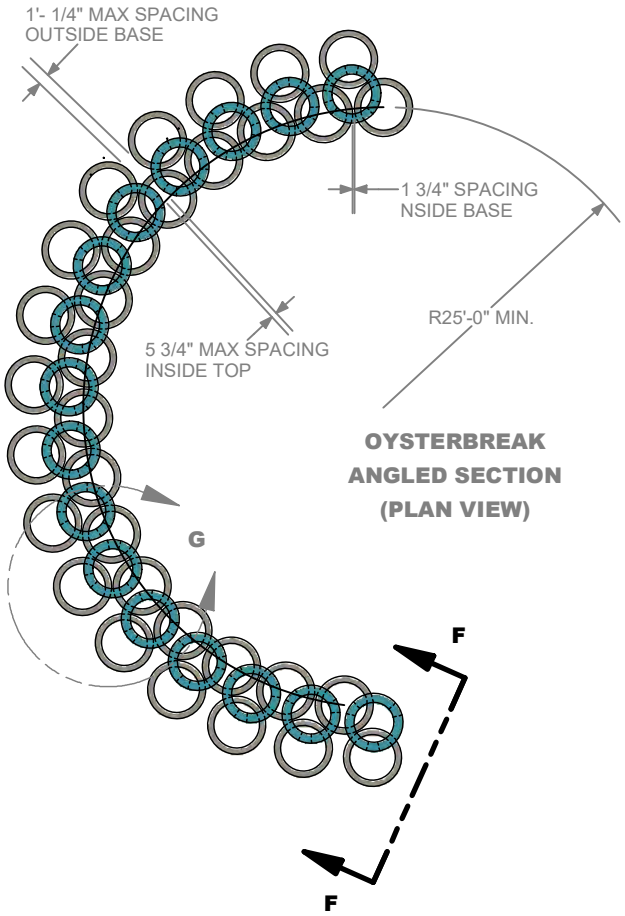
NPCA CERTIFIED PLANT

DESCRIPTION
58" Diameter
OYSTERBREAK

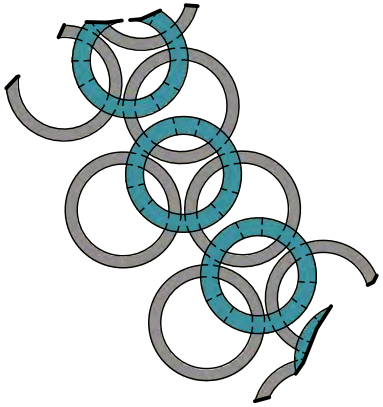
PROJECT
PO 174 (Configuration Alternative #2)

CUSTOMER
WAYFARER

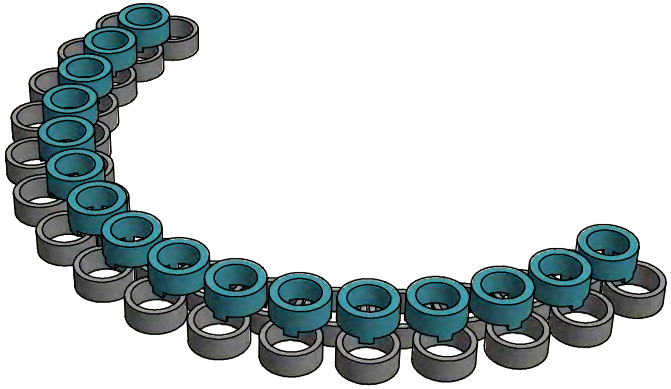
MODELED BY	DATE	SHEET
Jason	8/15/2018	1 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4

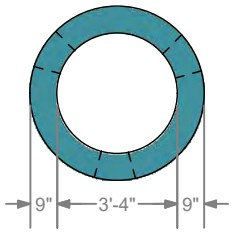


OYSTERBREAK ANGLED SECTION (PLAN VIEW)

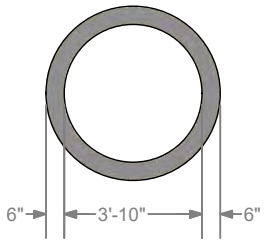


DETAIL G
SCALE 1/8" = 1'-0"

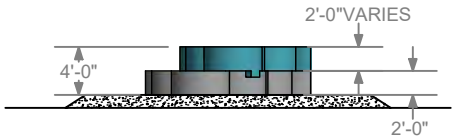




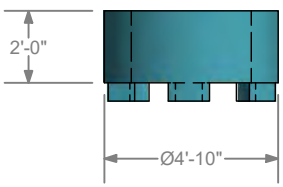
PLAN VIEW (TOP UNIT)



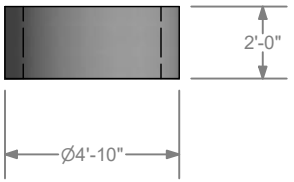
PLAN VIEW (BASE UNIT)



SECTION F-F
SCALE 1/16" = 1'-0"



ELEV. VIEW (TOP UNIT)



ELEV. VIEW (BASE UNIT)

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
TOP UNIT	2,046	2,202	1,074	1,230	9.61
FLOOR UNIT	1,390	1,496	730	836	9.61

WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

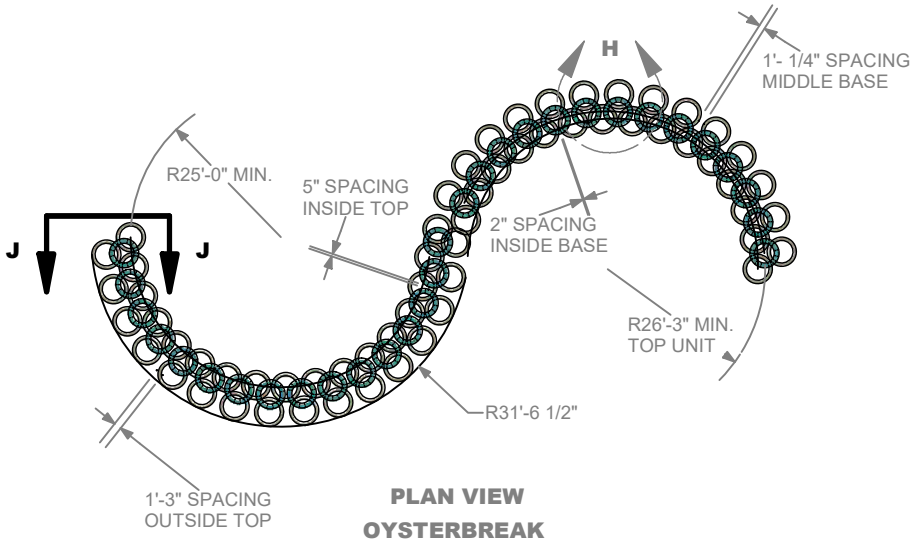
NPCA CERTIFIED PLANT

DESCRIPTION
58" Diameter
OYSTERBREAK

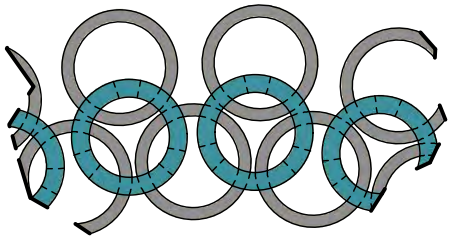
PROJECT
PO 174 (Configuration Alternative #2)

CUSTOMER
WAYFARER

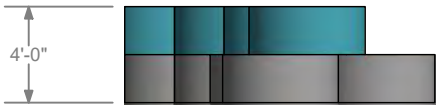
MODELED BY	DATE	SHEET
Jason	8/15/2018	2 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4



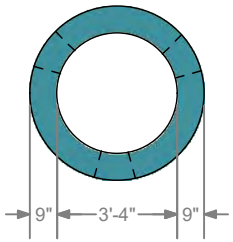
PLAN VIEW
OYSTERBREAK
UNIT



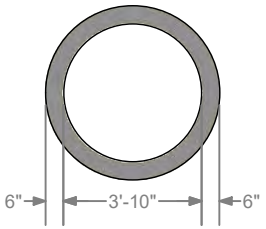
DETAIL H
SCALE 1/8" = 1'-0"



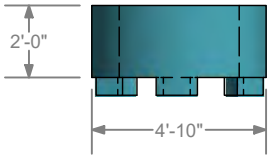
SECTION J-J
SCALE 1/8" = 1'-0"



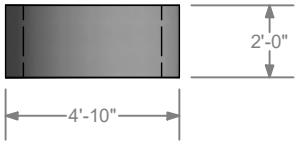
PLAN VIEW
(TOP UNIT)



PLAN VIEW
(BASE UNIT)



ELEV. VIEW
(TOP UNIT)



ELEV. VIEW
(BASE UNIT)

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
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WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

NPCA CERTIFIED PLANT

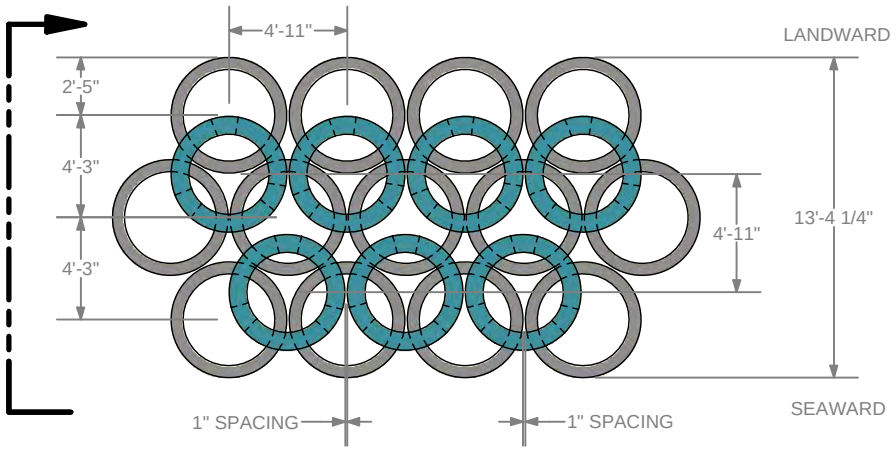
DESCRIPTION
58" Diameter
OYSTERBREAK

PROJECT
PO 174 (Configuration Alternative #2)

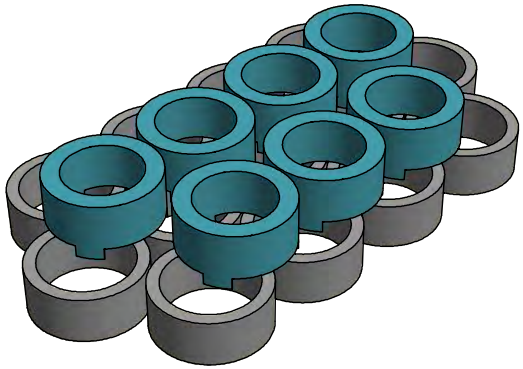
CUSTOMER
WAYFARER

MODELED BY	DATE	SHEET
Jason	8/15/2018	3 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4

CONFIGURATION 1 (3 FLOOR UNITS WITH 2 TOP UNITS)

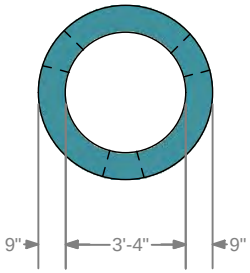


PLAN VIEW

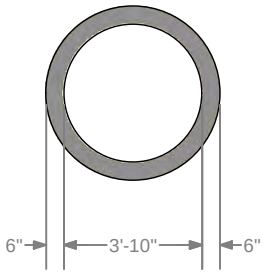


GEOGRID SCHEDULE

Length of Geogrid (ft)	Boring Location I.D.
49.0	NB02
36.0	NB03
21.0	NB04, NB12, NB16, NB08
31.0	NB07
24.0	NB09
34.0	NB11
39.0	NB14
47.0	NB15

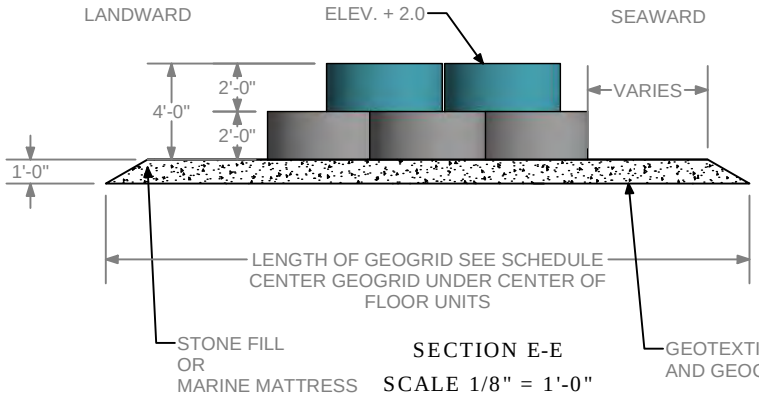


PLAN VIEW
(TOP UNIT)

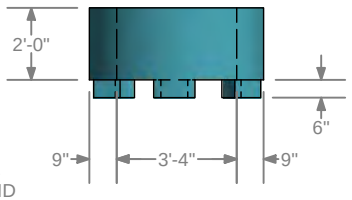


PLAN VIEW
(BASE UNIT)

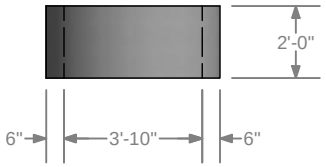
OYSTERBREAK ARMOR UNITS
MAY BE EITHER OYSTERKRETE
OR CONSOLIDATED CONCRETE
DEPENDING ON PROJECT NEEDS



SECTION E-E
SCALE 1/8" = 1'-0"



ELEV. VIEW
20.3128 cu.ft.



ELEV. VIEW

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
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FLOOR UNIT	1,390	1,496	730	836	9.61

WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

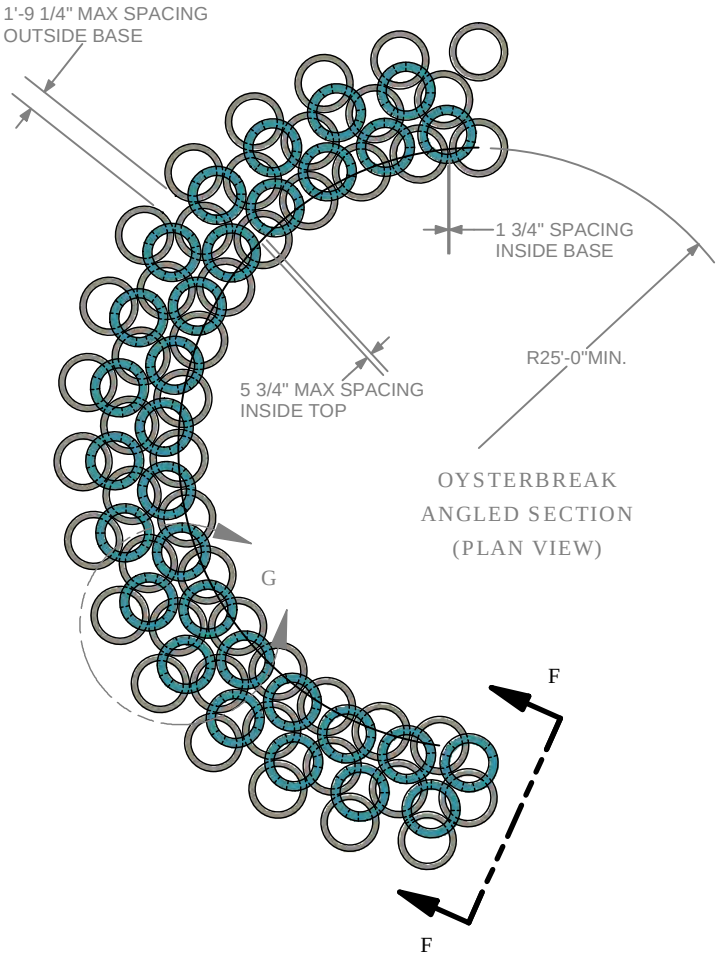
NPCA CERTIFIED PLANT

DESCRIPTION
58" Diameter
OYSTERBREAK

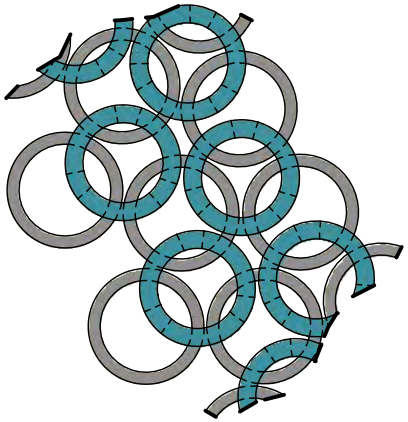
PROJECT
PO 174 (Configuration Alternative #1)

CUSTOMER
WAYFARER

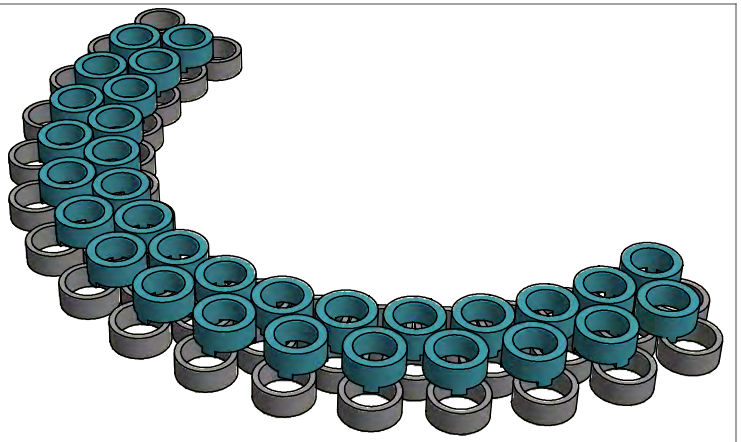
MODELED BY	DATE	SHEET
Jason	8/15/2018	1 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4



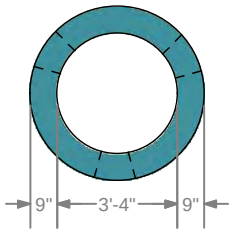
OYSTERBREAK
ANGLED SECTION
(PLAN VIEW)



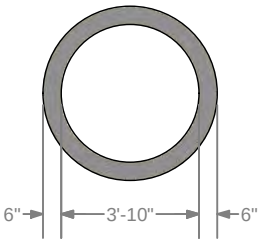
DETAIL G
SCALE 1/8" = 1'-0"



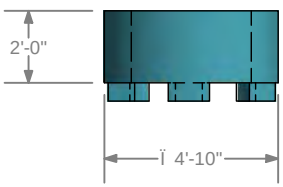
SECTION F-F
SCALE 1/16" = 1'-0"



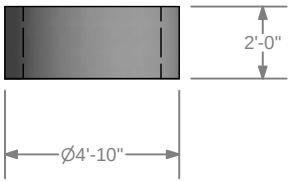
PLAN VIEW
(TOP UNIT)



PLAN VIEW
(BASE UNIT)



ELEV. VIEW
(TOP UNIT)



ELEV. VIEW
(BASE UNIT)

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
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WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

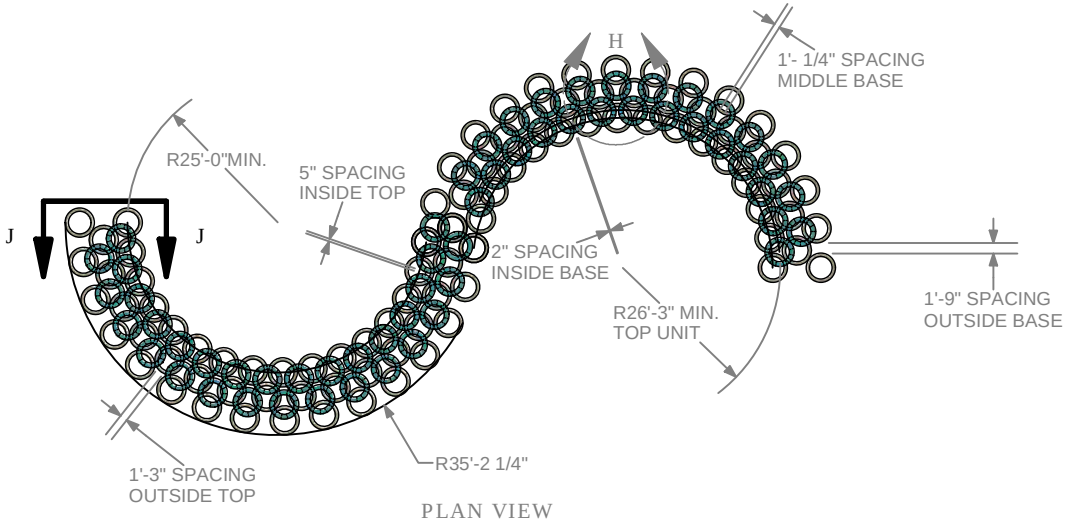
NPCA CERTIFIED PLANT

DESCRIPTION
58" Diameter
OYSTERBREAK

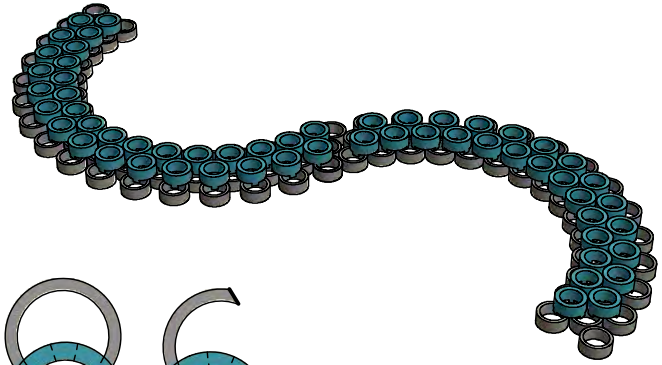
PROJECT
PO 174 (Configuration Alternative #1)

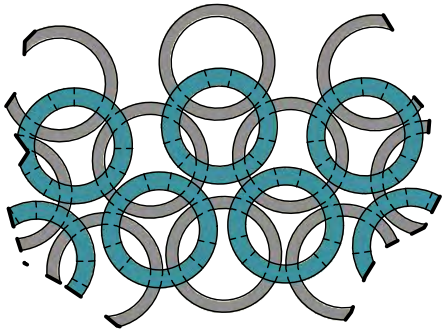
CUSTOMER
WAYFARER

MODELED BY	DATE	SHEET
Jason	8/15/2018	2 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4

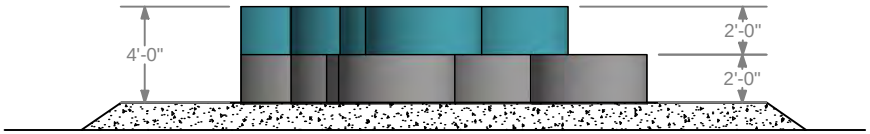


PLAN VIEW
OYSTERBREAK
UNIT

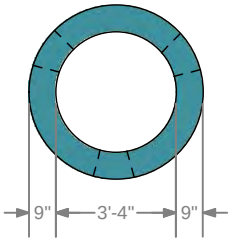




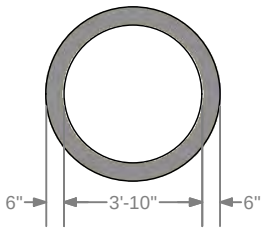
DETAIL H
SCALE 1/8" = 1'-0"



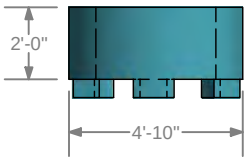
SECTION J-J
SCALE 1/8" = 1'-0"



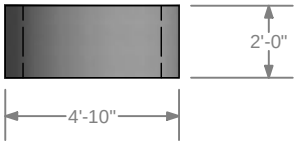
PLAN VIEW
(TOP UNIT)



PLAN VIEW
(BASE UNIT)



ELEV. VIEW
(TOP UNIT)



ELEV. VIEW
(BASE UNIT)

OysterBreak Armor Unit Properties					
OysterBreak Unit Type	OK Wt. (lbs) 130 cu ft Density	SCC (lbs) 145 cu ft Density	Submerged Wt. OK (lbs)	Submerged Wt SCC (lbs)	Loading Area Per Ring (sq. ft)
TOP UNIT	2,046	2,202	1,074	1,230	9.61
FLOOR UNIT	1,390	1,496	730	836	9.61

WAYFARER ENVIRONMENTAL TECHNOLOGIES

LOCKE

MADE IN THE USA

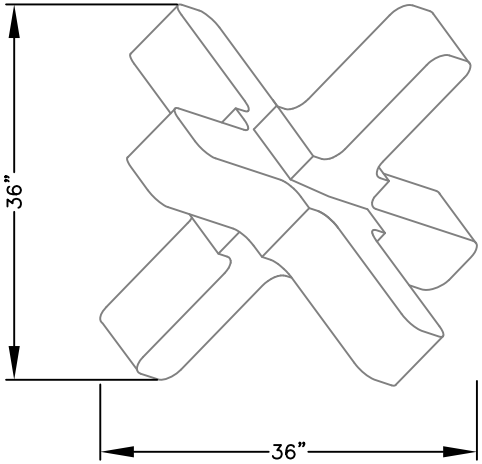
NPCA CERTIFIED PLANT

DESCRIPTION
58" Diameter
OYSTERBREAK

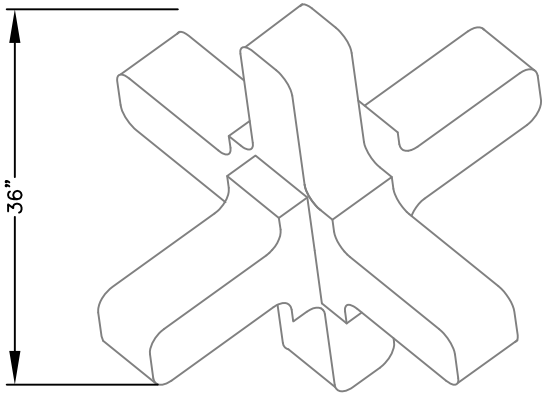
PROJECT
PO 174 (Configuration Alternative #1)

CUSTOMER
WAYFARER

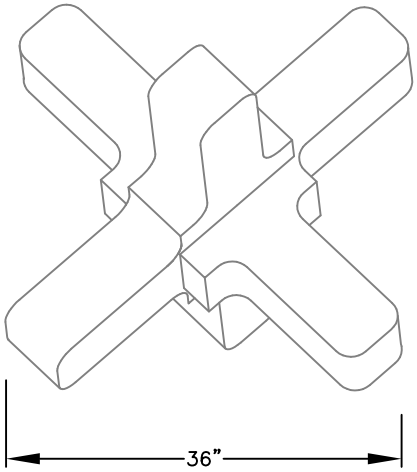
MODELED BY	DATE	SHEET
Jason	8/15/2018	3 of 3
REVISED BY	REV DATE	REV
Mario B.	4/25/2019	6
CHECKED BY		SCALE A4



PLAN VIEW



SECTION VIEW



PROFILE VIEW

VOLUME OF CONCRETE:

FULL UNIT – 4.49FT^3

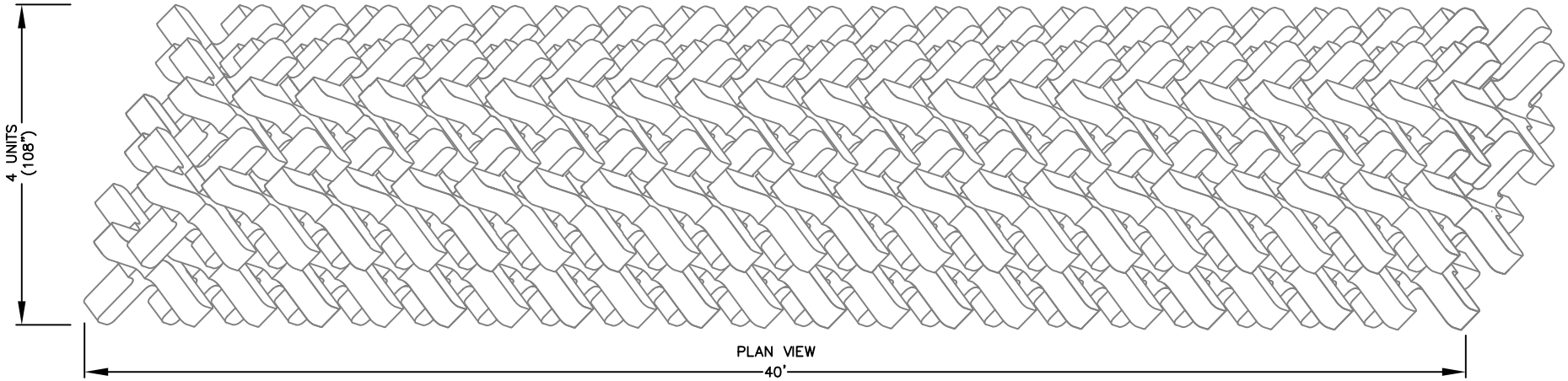
FROM BASE UP TO 2.52' – 4.25FT^3

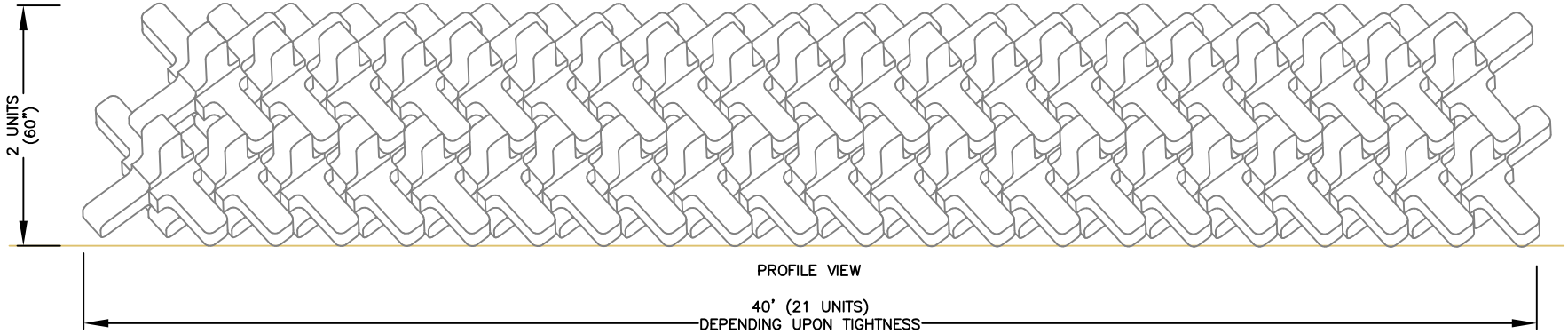
FROM BASE UP TO 3.31' – FULL UNIT

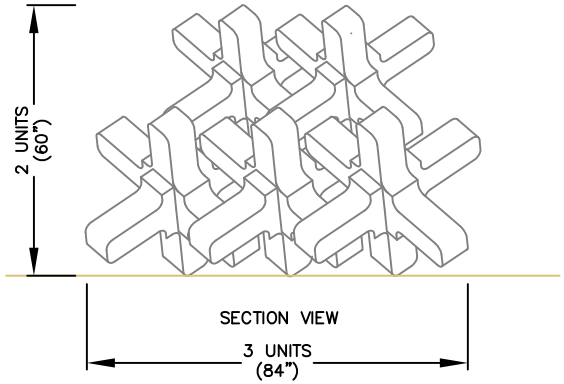
PREPARED FOR:

PREMIER CONCRETE PRODUCTS, INC.
510 O' Neal Lane
Baton Rouge, LA 70819
225-273-3511 Phone
225-273-9888 Fax

TITLE:	DRAWN BY:	DATE:	CAD FILE:
ShoreJax 48" Unit Detail	MDD	4/15/19	Prem. Conrete
	CHECKED BY: BD	SCALE: N.T.S.	DRAWING NAME/NO: Artificial Reef







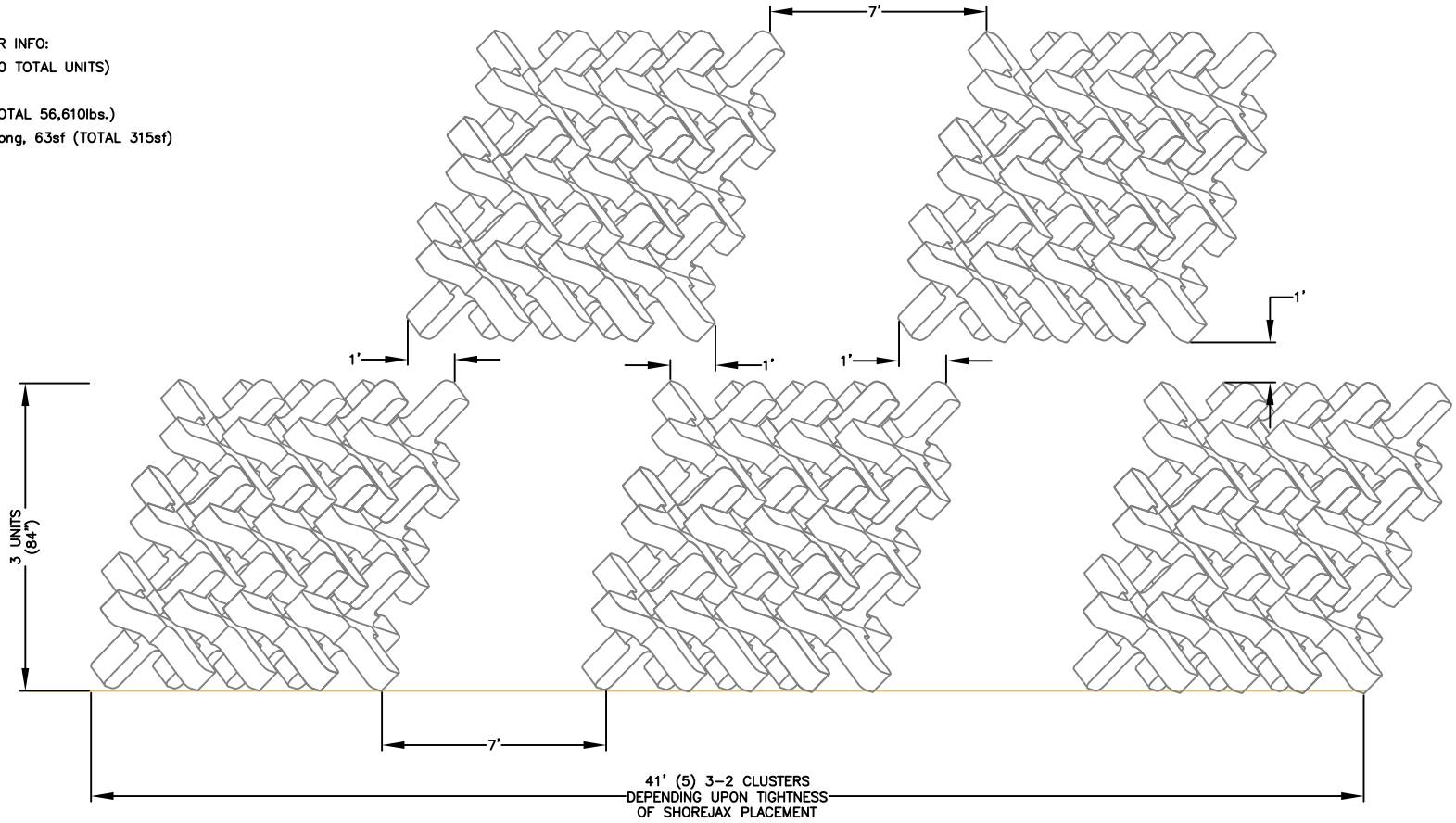
40' LONG 3–2 CLUSTER INFO:
105+/– UNITS
VOLUME OF CLUSTER – 471.5FT^3
VOLUME FROM BASE TO 2.52' – 332.8ft^3
VOLUME FROM BASE TO 3.31' – 409.1ft^3
VOLUME FROM BASE TO 4.1' – 446.2ft^3

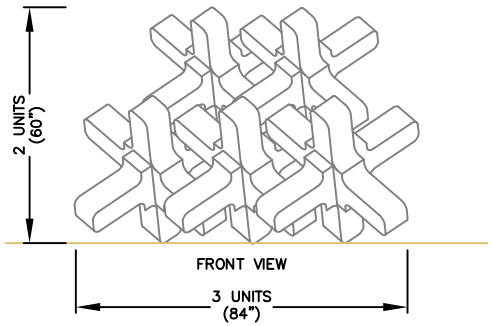
PREPARED FOR:

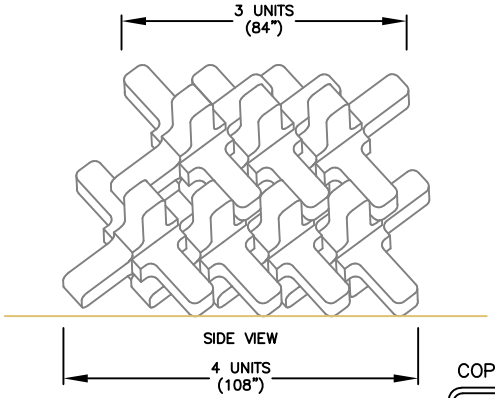
PREMIER CONCRETE PRODUCTS, INC.
510 O' Neal Lane
Baton Rouge, LA 70819
225-273-3511 Phone
225-273-9888 Fax

TITLE:	DRAWN BY:	DATE:	CAD FILE:
ShoreJax Detail 40' Long 3:2 Stack	MDD	4/15/19	Prem. Conrete
	CHECKED BY: BD	SCALE: N.T.S.	DRAWING NAME/NO: Artificial Reef

41' LONG (5) 3–2 CLUSTER INFO:
18 UNITS PER CLUSTER (90 TOTAL UNITS)
9.5FT^3 PER LF.
11,322lbs PER CLUSTER (TOTAL 56,610lbs.)
7ft wide X 5ft tall X 9ft long, 63sf (TOTAL 315sf)
180lbs. PER SQFT.





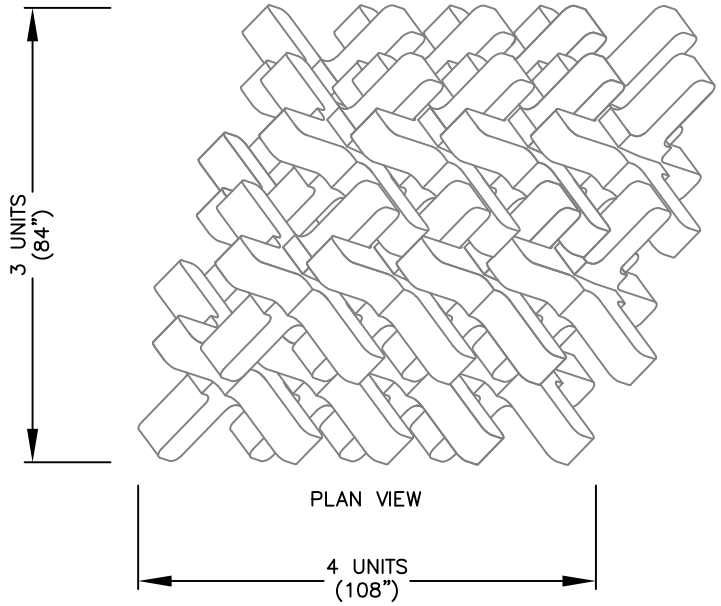


PREPARED FOR:

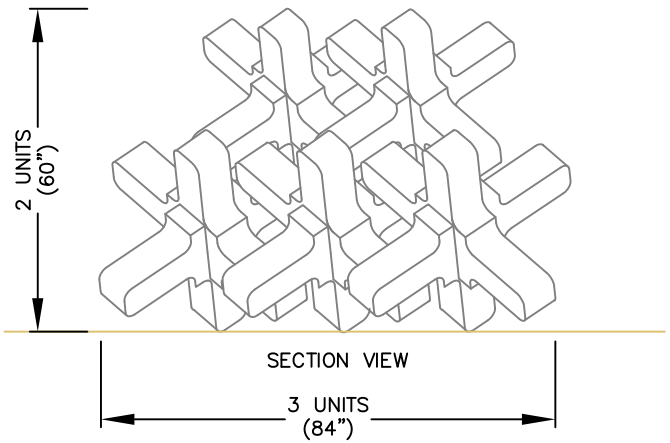
PREMIER CONCRETE PRODUCTS, INC.

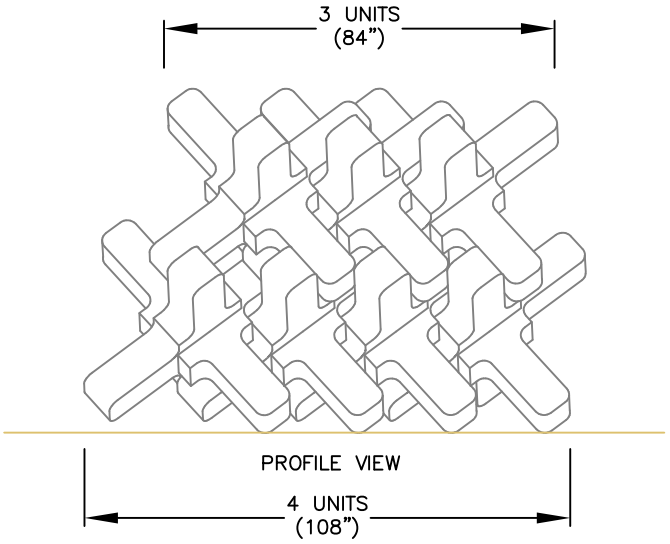
510 O' Neal Lane
Baton Rouge, LA 70819
225-273-3511 Phone
225-273-9888 Fax

TITLE: ShoreJax 41' Long 3:2 Stack Detail	DRAWN BY: MDD	DATE: 4/23/19	CAD FILE: Prem. Conrete
	CHECKED BY: BD	SCALE: N.T.S.	DRAWING NAME/NO: Artificial Reef



3–2 CLUSTER (4 UNITS LONG) INFO:
20 UNITS
VOLUME OF CLUSTER – 89.8FT^3
VOLUME FROM BASE TO 2.52' – 61ft^3
VOLUME FROM BASE TO 3.31' – 76.8ft^3
VOLUME FROM BASE TO 4.1' – 86.2ft^3





PREPARED FOR:
PREMIER CONCRETE PRODUCTS, INC.
510 O' Neal Lane
Baton Rouge, LA 70819
225-273-3511 Phone
225-273-9888 Fax

TITLE:	DRAWN BY:	DATE:	CAD FILE:
ShoreJax Detail 3:2 Stack (4 Units Long)	MDD	4/15/19	Prem. Conrete
	CHECKED BY: BD	SCALE: N.T.S.	DRAWING NAME/NO: Artificial Reef

Attachment 2

NOTES:

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave. Houma, LA 70363
(985)868-1050 - tbsmith.com

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

REVISION DESCRIPTION:
--

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	1	OF	4

60" ECOBALE UNIT

MARTIN ecosystems

4/15/2019 - P:\Y-2019\00019.0143\3D\WG\3D MODELS\MARTIN_ECOSYSTEMS_FINAL.DWG

NOTES:

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

REV. NO: 00	REV. DATE: --/--/--	REV. BY: --

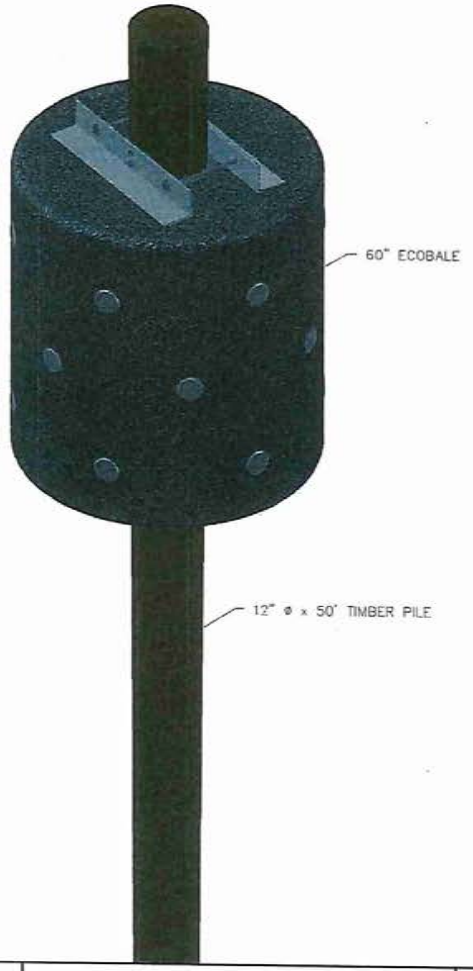
REVISION DESCRIPTION:
-

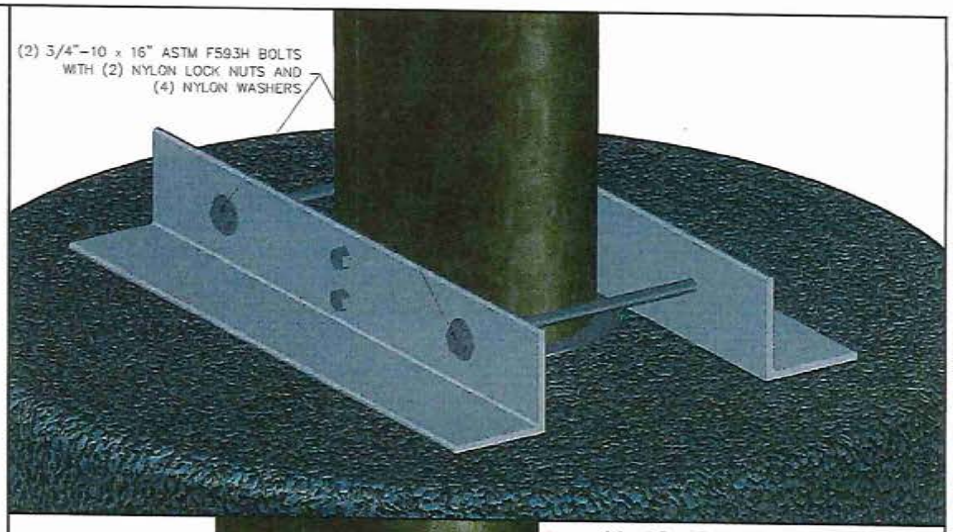
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	2 OF 4		

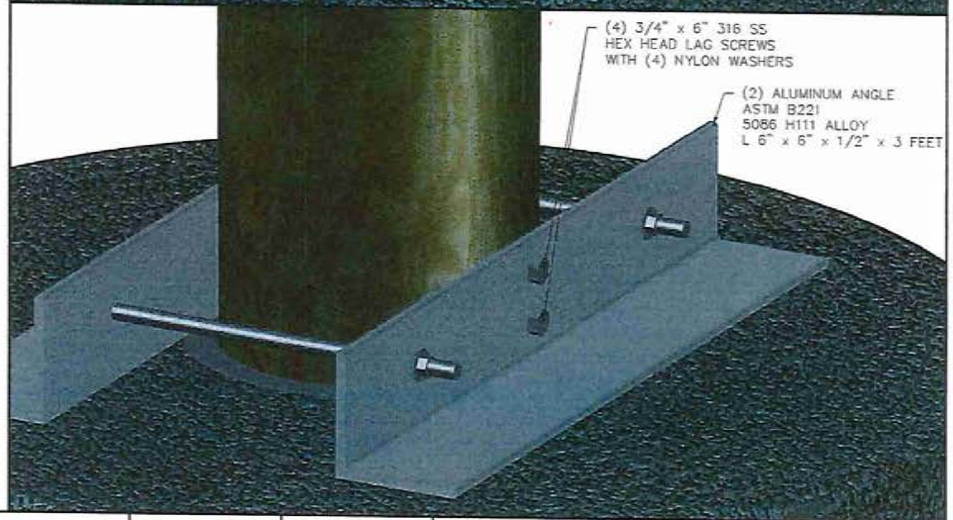
90" ECOBALE UNIT

MARTIN ecosystems

4/15/2019 - P:\Y-2019\2019.0143\GIS\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG







NOTES:

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

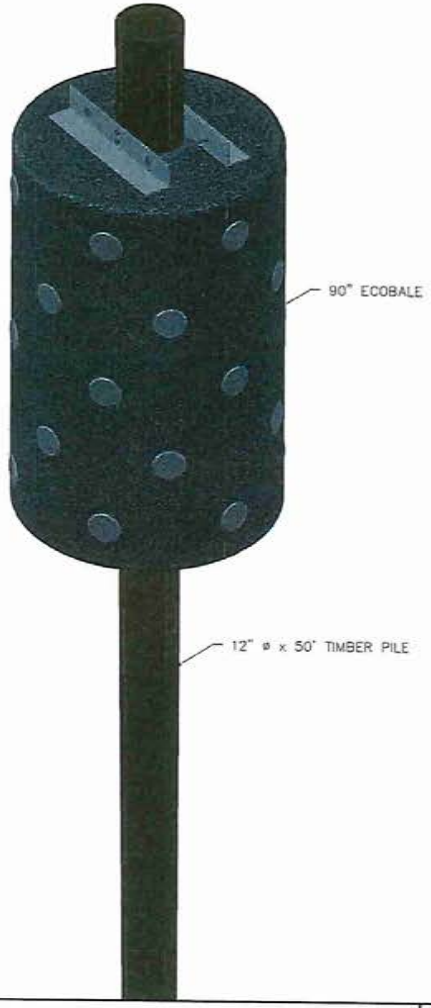
REVISION DESCRIPTION:
-

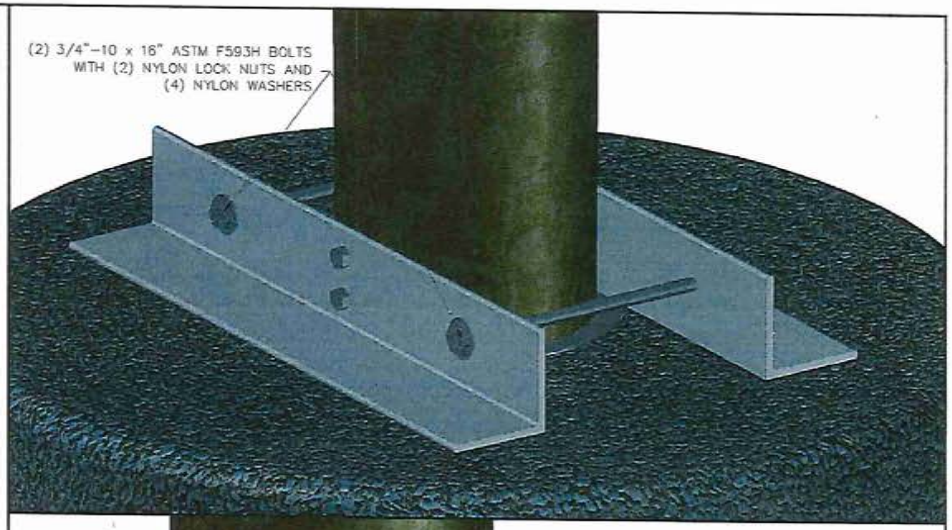
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	3 OF 4		

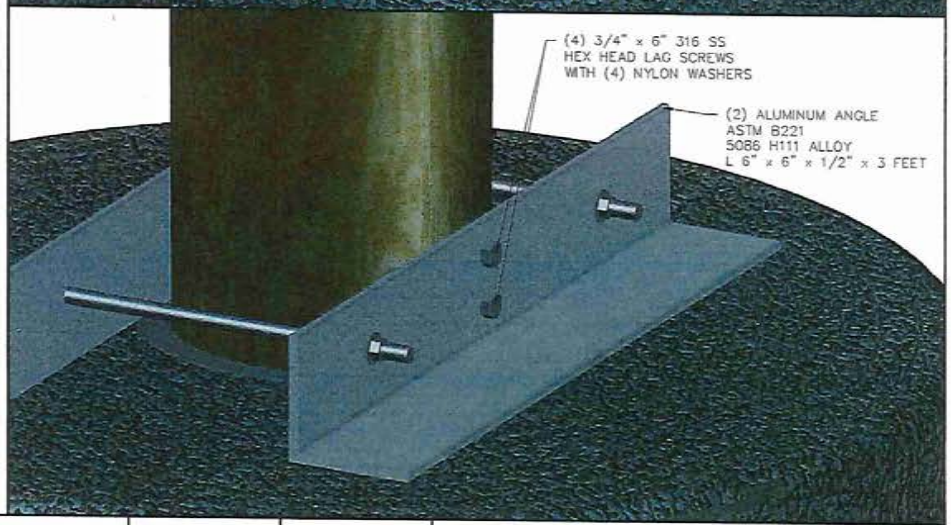
60" ECOBALE INSTALLATION

MARTIN ecosystems

4/15/2019 - P:\V-2019\2019.0143\3DW\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG







NOTES:

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ava, Houma, LA 70363
(985)868-1050 - tbsmith.com

REV. NO:	03	REV. DATE:	-/-/-	REV. BY:	-

REVISION DESCRIPTION:
-

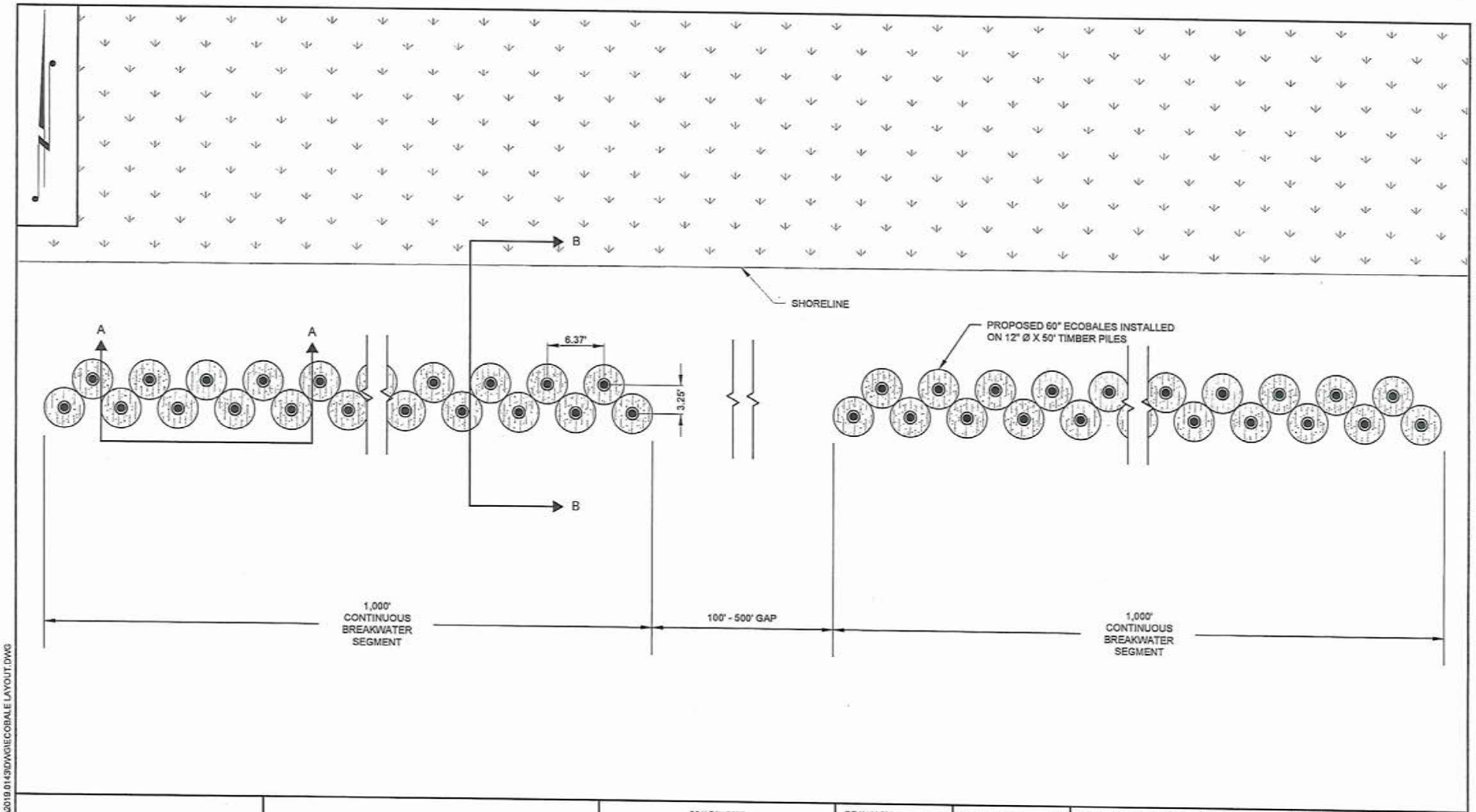
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	4	OF	4

90" ECOBALE INSTALLATION

MARTIN ecosystems

4/15/2019 - PJY:2019\2019.0143\DWG\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG

Attachment 3



MARTIN ecosystems

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

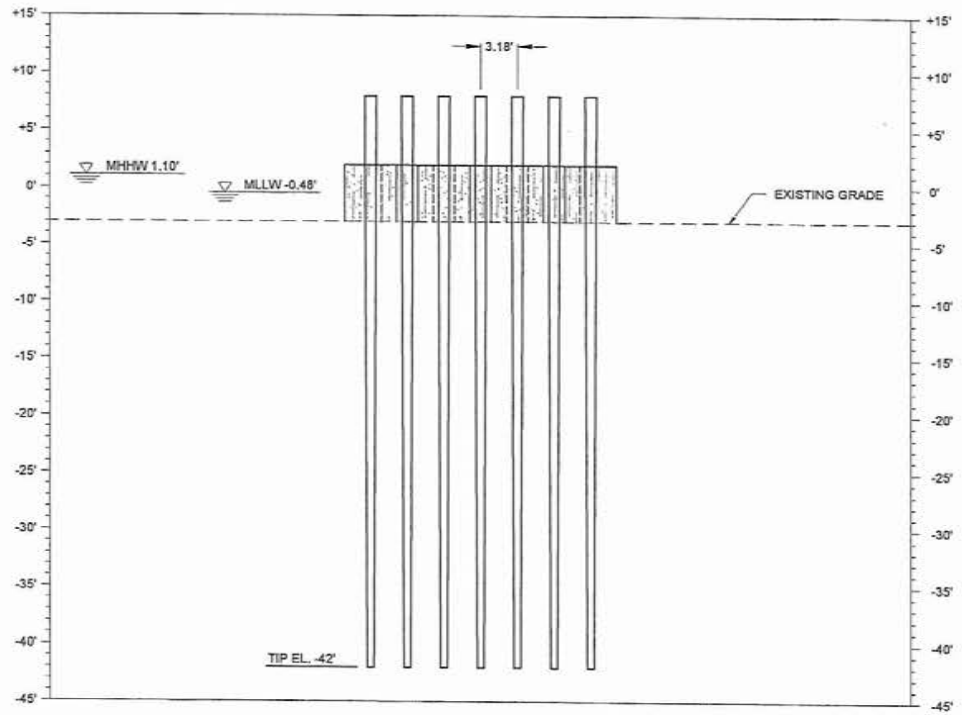
REVISION DESCRIPTION:
--

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	1	OF	8

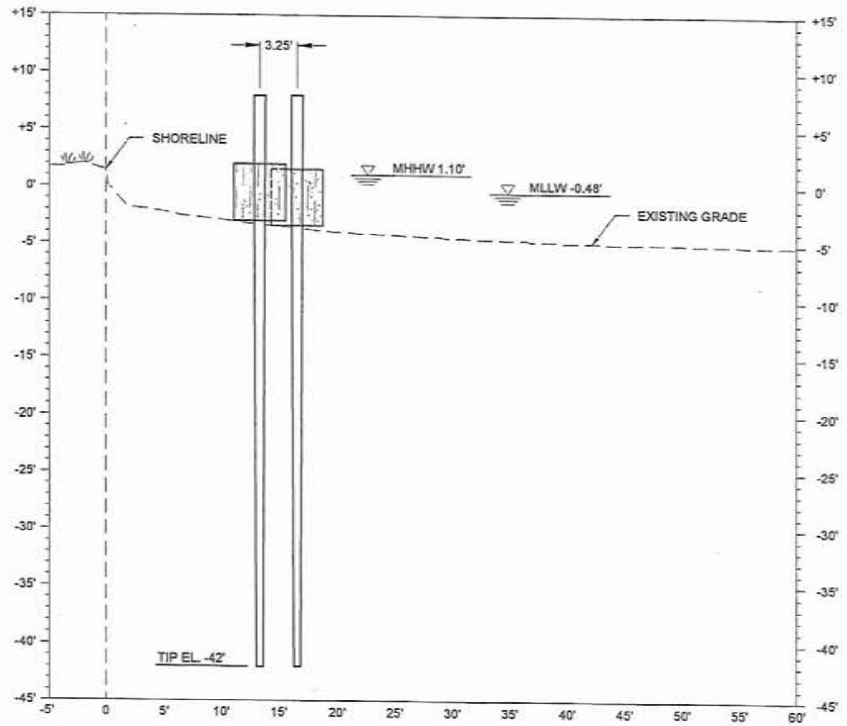
60" ECOBALE CONFIGURATION #1 LAYOUT

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG



TYPICAL SECTION A-A
PROFILE VIEW



TYPICAL SECTION B-B
CROSS - SECTION VIEW

4/10/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG

MARTIN ecosystems

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

REV. NO:	REV. DATE:	REV. BY:
00	--/--/--	--

REVISION DESCRIPTION:
-

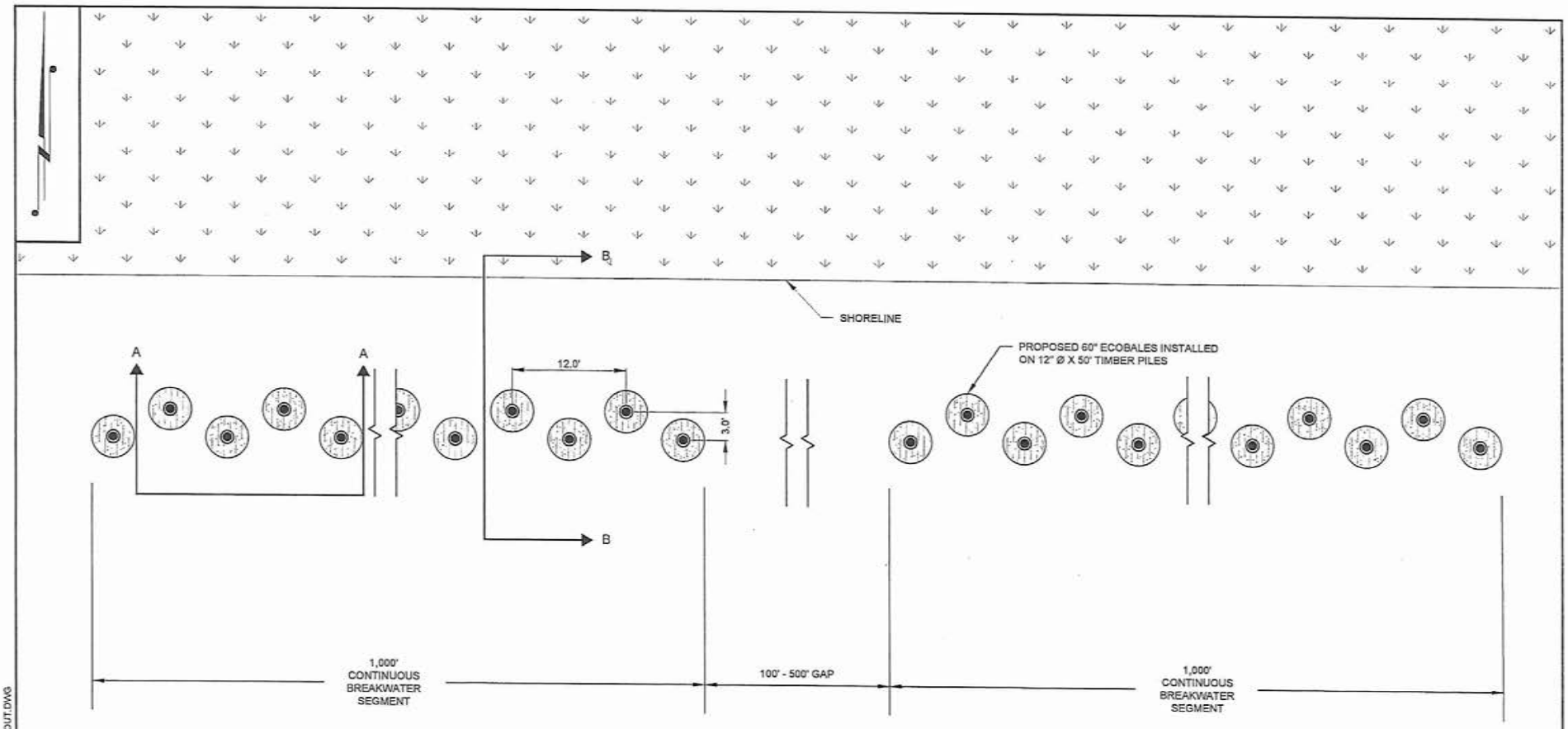
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		

PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702)
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SHEET NO: 2 OF 8

60" ECOBALE CONFIGURATION #1 SECTIONS

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04



MARTIN ecosystems

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

REV. NO:	00	REV. DATE:	-/-/-	REV. BY:	--

REVISION DESCRIPTION:
--

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		

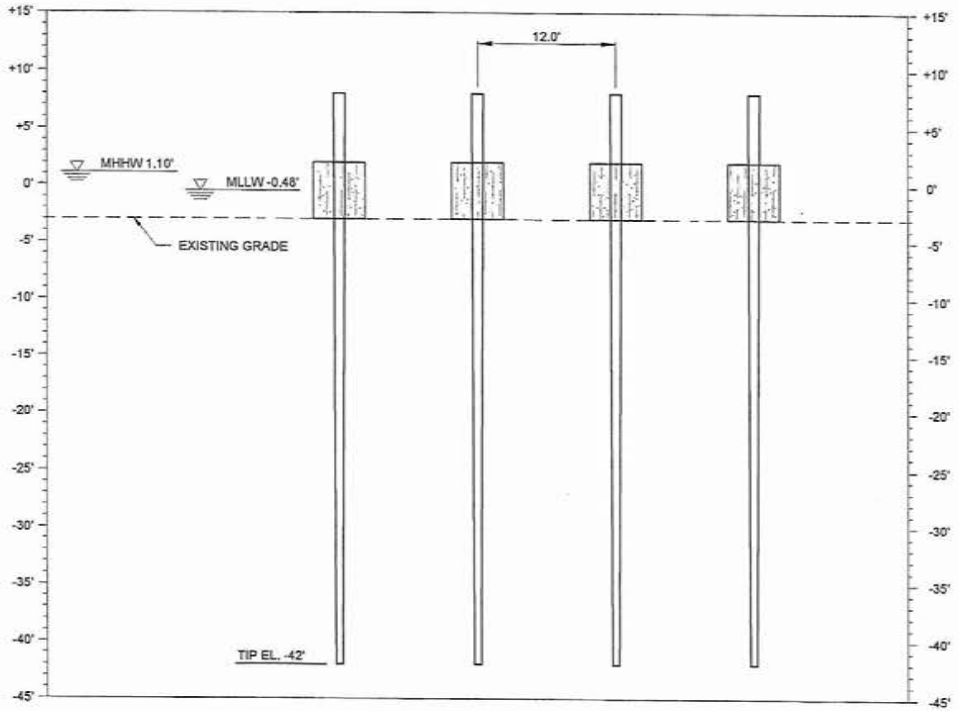
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702)
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SHEET NO: 3 OF 8

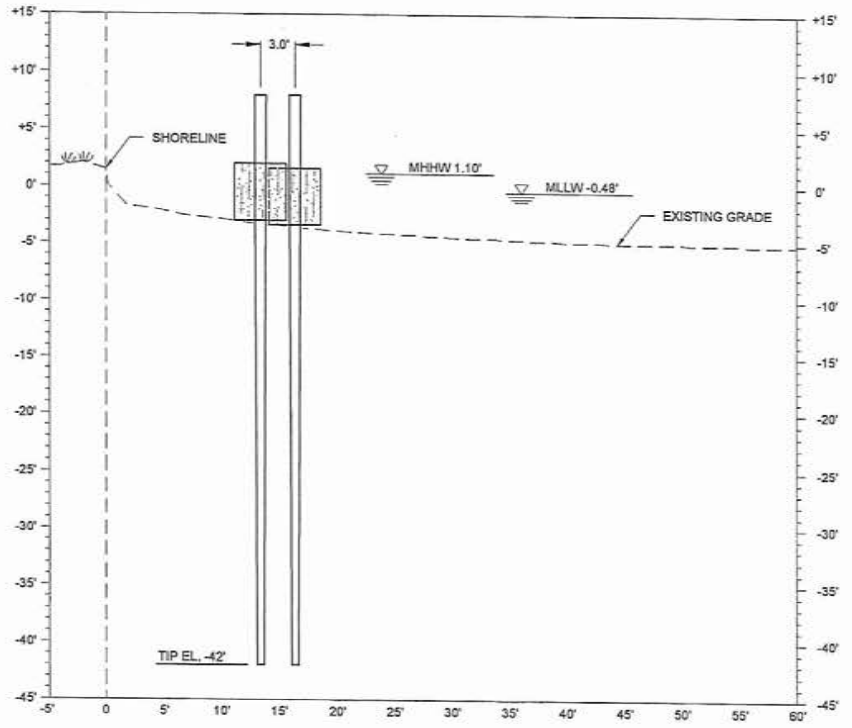
60" ECOBALE CONFIGURATION #2 LAYOUT

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG



TYPICAL SECTION A-A
PROFILE VIEW



TYPICAL SECTION B-B
CROSS - SECTION VIEW

MARTIN ecosystems

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

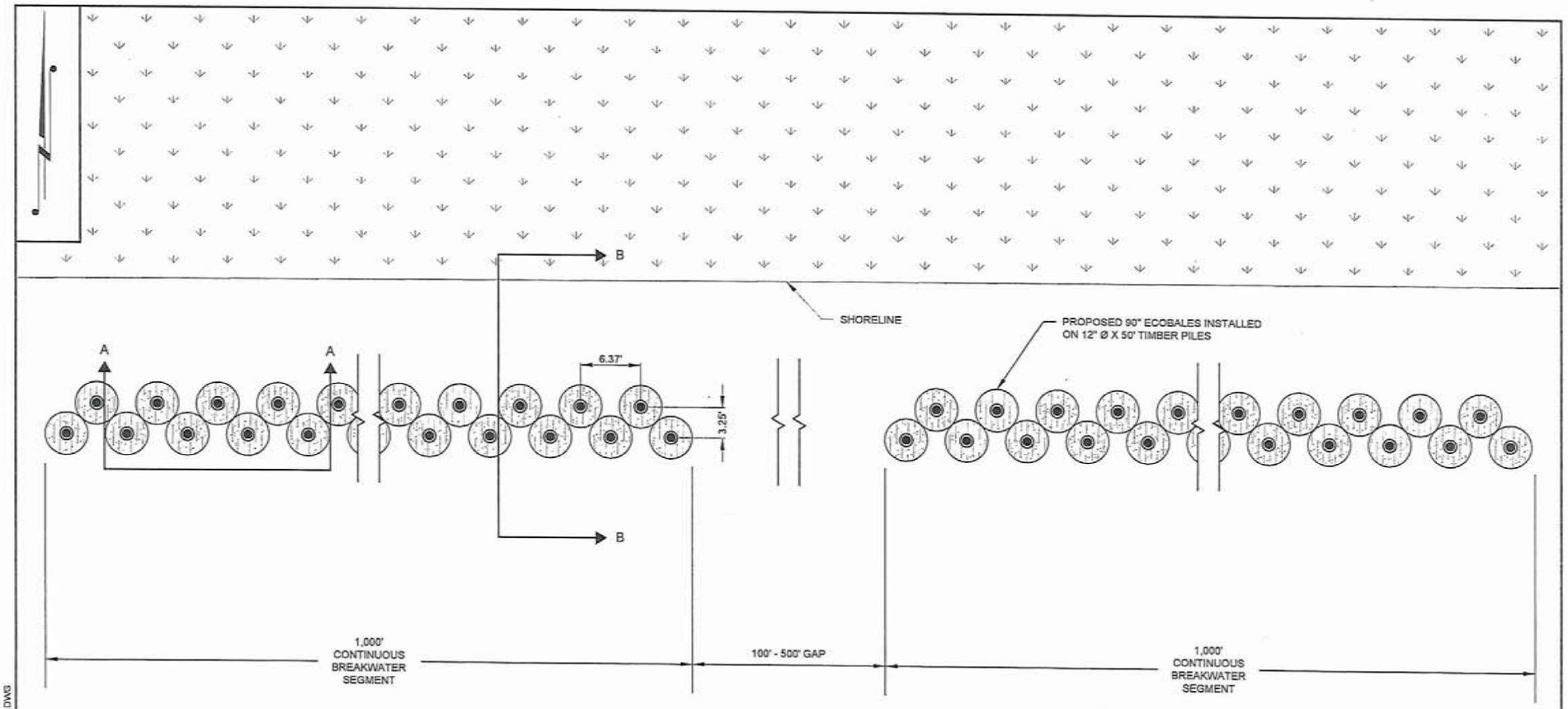
REVISION DESCRIPTION:
-

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	4 OF 8		

60" ECOBALE CONFIGURATION #2 SECTIONS

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG



MARTIN ecosystems

T. BAKER SMITH
A CENTURY OF SOLUTIONS
412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	—

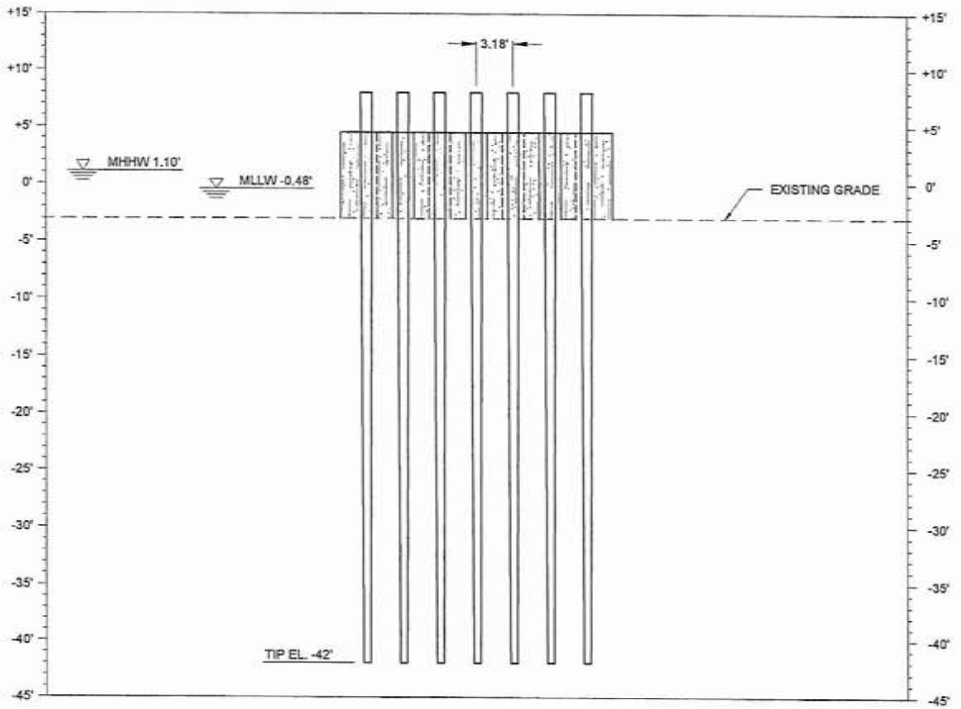
REVISION DESCRIPTION:
–

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	5	OF	8

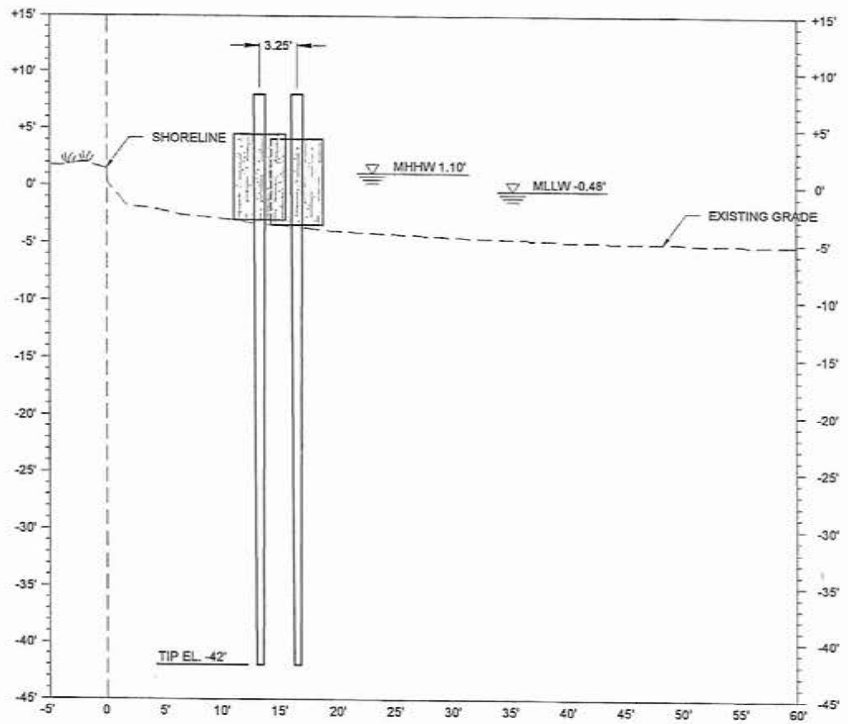
90" ECOBALE CONFIGURATION #1 LAYOUT

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG



TYPICAL SECTION A-A
PROFILE VIEW



TYPICAL SECTION B-B
CROSS - SECTION VIEW

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG

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412 South Van Ave, Houma, LA 70363
(985)868-1050 - tbsmith.com

SCALE IN FEET
10' 5' 0' 10'

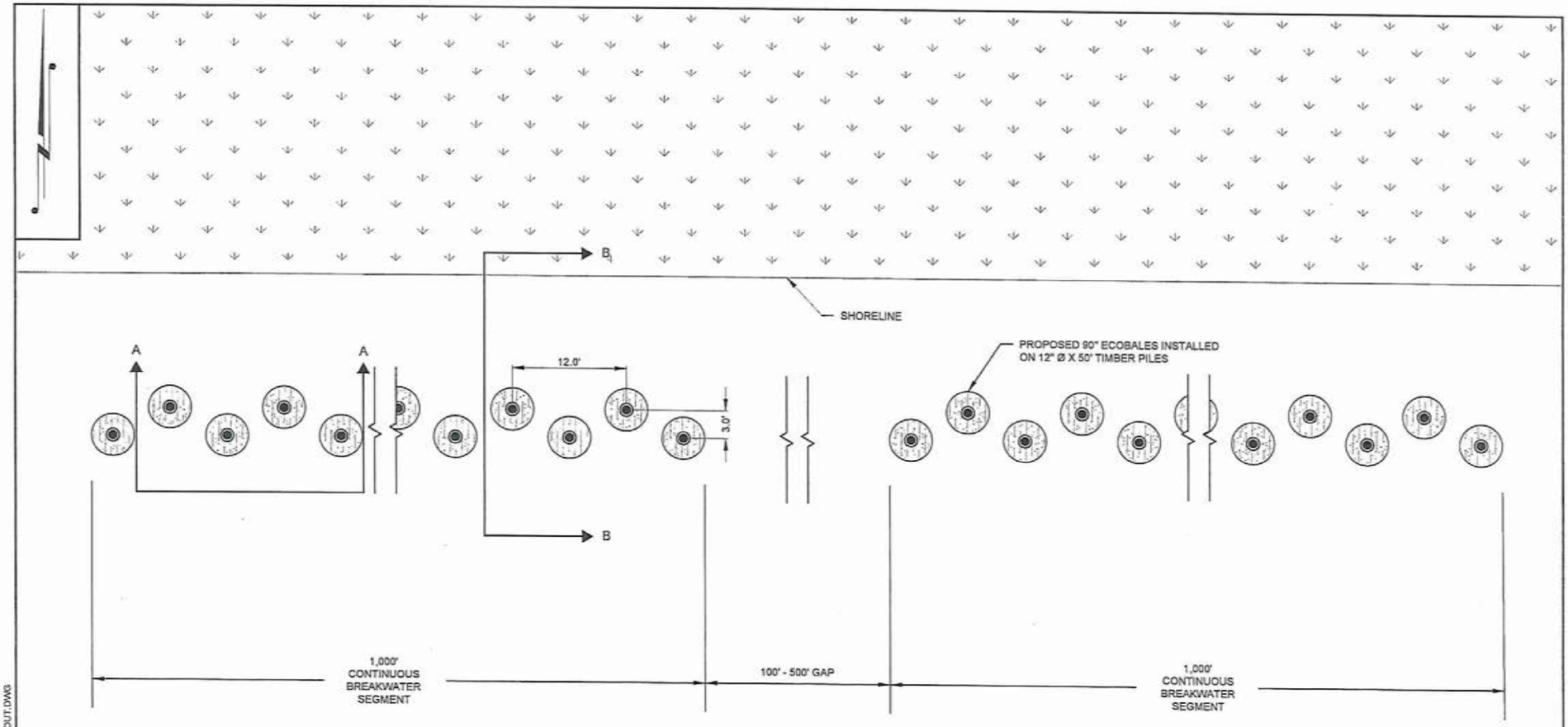
REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

REVISION DESCRIPTION:
-

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	6 OF 8		

90" ECOBALE CONFIGURATION #1 SECTIONS

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04



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SCALE IN FEET
10' 5' 0' 10'

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

REVISION DESCRIPTION:
-

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		

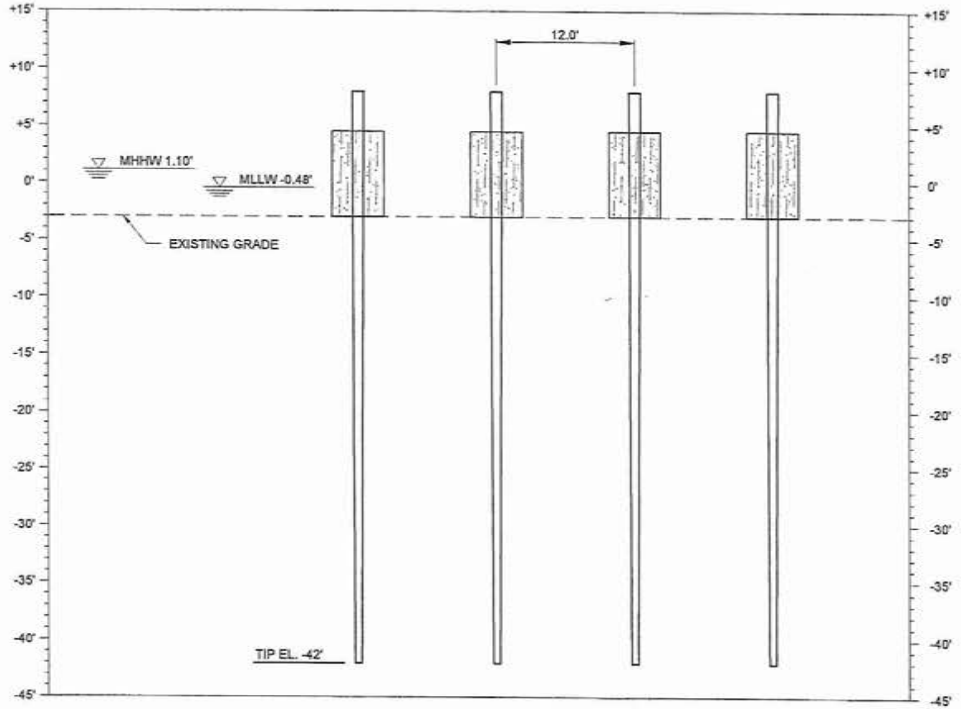
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702)
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SHEET NO: 7 OF 8

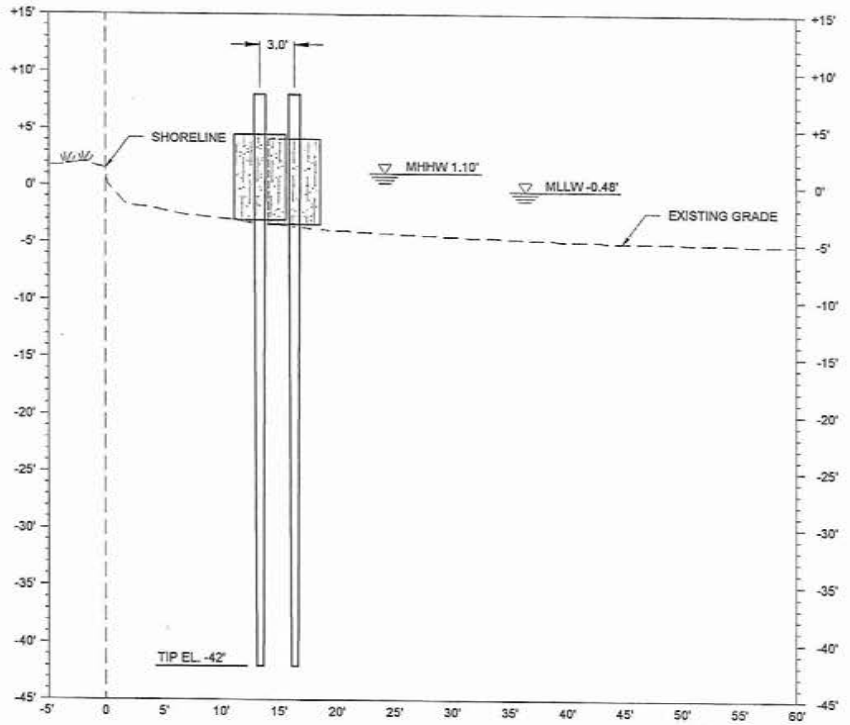
90" ECOBALE CONFIGURATION #2 LAYOUT

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04

4/15/2019 - P:\Y-2019\2019.0143\DWG\ECOBALE LAYOUT.DWG



TYPICAL SECTION A-A
PROFILE VIEW



TYPICAL SECTION B-B
CROSS - SECTION VIEW

4/15/2019 - P:\Y-2019\2019.0143\3D\WS\ECOBALE LAYOUT.DWG

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SCALE IN FEET
10' 5' 0' 10'

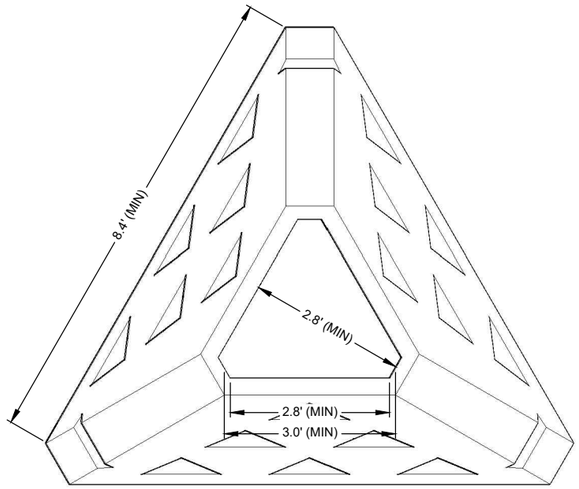
REV. NO:	00	REV. DATE:	-/-/-	REV. BY:	--

REVISION DESCRIPTION:
-

DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	04/15/2019	JOB NO:	2019.0143
DRAWING NAME:	ECOBALE LAYOUT.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	8	OF	8

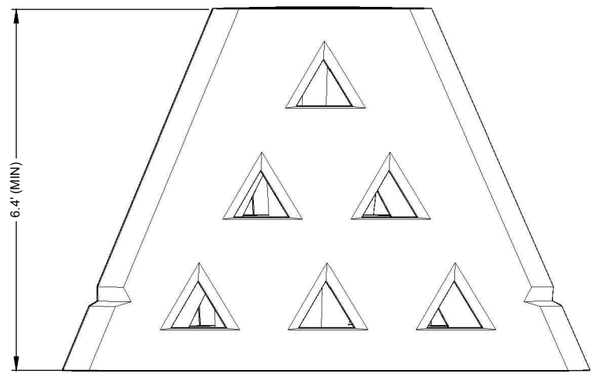
90" ECOBALE CONFIGURATION #2 SECTIONS

MARTIN ECOSYSTEMS
STATE OF LOUISIANA
COSTAL PROTECTION AND RESTORATION AUTHORITY
REQUEST FOR INFORMATION (RFI)
ARTIFICIAL REEF PRODUCT INFORMATION
RFI NO. 2503-19-04



1 DETAIL
STANDARD WAD
PLAN VIEW

0 16 36
SCALE IN INCHES



2 DETAIL
STANDARD WAD
FRONT VIEW

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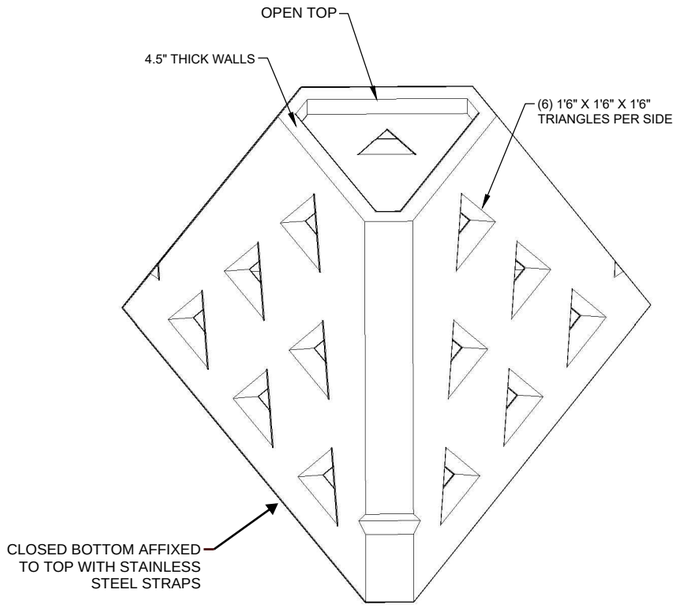
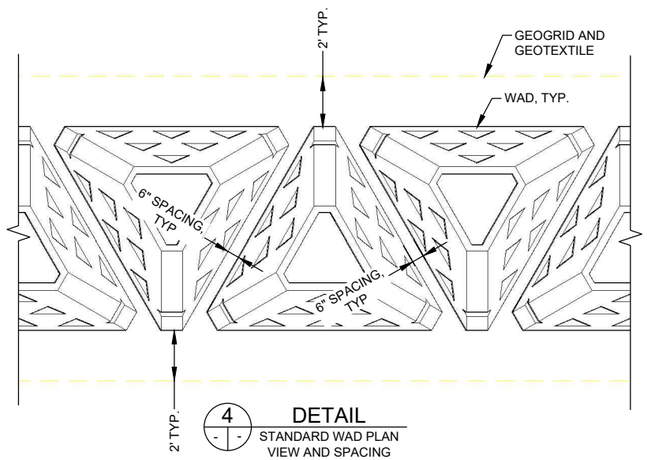
SCALE IN INCHES



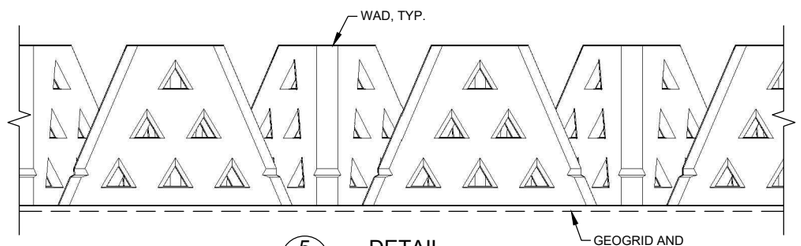
3 DETAIL
STANDARD WAD
ISOMETRIC VIEW

0 16 36
SCALE IN INCHES



4 DETAIL
STANDARD WAD PLAN
VIEW AND SPACING

0 3 6
SCALE IN FEET



5 DETAIL
STANDARD WAD
ELEVATION VIEW

0 3 6
SCALE IN FEET

MOTT MACDONALD

10415 Morado Circle
Building One, Suite 300
Austin, Texas 78759
Texas Registered Firm No. 12181

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www.mottmacamericas.com

Client

Rev	Date	Drawn	Description	Ch'k'd	App'd

Project Number | B/O | Total

Designed			Eng check		
Drawn			Coordination		
Dwg check			Approved		
Scale at ANSI D	Status		Rev	Security	
Drawing Number					

Title
BILOXI

WAD DETAIL

State of Louisiana

JOHN BEL EDWARDS

GOVERNOR

October 20, 2020

Ms. Christy Fellas
DWH Environmental Compliance Coordinator
NOAA Restoration Center
263 13th Ave. South
St. Petersburg, FL 33701

Re: Biloxi Marsh Living Shoreline Restoration Project from Louisiana TIG Restoration Plan and Environmental Assessment #6 – Additional Ecobale Detail

Dear Ms. Fellas:

I am sending an updated version of the product detail sheets for the Martin Ecosystems Ecobale unit. The product detail drawings originally included and available at the time of the PO-0174 Biloxi Marsh Living Shoreline Alternative Biological Evaluation Form did not have the level of detail as shown herein. In addition, we have included information on the product manufacturing process and quality assurance and control measures proposed to ensure product integrity.

Should you have any questions or comments, please contact me at (225) 342-1952 or e-mail me at micaela.coner@la.gov.

Sincerely,

Micaela Coner, PMP
Coastal Resources Scientist Manager
Project Management Division
Coastal Protection & Restoration Authority

Enclosure(s)

Attachment 2

NOTES:

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(985)868-1050 - tbsmith.com

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	--

REVISION DESCRIPTION:
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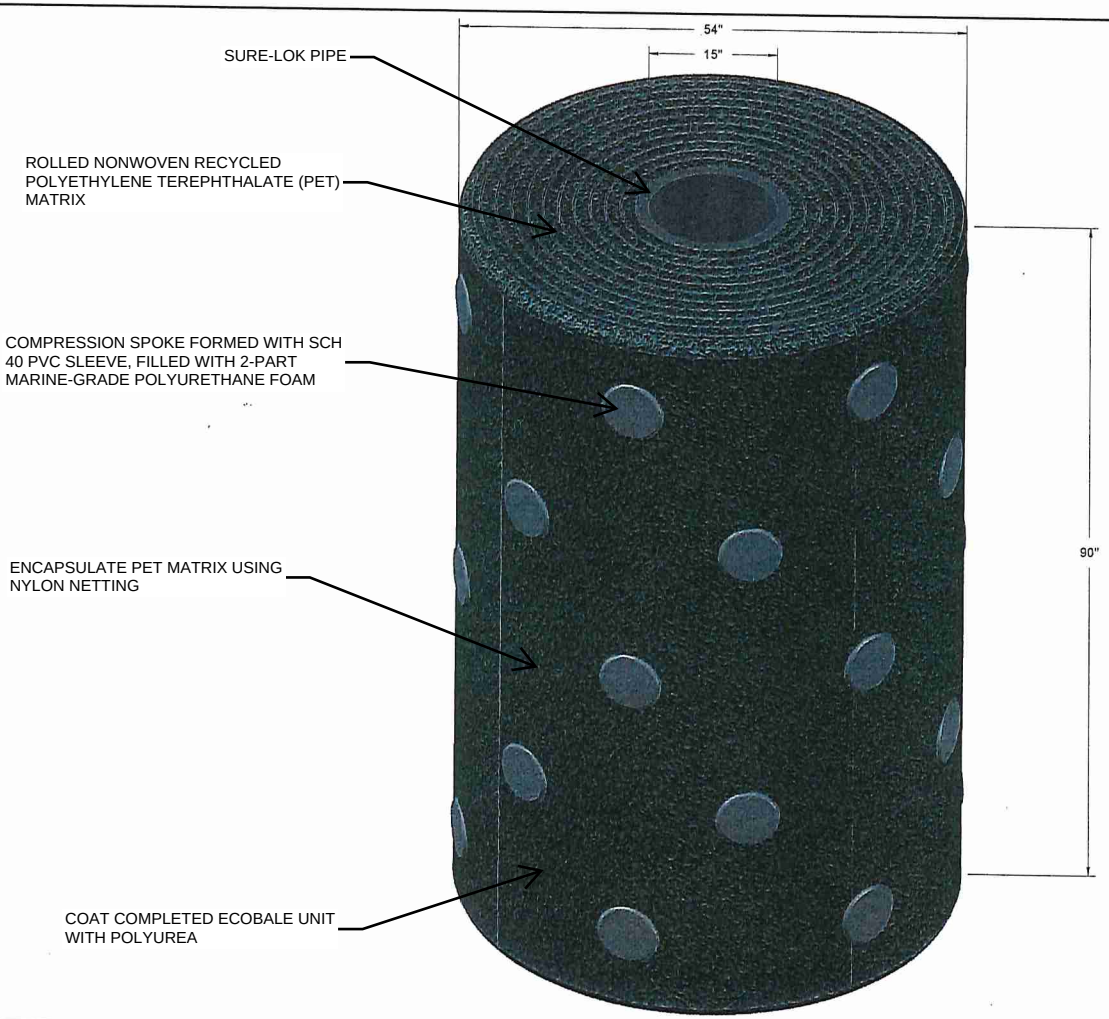
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	1 OF 4		

60" ECOBALE UNIT

MARTIN ecosystems

4/15/2019 - P:\Y-2019\2019.0143\DWG\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG



NOTES:

T. BAKER SMITH
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(985)868-1050 - tbsmith.com

REV. NO:	REV. DATE:	REV. BY:
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REVISION DESCRIPTION:
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DRAWN BY:	JJM	APPROVED BY:	JMC
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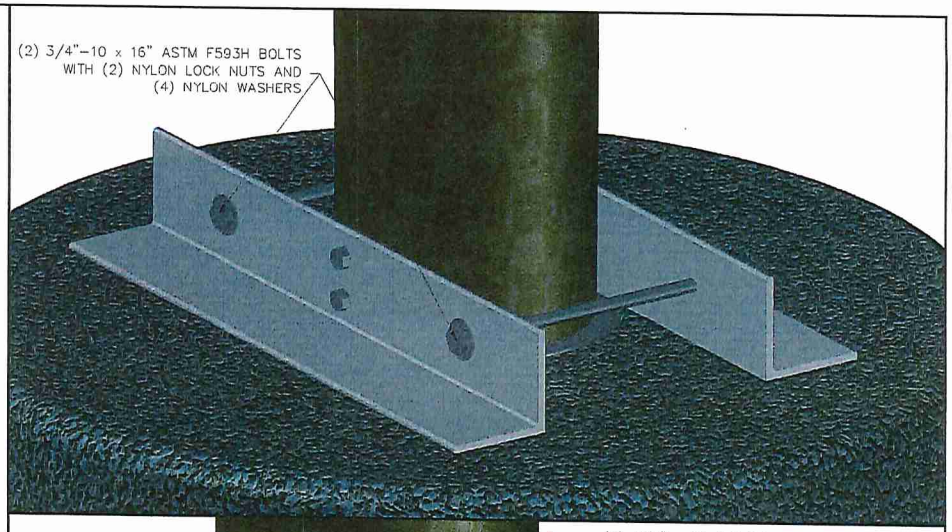
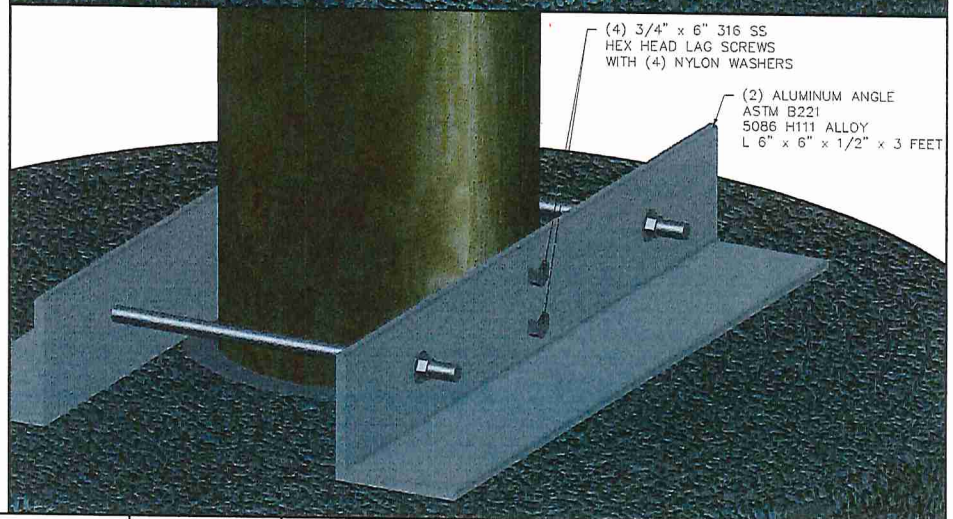
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	2 OF 4		

90" ECOBALE UNIT

MARTIN ecosystems

4/15/2019 - P:\Y-2019\2019.0143\DWG\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG





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(985)868-1050 - tbsmith.com

REV. NO:	00	REV. DATE:	--/--/--	REV. BY:	---

REVISION DESCRIPTION:
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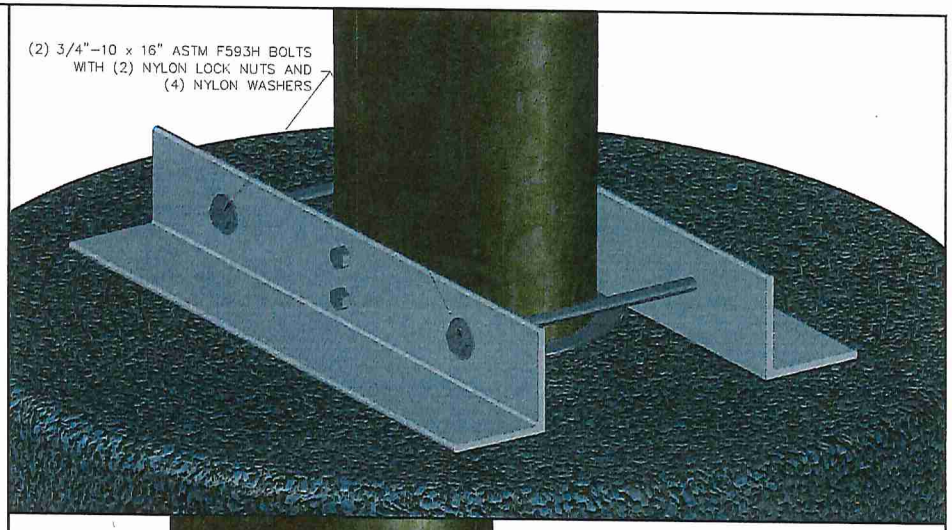
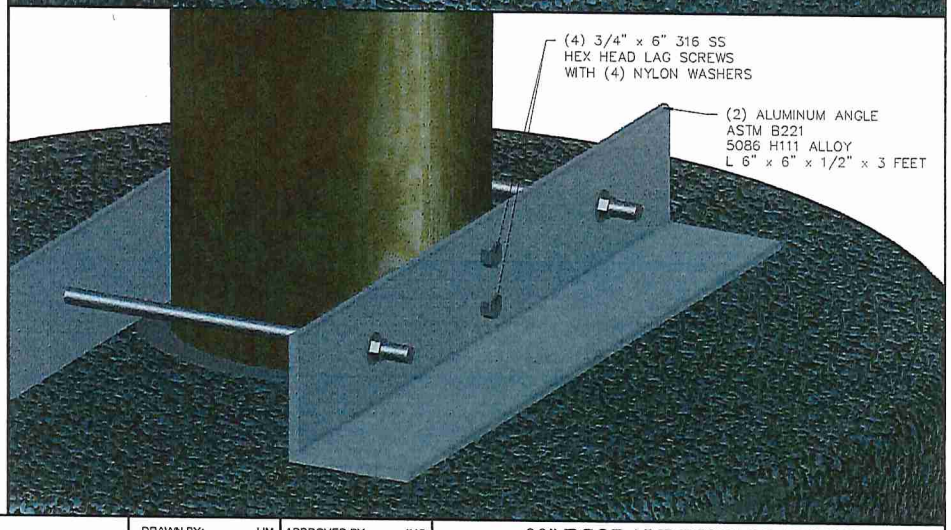
DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143
DRAWING NAME:	MARTIN_ECOSYSTEMS_FINAL.DWG		
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702) GEO. DATUM: NAD83 | VERT. DATUM: NAVD88 GRID UNITS: US SURVEY FEET			
SHEET NO:	3 OF 4		

60" ECOBALE INSTALLATION

MARTIN ecosystems

4/15/2019 - P:\V-2019\2019.0143\DWG\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG





NOTES:

TBS T. BAKER SMITH
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REV. NO:	REV. DATE:	REV. BY:
00	--/--/--	--

REVISION DESCRIPTION:
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DRAWN BY:	JJM	APPROVED BY:	JMC
DATE:	4/15/2019	JOB NO:	2019.0143

DRAWING NAME: MARTIN_ECOSYSTEMS_FINAL.DWG
PROJECTION: SPCS LOUISIANA SOUTH ZONE (1702)
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET
SHEET NO: 4 OF 4

90" ECOBALE INSTALLATION

MARTIN ecosystems

4/15/2019 - P:\Y-2019\2019.0143\3D\WG\3D MODEL\MARTIN_ECOSYSTEMS_FINAL.DWG

PO-0174 Biloxi Marsh

Description of EcoBale Manufacturing Process

1. Cut Sure-Lok pipe to proper length.
2. Spool nonwoven recycled polyethylene terephthalate (PET) matrix onto Sure-Lok pipe.
3. Drill compression spoke holes through PET matrix. The 5 ft tall EcoBale units have 18 spokes while the 7.5 ft tall EcoBale units have 30 spokes.
4. Insert Schedule 40 PVC into drilled holes.
5. Encapsulate PET matrix and PVC with nylon netting.
6. Inject 2-part marine-grade polyurethane foam into the PVC sleeves. Fill until foam forms a flat circular pancake and adheres to the nylon netting.
7. Spray EcoBale with polyurea and allow to cure. Polyurea is applied at 150 deg F which shrinks the net, bonding it to the PET matrix. The polyurea is marine-grade and ultraviolet (UV) light stabilized to protect against degradation.

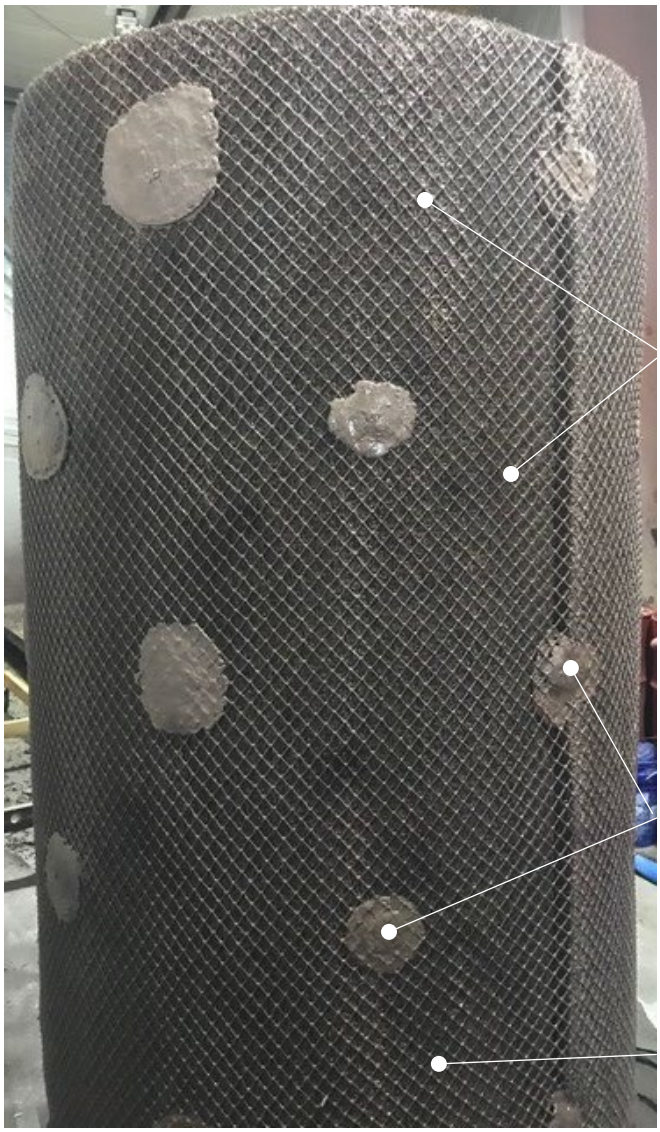

Figure 1. Completed EcoBale unit.

Figure 2. EcoBale unit being placed on a timber pile.

EcoBale units will be rejected under the following criteria:

1. Foam counts are greater than 15% of the targeted count.
2. Polyurea counts are less than 5% of the targeted count.
3. Weights are not in compliance with targeted weight.
4. Encapsulated netting is cut or torn.
5. Encapsulated netting is separated from the surface of the EcoBale unit at one or more compression spoke.

Standard of Quality

A strict standard of quality will be enforced in the manufacturing of each and every EcoBale.

A. **Materials**-Material will be inspected upon arrival from supplier for defects and damage. In addition, material analysis documentation and material certificates will be collected and reviewed by QA/QC Supervisor to verify material standards have been met.

1. Material Certificates will be collected and kept for the following:
   - Matrix
   - Foam
   - HDPE Pipe
   - Strapping
   - PVC Pipe
   - Netting
   - Polyurea
2. Material Test Reports will be collected and kept for the following:
   - Matrix Analysis
   - Foam QC
   - Netting Inspeciton
   - Polyurea SOP-11
   - Polyurea SPO-09

B. **Manufacturing**-Throughout the manufacturing process there will be QA/QC checkpoints to ensure that EcoBale are manufactured to the required weight, size and standard, without defects. These checkpoints will align with the Project Unit Replacement Criteria for EcoBale Rejection. The checkpoints are as follows:

1. Identification
   - Each EcoBale will be numbered according to Martin Ecosystems' Product Numbering/Tracking Policy. This includes Project number and product number. This number will be inside the center tube.
   - Each EcoBale will be identified and marked with a permanent paint marker inside the corrugated pipe with a Project # & Bale #. Example, EcoBale 275-1, 275-2, 275-3 and so on.
   - Each Project or Job will have an **EcoBale QA/QC Checklist** for documentation of measurable as the EcoBale goes through each step of the manufacturing process.

2. Spooling Station
   - Banding is aligned inside the tubing groove.
   - Customized 4'5" diameter plates are placed on both sides of the matrix as it is rolled onto the center pipe, providing a standard template for measuring each

EcoBale's diameter during production. The technician will cut the matrix at a pre-measured 4'5" diameter.

- Each EcoBale diameter will be measured following rolling of matrix onto corrugated pipe for consistency and tight wrapping. This measurement will be documented on the **EcoBale QA/QC Checklist**.
- **As per the Unit Replacement Criteria, EcoBales will be rejected if the diameter is <4'5**

3. Drilling Station
    - Each EcoBale spoke will be inspected for proper cutting, PVC pipe insertion and replacement of 3 matrix dots into PVC pipe. This visual inspection will be signed off on the **EcoBale QA/QC Checklist**.

4. Netting Station
    - Each EcoBale will be inspected following the placement of netting. This will be a visual inspection to confirm that the ropes of the netting are tied on top and bottom of the EcoBale and that the netting is free of tears. This will be signed off on the **EcoBale QA/QC Checklist.**

5. Foaming Station
    - The Graco Foaming machine used to spray foam automatically counts the amount of foam being injected into the EcoBale. After each EcoBale has been foamed, the amount of foam sprayed will be taken from the foam machine and recorded on the **EcoBale QA/QC Checklist**.
    - **As per the Unit Replacement Criteria, EcoBales will be rejected if the foam count is greater than 15% of the targeted round count for the specific EcoBale size.**
    - Each foam spoke will be inspected to confirm that a "pancake" has occurred and that the netting has been captured and is secure within the pancake of foam.

6. Polyurea Station
    - The Graco Foaming machine used to spray polyurea automatically counts the amount of polyurea coating the EcoBale. After each EcoBale has been fully coated with the required amount of milage, the amount of polyurea sprayed will be taken from the polyurea machine and recorded on the **EcoBale QA/QC Checklist**.
    - **As per the Unit Replacement Criteria, EcoBales will be rejected if the polyurea count is less than 5% of the targeted round coat for the specific EcoBale size**.
    - After polyurea has been applied, each EcoBale will be inspected for bare spots. EcoBale will be re-sprayed if bare spots exist.

7. Weigh Station
    - Following the 24 hour curing time, every EcoBale will be weighed and that weight will be recorded on the **EcoBale QA/QC Checklist.**
    - **As per the Unit Replacement Criteria, if any EcoBale weighs +/- 10% of the targeted weight for the specific EcoBale size, it will be rejected.**

8. Diameter Measure
    - Following completion of manufacture, every EcoBale diameter will be measured to ensure correct size and diameter will be recorded on the **EcoBale QA/QC Checklist**.
    - **As per the Unit Replacement Criteria, EcoBales will be rejected if the diameter is <4'5".**

9. Inspection Stamp
    - Following the completion of the above checkpoints and manufacturing, every EcoBale will be stamped as inspected/approved for delivery.

60” EcoBale QA/QC Checklist

EcoBale Serial #	Diameter (ft)	Spoke Inspection	Netting Inspection	Foam Rounds	Foam Pancake	Polyurea Rounds	Weight (lbs)	Serial Number Tag
304-1	4.5	INITIAL	INITIAL	300	INITIAL	200	244	INITIAL

90” EcoBale QA/QC Checklist

EcoBale Serial #	Diameter (ft)	Spoke Inspection	Netting Inspection	Foam Rounds	Foam Pancake	Polyurea Rounds	Weight (lbs)	Serial Number Tag
304-1	4.5	INITIAL	INITIAL	300	INITIAL	200	244	INITIAL