



Appendix K

Marine Mammal Protection Act Technical Memorandum

June 2021



TECHNICAL MEMORANDUM: MARINE MAMMAL PROTECTION ACT

Prepared for:



Prepared by:



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1.0 INTRODUCTION

The proposed US 278 Corridor Improvements Project (project) will result in modifications to the human and natural environment. The Federal Highway Administration (FHWA) and the South Carolina Department of Transportation (SCDOT) are responsible for the Environmental Assessment (EA) according to the provisions of the National Environmental Policy Act (NEPA) and corresponding regulations and guidelines (23 Code of Federal Regulations [CFR] 771 and 40 CFR 1500–1508A). As required by the NEPA process, as well as the Marine Mammal Protection Act (MMPA) of 1972 as amended, potential effects to federally protected species must be evaluated.

The MMPA prohibits, with certain exceptions, the "take" of marine mammals in US waters and by US citizens on the high seas, and the importation of marine mammals and marine mammal products into the US (16 USC 1361-1407). The jurisdiction for MMPA is shared by the US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS). The purpose of this Technical Memorandum is to identify the presence, or potential presence of federally protected marine mammal species known to occur in Beaufort County, South Carolina, and to document potential project related effects to the protected species within or adjacent to the proposed project action area.

1.1 PROJECT DESCRIPTION

SCDOT, FHWA, and Beaufort County propose to make improvements to the US 278 corridor between Bluffton and Hilton Head Island in Beaufort County, South Carolina (Figure 1, Appendix A). The project limits extend from Moss Creek Drive to Wild Horse/Spanish Wells Road for approximately 4.11 miles (Figure 2, Appendix A).

The project includes replacement of the eastbound Mackay Creek bridge and replacement of the three other bridges located within the project corridor. The three additional bridges to be replaced include the westbound Mackay Creek, the eastbound Skull Creek, and the westbound Skull Creek bridge. Improved access to the Pinckney Island National Wildlife Refuge (PINWR) and the C.C. Haigh, Jr. boat ramp is also proposed as part of this project. Potential impacts to the environment will include construction of new bridges, the placement of clean fill material for construction and improvements to bridge approaches, new roads, and/or realignment of existing roads for community access, and finally the demolition and removal of the existing bridges.

2.0 AGENCY CONSULTATION HISTORY

A Letter of Intent (LOI) was distributed on September 4, 2018 by email to the resource and regulatory agencies to notify them of the initiation of the proposed project. The list of federally protected species, including species listed for protection under the MMPA, that are known to occur in Beaufort County was provided by the USFWS on October 1, 2018 in their response to SCDOT's LOI (USFWS Log No. 2018-CPA-0085). In March 2019, FHWA sent an invitation to become a Participating Agency to NMFS.

Following the LOI, a series of Agency Coordination Effort (ACE) meetings were hosted by SCDOT and FHWA in February, June, and August 2019 and March and May 2020. These meetings were used as coordination points to discuss the Purpose and Need of the project, alternative evaluation criteria, alternative evaluations, and the proposal of a Recommended Preferred Alternative. Representatives from both USFWS and NMFS were present at multiple ACE Meetings.

Table 2-1 provides a summary and timeline of consultation with USFWS and NMFS. Copies of the letters and other consultation efforts as described above can be found in Appendix B.

Table 2-1: Agency Consultation Summary

Consultation	Submittal/Receipt Date	Response Date
LOI Submittal	9/4/18 from FHWA/SCDOT	USFWS response 9/26/18 NMFS response 4/24/19
ACE Meeting	2/14/19	N/A
Participating Agency Letter	3/25/19 from FHWA	USFWS response 4/22/19 – Cooperating Agency NMFS response 4/24/19 – Participating Agency
ACE Meeting	6/13/19	N/A
ACE Meeting	8/8/19	N/A
ACE Meeting	3/12/20	N/A
ACE Meeting	5/14/20	N/A

3.0 PROTECTED SPECIES DESCRIPTIONS

All marine mammals are protected by the MMPA. Marine mammals are mammals that rely on the ocean to survive. They include whales, dolphins, porpoises, seals, sea lions, sea otters, and manatees (NOAA-NMFS 2021c). West Indian manatees and listed whale (cetacean) species are protected under the MMPA and under the Endangered Species Act (ESA) of 1973, as amended. A list of federally protected species that are known to occur in Beaufort County, including species listed for protection under the MMPA, was provided by the USFWS on October 1, 2018, in their response to SCDOT's LOI. The USFWS county lists have been updated since the 2018 version was provided by USFWS. Species listed in this report reflect the January 4, 2021 Beaufort County list.

Marine mammal species known to occur in Beaufort County are provided below in Table 3-1. A literature review was completed for marine mammal species to determine their physical description and habitat requirements. The NMFS “Species Directory” (NOAA-NMFS 2021d), South Carolina Department of Natural Resources (SCDNR) and USFWS species descriptions and articles were referenced extensively.

Table 3-1: Marine Mammal Species in Beaufort County, South Carolina

Common Name	Scientific Name	Federal Protection Status	Jurisdiction
Finback whale	<i>Balaenoptera physalus</i>	Endangered; MMPA	NMFS
Humpback whale	<i>Megaptera novaengliae</i>	Endangered; MMPA	NMFS
Right whale	<i>Balaena glacialis</i>	Endangered; MMPA	NMFS
Sei whale	<i>Balaenoptera borealis</i>	Endangered; MMPA	NMFS
Sperm whale	<i>Physeter macrocephalus</i>	Endangered; MMPA	NMFS
West Indian manatee	<i>Trichechus manatus</i>	Threatened; MMPA	USFWS
Bottlenose dolphin	<i>Tursiops truncatus</i>	MMPA	NMFS

Five of the marine mammal species listed for Beaufort County are restricted to deep marine habitats, which was not identified within the PSA and the species have not been documented to be present, based on occurrence records. Therefore, they were not included in the marine MMPA evaluation. These are the finback whale, humpback whale, right whale, sei whale, and sperm whale. Potential effects to the West Indian manatee and bottlenose dolphin were evaluated for the proposed US 278 improvement project.

3.1 MARINE MAMMAL SPECIES DESCRIPTIONS

The initial evaluation for the presence of marine mammal species in the project area and surrounding area focused on the presence or absence of species-specific suitable habitat based on NMFS, SCDNR, and USFWS species descriptions and relevant literature. The determination of potential occurrence in the project area were determined through research of online databases such as SCDNR’s SC Natural Heritage Species Reviewer (SCDNR 2021), NMFS Critical Habitat maps (NOAA-NMFS 2021b), and USFWS Critical Habitat mapper (2021b).

3.1.1 West Indian manatee (*Trichechus manatus*)

West Indian manatees are greyish marine mammals with bulbous bodies and no dorsal fin. They reach lengths over 14 feet long. They reside in shallow marine, brackish, and freshwater systems eating vegetation. They cannot live in temperatures under 68 degrees Fahrenheit, so their range expands and contracts from warmer to cooler months (USFWS 2001). In South Carolina, they will move far into freshwater rivers until the river becomes too shallow or they encounter an obstruction (Murphy and Griffin, 2012). West Indian manatees that occur in the PSA are designated as part of the Florida stock by the USFWS for the purposes of the MMPA (USFWS 2014). According to the most recent USFWS manatee report, the status of the stock is considered to be depleted (USFWS 2014). According to the online USFWS Critical Area Mapper tool (2021b), designated critical habitat for the West Indian manatee is only located in Florida. No critical habitat is present in South Carolina.



West Indian manatee
Photo by Keith Ramos (USFWS)

3.1.2 Bottlenose dolphin (*Tursiops truncatus*)

Bottlenose dolphins occur world-wide in tropical and temperate waters (SCDNR 2015a). Bottlenose dolphins are separated into two groups based on the primary ecological zones that they occupy. These groups are offshore and coastal forms. Bottlenose dolphins that are likely to occur in the US 278 PSA belong to the coastal form group (SCDNR 2015a, NOAA-NMFS 2015). Coastal form dolphins typically have a smaller, thinner body than offshore forms, growing to 6 to 12 feet in length. They have a dorsal fin that is tall and curves toward the posterior of the animal, pointed flippers, and a notched fluke (SCDNR 2015a). Individual animals can often be identified by dorsal fin characteristics. Bottlenose dolphin prey includes, but not limited to, fish, squid, crabs, and shrimp (NOAA-NMFS 2021a).



*Bottlenose dolphin
Illustration From NMFS*

4.0 ENVIRONMENTAL BASELINE

4.1 PROJECT STUDY AREA

The Project Study Area (PSA) (Figure 2, Appendix A) is approximately 438-acres and was used to assess all Reasonable Alternatives (see Section 5.3). The PSA also establishes a 5-mile radius for the determination of potential occurrences for the listed marine mammal species in Beaufort County.

Potential habitat communities within the PSA were initially identified by reviewing recent aerial imagery (2018), digital elevation models for Beaufort County (SCDNR 2015b), 2016 National Land Cover Data (NLCD) [Yang et al. 2018]), and USFWS National Wetland Inventory (NWI) mapping (USFWS 2021c) to create a composite map of potential habitats within the cumulative PSA. Habitat types identified utilizing remote sensing data were field reviewed and additional data was collected during site visits and field delineation of waters of the United States (WOTUS), conducted May 20-24, 2019, July 9-11, 2019, January 20-24, 2020, and May 6, 2020. The project biologists used field observations and data collected on site to make corrections to the PSA habitat map.

The PSA is situated in the Sea Islands/Coastal Marsh Level IV ecoregion as defined by the US Environmental Protection Agency (EPA). *“The Sea Islands/Coastal Marsh region contains the lowest elevations in South Carolina and is a highly dynamic environment affected by ocean wave, wind, and river action... The island, marsh, and estuary systems form an interrelated ecological web, with processes and functions valuable to humans, but also sensitive to human alterations and pollution. The coastal marshes, tidal creeks, and estuaries are important nursery areas for fish, crabs, shrimp, and other marine species”* (Griffith et al. 2002). The project is within the Calibogue Sound watershed (Hydrologic Unit Code 10: 0306011003) and Savannah River Basin (SCDHEC 2021).

A portion of the Pinckney Island National Wildlife Refuge (PINWR) falls within the PSA. PINWR is 4,053 acres of salt marshes, tidal creeks, forests, fields, and freshwater ponds owned and managed by the USFWS. The C.C. Haigh, Jr. Boat Landing is located on PINWR. This public boat landing includes a parking lot, two floating docks, and a kayak launch.

Santee Cooper overhead power lines extend through the study area in an easement that parallels US 278. The power lines follow the northside of US 278 in Bluffton, then cross Mackay Creek where the easement splits and parallels the north and south sides of US 278 on PINWR and Hog Island. The south easement reconnects with the north easement on Jenkins Island and the power lines parallel US 278 through the study area on Hilton Head Island.

4.2 ESTUARINE HABITAT

Marine mammals occupy estuarine habitats identified within the PSA; therefore, the following habitat discussion focuses specifically on this habitat type. Estuarine habitats found within the PSA and their respective coverage are provided in Table 4-1. Habitats that were initially identified within the PSA using remote sensing data and then confirmed during the field survey includes four basic estuarine habitat types. Much of the US 278 corridor contains natural buffers surrounding urban development and residential communities. Estuarine habitat types were classified using the Cowardian naming convention (USFWS 1979). Photographs of the identified habitats in the PSA can be found in Appendix C.

Table 4-1: Identified Estuarine Habitat Types in the Project Study Area

Habitat types	Area of coverage (acres)	Percent coverage
Estuarine emergent wetlands	76	44%
Estuarine sub-tidal unconsolidated bottom	73	41%
Estuarine tidal creeks	2	1%
Intertidal non-vegetated flats	24	14%
Total	178 acres	100%

4.2.1 Estuarine emergent wetlands

Two types of Estuarine Emergent Wetlands (USFWS 1979) occur within the PSA: low marsh and high marsh. The low marsh wetlands are a single-species community of saltmarsh cordgrass (*Spartina alterniflora*). The high marsh consists of black needle rush, glasswort (*Salicornia depressa*), salt grass (*Distichlis spicata*), and big cordgrass (*Spartina cynosuroides*). These emergent wetlands often have moderately salt-tolerant woody species above the tidal zone such as marsh elder (*Iva imbricata*), groundsel bush (*Baccharis halimifolia*), southern redcedar, and cabbage palms. Intertidal zones may have exposed mud flats or sand at low tide. Hard surfaces such as concrete, metal, and wood in the inter-tidal zone are typically encrusted in both living and deceased arthropods like barnacles and mussels.

4.2.2 Estuarine sub-tidal unconsolidated bottom

Estuarine sub-tidal unconsolidated bottom habitat (unconsolidated bottom [USFWS 1979]) includes all wetland and deep-water habitats with at least 25% cover of particles smaller than stones, less than 30% vegetative cover, and subtidal, permanently flooded, intermittently exposed, or semi-permanently flooded water regimes (USFWS 1979). This designation was chosen to describe the group of habitats that are permanently to semi-permanently beneath tidal waters. There are two types of unconsolidated bottom habitat located within the cumulative PSA: the main channels of Mackay and Skull Creeks and man-made ponded features.

Water level in the creeks fluctuates continuously and is dependent on tide cycles and flow volumes; however, even at low tide, water is always present. Channel depths at mean low tide range from approximately 14 to 20 feet deep in Mackay Creek and approximately 20 to 25 feet deep in Skull Creek (NOAA 2021). Measurements taken by the project biologists documented salinity between 20-30 parts per thousand throughout much of the PSA. Mollusks grow on most hard surfaces in the estuarine intertidal zone, such as bridge piles. Oyster beds are abundant in the shallow sub-tidal areas, often growing on top of each other to form tall pillars and extensive beds. Estuarine fishes, mammals, and sea turtles may utilize these saline waters as foraging areas and travel corridors.

Man-made unconsolidated bottom features found within the cumulative PSA are excavated pond features near the Bluffton Parkway and along Squire Pope Road that do not have obvious surface connectivity to other unconsolidated bottom or tidal creek habitats. These features are surrounded by estuarine emergent wetlands and intertidal non-vegetated flats but are lacking in vegetative cover and maintain a stable depth of saline waters at low tide.

Estuarine tidal creek

Tidal creeks are sinuous drainage channels that are subject to the ebb and flow of each tide cycle. As the tide rises, tidal waters flow upstream filling the channel before spilling into the surrounding marshlands. The depths of tidal creeks vary depending on tide range, land use, and distance upstream from coastal inlet channels. Shallow depths of tidal creeks serve as nurseries for fish, crustaceans, and mollusks because they are inaccessible to larger predators (SAFMC 2016). Tidal creeks also have soft-bottom substrate that provides benefits like those provided by intertidal flats. Tidal creek habitat within the PSA are tributaries associated with Skull Creek and Jarvis Creek. The depths of these tidal creeks were observed to be less than one foot at low tide. The tidal creeks in the PSA are fully functional in that all ecosystem services essential to fisheries are present. Existing disturbances, such as the existing US 278 structures, have not significantly altered functions of this habitat.

Intertidal non-vegetated flats

An intertidal area is a subsystem of an estuarine environment that lies between the high and low tide lines (USFWS 1979). Intertidal non-vegetated flats are sediment deposits that occur across areas of gentle slope within the intertidal zone. These are dynamic habitats because of the drastic changes in salinity and temperature that occur within each tide cycle (SAFMC 2020). The intertidal flats can have a much higher salinity than the channels that feed them since evaporation leads to higher salt concentrations (USFWS 1979). Despite being called “non-vegetated,” these flats can have extensive communities of microalgae that benefit macroinvertebrates and other benthic feeders. Along the South Atlantic coast, these flats typically have very fine sediments, which are inhabited by benthic organisms such as nematodes, copepods, annelids, bivalves, etc. High tide brings food and predators onto the flat while low tide provides residents a temporal refuge from the mobile predators (SAFMC 2016).

4.3 WATER QUALITY

The South Carolina Department of Health and Environmental Control (SCDHEC) develops a priority list of waterbodies that do not currently meet state water quality standards pursuant to Section 303(d) of the Clean Water Act (CWA) and 40 CFR § 130.7. It is commonly referred to as the 303(d) List of Impaired Waters. There are no 303(d) listed waters found within the PSA. SCDHEC also designates suitable Shellfish

Harvesting Waters (SFH), determines water quality classifications and standards for the State. Mackay Creek and Skull Creek are both classified by SCDHEC as SFH.

SCDHEC monitors the water quality of Mackay Creek and Skull Creek with ambient water quality monitoring stations. These stations are used for “determining long-term water quality trends, assessing attainment of water quality standards, identifying locations in need of additional attention, and providing background data for planning and evaluating stream classifications and standards” (SCDHEC 2021). There are two shellfish monitoring stations located within the PSA. Shellfish Harvest station 20-07 monitors Mackay Creek and is located near the existing US 278 bridge adjacent to Buckingham Landing. Station 20-10 monitors Skull Creek and is located near a small tidal creek in the vicinity of the Mariners Cove development. Neither of these stations are currently listed for water quality impairments. Figure 4 (Appendix A) provides a depiction of the SFH water classifications and locations of the water quality monitoring stations.

5.0 ALTERNATIVES ANALYSIS

The sections below briefly discuss the No-Build Alternative and the process that resulted in the selection of the Recommended Preferred Alternative 4A. The analysis was conducted in coordination with federal and state regulatory agencies (including USFWS and NMFS), project stakeholders, and public involvement. Chapter 3 of the EA provides a more detailed description of how alternatives were analyzed and evaluated for the project.

5.1 NO BUILD ALTERNATIVE

Under the No Build Alternative, the environmental baseline conditions as described in Section 4 would be expected to remain the same. The existing roadway and bridges would remain in place with no additional structures being placed in the different habitats and biotic communities within the PSA. No long-term effects would be expected from the No Build Alternative. However, the No Build Alternative does not meet the purpose and need of the project and was therefore only considered as a baseline for existing conditions during the alternative analysis and evaluation.

5.2 PRELIMINARY RANGE OF ALTERNATIVES

A wide range of alternatives were developed and analyzed to determine compatibility with the project’s purpose and need to repair the structurally deficient bridge over Mackay Creek. Nineteen preliminary alternatives were developed including:

- No-Build
- Transportation System Management/Transportation Demand Management (TSM/TDM)
- Mass Transit
- Build Alternatives

Of these nineteen alternatives, six were carried forward for further analysis as Reasonable Alternatives. Figures and descriptions of each of the Preliminary Range of Alternatives, as well as the criteria used to assess each preliminary alternative can be found in Chapter 3 of the EA.

5.3 REASONABLE ALTERNATIVES

The six alternatives carried forward as Reasonable Alternatives were updated based on input from stakeholders, the public, and regulatory agencies as part of the continued alternatives analysis. Modifications resulted in three additional alternatives for consideration. A total of nine reasonable alternatives were ultimately analyzed to identify the Recommended Preferred Alternative 4A. Additional figures and descriptions of each of the Reasonable Alternatives, as well as the criteria used to assess each alternative can be found in Chapter 3 of the EA.

Based on evaluation of the alternatives, it was determined that Recommended Preferred Alternative 4A, provides maximum improvements to the corridor with minimal impacts to the human and natural environments. A depiction of the Recommended Preferred Alternative 4A is provided in Figure 5 (Appendix A).

5.4 RECOMMENDED PREFERRED ALTERNATIVE

The Recommended Preferred Alternative 4A is approximately 4.11 miles long and includes widening the existing US 278 corridor to six lanes from Salt Marsh Drive to Mackay Creek bridge, building a new six-lane structure that bridges both Mackay Creek and Skull Creek south of the existing US 278 alignment and connecting back to the existing US 278 corridor at the end of the existing Skull Creek bridges. The existing Mackay Creek bridges and Skull Creek bridges will be removed once construction is complete. A new right-in/right-out interchange will be constructed at the PINWR and C.C. Haigh, Jr. Boat Landing closer to the existing interchange alignment allowing vehicles to pass underneath the existing bridges to access either side and provide full access to US 278. The existing at-grade intersection on PINWR will be decommissioned.

This alternative relocates the existing Blue Heron Point Drive to the existing US 278 roadbed and improves the intersection with Gateway Drive. This will also include a new bridge over the tidal area between Hog Island and Jenkins Island (Figure 10, Appendix A). The new bridge and roadway associated with Hog Island is needed to provide more efficient ingress/egress to properties on Hog Island. In addition, the refined Hog Island access allows for improved maintenance of traffic during construction. The Recommended Preferred Alternative 4A also widens the existing US 278 corridor to six-through lanes through Jenkins Island to Spanish Wells Road. The widening would primarily occur in the median on Jenkins Island and transitions to widen along the north side of US 278 from the eastern side of Jenkins Island to Spanish Wells Road.

The Recommended Preferred Alternative 4A consisted of the least amount of total wetland impacts and lowest impacts to tidal salt marsh/critical area wetlands when compared to the other Reasonable Alternatives. This alternative would also have minimum ROW and relocation impacts in comparison to the other Reasonable Alternatives.

The existing Mackay Creek and Skull Creek bridges do not meet current seismic design standards. The Recommended Preferred Alternative 4A would result in a new 6-lane facility with one new bridge over Mackay and Skull Creeks, as well as one new bridge on a new local connector road between Hog Island

and Jenkins Island, that would meet current seismic design standards. These new structures would add longevity and increased safety to this singular link between Beaufort and Hilton Head.

Coordination with USFWS completed on January 30th, 2020 to discuss the reasonable alternatives revealed the Recommended Preferred Alternative was the most consistent with PINWR purposes. USFWS expressed that this alternative was the best alternative for their maintenance and regulatory needs. This alternative also results in fewer impacts on PINWR due to the proposed new facility being elevated.

5.4.1 Refinements to the Recommended Preferred Alternative 4A

Following the selection of the Recommended Preferred Alternative 4A, additional analysis was completed to review and determine potential effects to marine mammal species based on the footprint of only the Recommended Preferred Alternative 4A. Since the initial protected species evaluation of the PSA, there have been refinements to the Recommended Preferred Alternative 4A footprint due to design modifications. These design modifications were required to meet SCDOT and FHWA design standards for the proposed bridge and roadway approaches as well as the intersection improvements within the project corridor.

The proposed new bridge over Mackay Creek and Skull Creek remains in its initial design alignment but was lengthened, as were the span lengths along the bridge. These modifications resulted in changes to the size of proposed bridge support structures described and quantified in the previous protected species effects evaluations. The roadway design modifications predominantly affected the potential limits of upland clearing and earthen fill materials placement in estuarine habitats. Modifications to the proposed connector road and bridge between Hog and Jenkins Island were minimal.

The modifications to the Recommended Preferred Alternative 4A also resulted in changes to the refined evaluation area, which led to changes in the previously reported percent coverage of habitat types. Table 5-1 provides an updated total of the estuarine habitat types identified within the expanded Recommended Preferred Alternative 4A evaluation area.

Table 5-1: Identified Estuarine Habitat Types within Refined Recommended Preferred Alternative 4A

Habitat types	Area of coverage (acres)	Percent coverage
Estuarine emergent wetlands	36.5	41%
Estuarine sub-tidal unconsolidated bottom	34.9	39%
Estuarine tidal creeks	0.6	< 1%
Intertidal non-vegetated flats	17.2	19%
Total	89.2 acres	100%

6.0 PROPOSED ACTION

The purpose of the project is to address structural deficiencies at the existing eastbound Mackay Creek bridge and reduce congestion within the PSA. While the original purpose of this project was to replace the structurally deficient eastbound Mackay Creek Bridge, the project has expanded to include improvements throughout the corridor between Moss Creek Drive and Wild Horse/Spanish Wells Road. The eastbound Mackay Creek bridge (traveling to Hilton Head Island), which crosses the Intracoastal Waterway, would be replaced as part of SCDOT's bridge replacement program. The other three bridges in the PSA—the westbound bridge over Mackay Creek and the eastbound and westbound bridges over Skull Creek—have also been identified for potential improvements. In addition, the access to PINWR and the C.C. Haigh, Jr. boat landing have also been considered for possible improvements.

Construction is expected to occur between 2023 and 2026. The following is a discussion of the proposed construction activities within estuarine habitats associated with the US 278 Corridor Improvement project. Some of the proposed activities may have permanent effects to habitats important for the life functions of marine mammal species; while others will be temporary in nature but may present a risk for certain species during construction. The proposed construction activities described below are based on conceptual plans and “worst-case” scenarios for fill limits, bridge supports, and temporary construction access techniques. All potential fill impacts to wetland habitats within the project area are based on the conceptual construction limit plus an additional 50-foot buffer to represent a “worst-case” scenario.

Estimated impacts to other environmental factors are addressed in more detail in Chapter 4 of the EA. Impacts to estuarine wetlands will be addressed in more detail in the Section 404/401 permit application.

6.1 CONSTRUCTION ACTIVITIES AND POTENTIAL IMPACTS OR EFFECTS

6.1.1 Site Preparation

SCDOT and/or the contractor will develop a Stormwater Pollution Prevention Plan (SWPPP) and obtain both a land disturbance permit and a National Pollutant Discharge Elimination System (NPDES) permit from the SCDHEC before construction can commence. SCDOT will require the contractor to properly install the required erosion, turbidity, and sediment control devices prior to all other construction activities. The contractor will be required to install these measures around the perimeter of the active construction site, including any off-site staging areas. After the installation of erosion, turbidity and sediment control measures, the contract will begin the project staging area preparation and general site preparation.

To prepare the general project area for construction and establish staging areas, the contractor may need to clear vegetation and remove stumps, roots, or debris. Clearing may occur in estuarine emergent habitats in the project area. The contractor may also grade portions of the project area to establish a suitable work environment. Staging areas will be selected by the contractor to establish a construction site office and will also include materials, equipment, and fuel storage. Staging areas are expected to be predominantly located in uplands.

Potential Estuarine Habitat Impacts

The contractor will be required to utilize SCDOT Best Management Practices (BMPs) for soil and erosion control during construction. Impacts associated with construction site preparation will be temporary in nature. Clearing of vegetation and maintenance of erosion and sediment control devices may temporarily impact suitable foraging habitat for marine mammal species. Construction site preparation and maintenance will continue during the different phases of construction and may result in permanent impacts to estuarine habitats, such as direct loss and degradation. Construction site preparation is not expected to result in the mortality of any marine mammal species.

The clearing, grading, or placement of fill in wetlands will require authorization from the United States Army Corps of Engineers (USACE) and SCDHEC. The limits of any clearing, grading, or fill in wetlands will be delineated and shown on approved permitted plans by the USACE and SCDHEC. SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill in wetlands.

6.1.2 Roadway Construction

Once the project area has been prepared, the contractor will begin construction of the proposed bridge approaches, roadway widening and associated intersection improvements. Bridge approach, roadway widening, and intersection improvement construction will consist of placing clean fill materials at locations throughout the project area where bridging is not proposed. The fill will then be compacted and formed into the roadway prism and shoulder slopes.

Potential Estuarine Habitat Impacts

Permanent impacts to estuarine habitat types in the project area, including suitable foraging habitat for marine mammal species, are expected where new fill material is required for proposed bridge approaches, roadway widening and associated intersection improvements. Clean fill material will be placed in estuarine emergent wetlands to realign the bridge approach from the mainland and Jenkins Island; on the east side of Hog Island and west side of Jenkins Island to create a new connector road and bridge which will connect to Gateway Drive; and on either side of the US 278 causeway between Jenkins Island and Hilton Head Island.

Table 6-1 provides a summary of potential roadway fill impacts to estuarine habitats. All potential roadway fill impacts to estuarine habitats within the project area are based on the conceptual construction limit plus an additional 50-foot buffer to represent a “worst-case” scenario. The potential impacts from the placement of fill represents a very small percentage of available habitat in the action area and will ultimately be discountable in the context of the entire ecosystem.

Table 6-1: Potential Roadway Fill Impacts to Estuarine Habitats

Habitat Type	Estimated Fill Impacts (acres)
Estuarine emergent wetland	12.7
Estuarine sub-tidal unconsolidated bottom	0.1
Estuarine tidal creek	< 0.1
Intertidal non-vegetated flats	6.2
TOTAL	19.1 acres

The placement of roadway fill material in estuarine habitats will require authorization from the USACE and SCDHEC. The limits of any fill materials in estuarine habitats will be delineated and shown on approved permitted plans by the USACE and SCDHEC. SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill in wetlands. Roadway construction is not expected to result in the mortality of any marine mammal species.

6.1.3 Bridge Construction Access

Temporary access for the construction of the bridge supports and superstructure will be required. Bridge construction access may be required throughout the life of the project (approximately three years). There are many ways the contractor could establish temporary access such as the use of temporary causeways made of fill, floating barges, or temporary work trestles. It is possible the contractor may elect to use a different method for bridge construction access, but **any method selected will be required to comply with all applicable permits and/or environmental commitments for the project.**

To evaluate a “worst-case” scenario for potential effects to marine mammal species, SCDOT is assuming the contractor will utilize temporary trestles to the maximum extent practicable in shallow waters. The contractor will be responsible for the design of the trestle, so all numbers provided are estimates based on a conceptual design. This assessment assumes the contractor would install a 40-foot-wide temporary work trestle in shallow estuarine emergent wetlands. The trestle would parallel the proposed new bridge location and include shorter 30-foot-wide sections (fingers) between the bents to allow full construction access along this portion of the project. It is assumed the trestle could be constructed using a top-down method with minimal need for additional construction access for the installation of the trestle. Figures 6 through 12 (Appendix A) indicate the approximate and conceptual locations of work trestles and the associated pipe piles in each estuarine habitat used for the analysis in this report.

Channel depths at mean low tide range from approximately 14 to 20 feet deep in Mackay Creek and approximately 20 to 25 feet deep in Skull Creek (NOAA 2021). Survey data and as-built plans of the existing bridges collected during the preliminary engineering indicates Skull Creek depths are approximately 30 to 40 feet deep at the center of the channel. For bridge construction access in these deeper waters of Mackay Creek and Skull Creek, the contractor will likely use work barges anchored in place by spuds set in the substrate. The total number of required barges would be at the discretion of the contractor and is unknown at this time.

For the secondary connector bridge between Hog Island and Jenkins Island, it is anticipated that construction access would be achieved through adjacent upland habitat, bridge approach fills, and top-down methods as the bridge is built.

Potential Estuarine Habitat Impacts

Impacts associated with bridge construction access are expected to be temporary and interspersed throughout the life of the project. The construction of the temporary trestle for construction access may cause a temporary increase in turbidity in Mackay Creek and Skull Creek as mud and silt is disturbed during installation and removal of the trestle support piles. Turbidity is expected to be localized and will dissipate quickly. Studies of turbidity affects associated with dredging projects indicates that turbidity does not have a direct affect to marine mammals as they rely on use of other senses for navigation and foraging (Todd, V.L.G et al. 2015). **The contractor will be required to utilize all appropriate SCDOT BMPs for soil and erosion control during construction to minimize the potential impacts and effects of turbidity.**

The temporary trestle support piles will impact the surface area of multiple habitat types while they are in use. A summary of potential habitat impacts from bridge construction access is presented in Table 6-2. The information provided in the table below represents estimates based on the current conceptual design. Temporary trestle piles located within the conceptual roadway fill limits are not included in the estimated number of piles below since impacts those areas have already been quantified under the roadway fill impacts. The estimated area of all temporary support piles is expected to be less than 0.4 acres. The temporary trestle may also result in approximately 0.7 acre of temporary shade impacts to estuarine emergent wetlands. However, these habitats are all highly abundant in Mackay Creek and Skull Creek. The potential temporary impacts from temporary trestle pile installation and shading represents a very small percentage of available habitat in the action area and will ultimately be discountable in the context of the entire ecosystem.

Table 6-2: Estimated Temporary Work Trestle Impacts to Estuarine Habitats

Estuarine Habitat Type	Number of Piles	Temporary Pile Surface Area (acres)	Temporary Shade Impacts (acres)
Estuarine emergent wetland	269	< 0.1 acre	0.7 acre
Estuarine tidal creek	8	< 0.1 acre	N/A
Estuarine sub-tidal unconsolidated bottom	51	< 0.1 acre	N/A
Intertidal non-vegetated flats	72	< 0.1 acre	N/A
SUM OF PIPE PILES	400		
SUM OF IMPACTS		< 0.4 acre	0.7 acre

Once the contractor has completed construction of bridge support structures, all temporary trestle piles will be removed or cut off two feet below the mudline. If required, any temporary fill materials for bridge construction access will also be removed once the contractor has completed work in those locations. **SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill in estuarine habitats.** Bridge construction access areas will be allowed to return to their natural state when construction is completed.

The contractor will be also required to maintain navigability during construction will not be allowed to block the respective channels of Mackay or Skull Creeks.

The installation of the temporary trestles is also expected to cause an increase in underwater noise levels. These potential impacts are discussed in more detail in Section 6.6.

6.1.4 Bridge Construction

The proposed project will require construction of two new permanent bridges: one mainline US 278 bridge that will span both Mackay Creek and Skull Creek and one bridge that will connect Hog Island and Jenkins Island as part of a new local connector road. Bridge construction activities are expected to occur throughout the life of the project (approximately three years).

New US 278 Bridge over Mackay Creek and Skull Creek

The new mainline US 278 bridge will be a singular structure that will carry six lanes of traffic and a multi-use path from the mainland to Jenkins Island. The proposed typical section for the new US 278 bridge can be found in Appendix D. This new bridge will be 132 feet wide, approximately 6,750 feet long and will

span the entire bank to bank channel width of Mackay Creek (2,107 feet) and Skull Creek (763 feet). The new structure will be constructed parallel to and approximately 55 feet southwest of the existing bridge structures. The existing bridges will remain open to traffic until such time traffic can be shifted onto the new structure prior to demolition.

The bridge design has undergone refinements since the analysis completed in July 2020. These refinements include a lengthening of bridge spans from 100 feet to 175 feet long, thereby reducing the number of bents and piles required to support the replacement bridge. Additionally, the bridge has been lengthened on either end which will reduce the earthen fill previously designated in estuarine habitats.

The refined conceptual design for the main bridge over Mackay Creek and Skull Creek proposes three different sized drilled shafts, measuring approximately 72 inches, 96 inches, and 120 inches in diameter, for the permanent bridge support structures. Locations of the proposed drilled shafts are indicated on Figures 6 through 12 (Appendix A). The construction of drilled shaft bridge columns will require the contractor to install a permanent steel casing to ensure the drilled shaft remains open and does not collapse prior to the pouring of concrete. The permanent casing will also act as a concrete form for the shaft. Drilled shafts are expected to be installed by the following process:

1. Install the casing using a vibratory hammer until refusal or a depth specified by Geotechnical Engineer of Record
2. Repeat process to install all required casings for the respective bridge bent
3. Drill/auger inside casing to set final depth (if necessary) and to prepare for rebar cage installation
4. Install rebar cage
5. Pour concrete inside the casing
6. Repeat steps above until the respective bent is complete

Connector Bridge between Hog Island and Jenkins Island

The second bridge is proposed as part of a new connector road between Hog Island and Jenkins Island. This second bridge will be approximately 36 feet wide, 300 feet long, and will span a small tidal creek and most of the adjacent estuarine emergent wetlands. The bank-to-bank width of the cove is 388 feet. The clearance of the connector bridge will be approximately 5 feet at high tide, approximately 9 feet at mean tide, and approximately 10 feet at low tide. The new connector road bridge will be supported by 24-inch pre-stressed concrete piles. The 24-inch prestressed concrete would be installed by the following process:

1. Install piles and hammer them until they reach a depth specified by Geotechnical Engineer of Record
2. Repeat process to install all required piles for the respective bridge bent

Table 6-3 provides the number and type of bridge support structures that are proposed to be in estuarine habitats. Some support structures will be installed within the proposed fill limits required for the construction of the new bridge approaches and therefore are not included in the table below since the predominant habitat impact in those areas will be the placement of fill material. Support structures in uplands were excluded as well because there is no anticipated impact to habitats potentially utilized by marine mammal species as the result of their placement.

Table 6-3: Bridge Support Structure Types in Estuarine Habitats

Support Type (Location)	Number of Supports
24-inch Pre-Stressed Concrete Pile (Connector Bridge)	30
72-inch Drilled Shaft (Mackay Creek)	24
96-inch Drilled Shaft (Mackay and Skull Creeks)	112
120-inch Drilled Shaft (Skull Creek)	16
TOTAL	182

Potential Estuarine Habitat Impacts

Bridge construction may result in both temporary and permanent impacts to suitable foraging habitat for marine mammal species. Temporary impacts may include increased turbidity in the vicinity of construction activities. Turbidity is expected to be localized and will only be increased during the installation of bridge support structures. Turbid water will have no detectible effects on manatees or dolphins (Todd, V.L.G et al. 2015). **The contractor will be required to utilize all appropriate SCDOT BMPs for soil and erosion control during construction to minimize the potential impacts and effects of turbidity.**

Additional temporary impacts in the form of increased underwater noise are discussed in more detail in Section 6.1.6.

Permanent impacts will result from installing the different types and sizes of support structures for the new bridges. Locations of the proposed bridge support structures are indicated on Figures 6 through 12 (Appendix A). A summary of potential permanent impacts to estuarine habitats associated with the construction of the new bridges is presented in Table 6-4. Bridge support structures located within the conceptual fill limits for the bridge approaches are not included in Table 6-4. These supports are excluded because the predominant habitat impact in those areas will be the placement of fill material and those impacts have already been quantified as such. Placement of new bridge support structures will result in approximately 0.4 acres of surface area loss across multiple estuarine habitat types. Additionally, the new bridge deck is expected to result in permanent shading impacts of approximately three acres of estuarine emergent wetlands. However, the habitats are all highly abundant in Mackay Creek and Skull Creek and the loss will be partially offset by the removal of the four existing bridges. The potential loss of habitat from bridge support placement and bridge deck shading represents a very small percentage of available habitat in the action area and will ultimately be discountable in the context of the entire ecosystem of Mackay Creek and Skull Creek.

Table 6-4: Estimated Permanent Impacts to Wetland Habitats from Bridge Construction

Estuarine Habitat Type	Concrete Piles	Drilled Shafts	Estimated Impact Surface Area (acres)	Estimated Shade Impacts (acres)
Estuarine emergent wetland	7	31	< 0.1 acre	3
Estuarine tidal creek	10	1	< 0.1 acre	N/A
Estuarine sub-tidal unconsolidated bottom	0	84	< 0.1 acre	N/A
Intertidal non-vegetated flats	13	28	< 0.1 acre	N/A
TOTAL	30	152	< 0.4 acre	3 acres

6.1.5 Bridge Demolition

There are currently four bridges in the US 278 corridor: two bridges over Mackay Creek and two bridges over Skull Creek. The existing bridges have separate structures for eastbound and westbound traffic over the respective waterbodies. The existing eastbound bridge over Mackay Creek was originally constructed in 1956. The westbound lane was constructed in 1982. Both existing bridges over Mackay Creek are approximately 2,300 feet long. They are approximately 25 feet above mean high tide. The existing bridges over Skull Creek were constructed in 1982 and 1983 and are both approximately 2,800 feet long. These bridges are approximately 65 feet above mean high tide. All four of the existing bridges are approximately 36 feet wide. A copy of bridge plan profile sheets for the existing bridges are included in Appendix E. **These existing bridges will be removed in their entirety once construction of the new bridge is completed.**

All four bridge decks and superstructures are comprised of mostly concrete. A summary of the in-water bridge support structures to be removed for each of the four bridges is presented in Table 6-5. The Mackay Creek bridges are supported by 18-inch and 20-inch prestressed concrete piles. The Skull Creek bridges are supported by a combination of 18-inch and 20-inch prestressed concrete piles and steel H-piles. H-piles are embedded in large concrete footings below the ground (see Appendix E). The concrete footings will be removed, and the H-piles will be cut off just below the mudline.

Table 6-5: Existing In-Water Bridge Support Structures to Be Removed

Location	Type	Quantity
Westbound Mackay Creek	18-inch Prestressed Concrete Pile	372
Eastbound Mackay Creek	18-inch Prestressed Concrete Pile	276
Westbound Skull Creek	18-inch Prestressed Concrete Pile	300
	20-inch Prestressed Concrete Pile	190
Eastbound Skull Creek	18-inch Prestressed Concrete Pile	300
	20-inch Prestressed Concrete Pile	190
TOTAL		1,628

It is expected the contractor will implement standard bridge demolition techniques such as the use of concrete saws and jack hammers to dismantle the bridge decks. The demolition of substructure and bridge supports may be removed by direct pull, vibratory hammer, or cutting piles with saws, torches, or other

cutting tools. **Non-hazardous demolition debris will be hauled off site and disposed of in accordance SCDOT policy and SCDHEC regulations.**

Final demolition plans are the responsibility of the contractor and therefore are not available for this analysis. Also, because Mackay Creek and Skull Creek are navigable waters, the demolition plan may require additional coordination with the US Coast Guard (USCG). **If explosives are required for demolition, the contractor, SCDOT, and FHWA will initiate additional coordination and consultation with the USFWS and NMFS.**

To evaluate a “worst-case” scenario for potential impacts to protected species, SCDOT is assuming the contractor will utilize vibratory hammers to remove all existing in-water support structures. A general sequence for the demolition work may resemble the following:

1. Remove all super structure
2. Remove bridge span and bent caps to expose support piles
3. Piles are attached to equipment and vibrated/lifted out of place
4. Repeat process to remove each section of bridge

Potential Estuarine Habitat Impacts

Impacts from demolition may be temporary and permanent. Temporary impacts include an increase in turbidity in Mackay Creek and Skull Creek during the removal of existing substructures. Turbidity is expected to be localized. Turbid water will have no detectible effects on manatees or dolphins (Todd, V.L.G et al. 2015). **The contractor will be required to utilize all appropriate SCDOT BMPs for soil and erosion control during construction to minimize the potential impacts and effects of turbidity.**

During demolition, every effort will be made to avoid dropping pieces of existing bridges into waterways. Materials dropped into the waterways should be retrieved if practicable. **SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill, including materials dropped during demolition.** Additional temporary impacts in the form of increased underwater noise are discussed in more detail in Section 6.1.6.

Permanent impacts from the removal of the existing bridges may include the restoration of wetland habitats. Table 6-6 presents the potential area of wetland habitats that may benefit from the removal of the old US 278 facility. The removal of the old bridge substructure may allow for the previously impacted wetland habitat areas to return to a more natural condition. The removal the existing bridge decks may allow up to 1.6 acres of estuarine emergent wetlands to revegetate under natural processes.

Table 6-6: Estuarine Habitats Potentially Benefited by Removal of Existing US 278 Bridges

Habitat Type	Number of Piles Removed	Estimated Area of Removed Piles (acres)	Estimated Area of Removed Shading (acres)
Estuarine emergent wetland	540	0.03 acres	1.6 acres
Estuarine tidal creek	0	0 acres	0 acres
Estuarine sub-tidal unconsolidated bottom	608	0.01 acres	0 acres
Intertidal non-vegetated flats	480	0.02 acres	0 acres
TOTAL	1,628	0.06 acres	1.6 acres

It should be noted that SCDOT does not plan to seek credit for restoration that may result from the removal of the old US 278 structures. SCDOT does not intend to apply the removal of the old structure and/or approach fills as compensatory mitigation for impacts to wetlands or protected species habitats. SCDOT does not guarantee that these areas will revegetate, and no monitoring of these areas is proposed.

6.1.6 Underwater Construction Noise

An increase in underwater noise is expected during construction. Construction noise may occur in the form of impulsive or non-impulsive sounds, as defined below.

- Impulsive sounds are transient, brief (less than 1 second), and typically consist of high peak pressure with rapid rise time and rapid decline (ANSI 1986; NIOSH 1998; ANSI 2005).
- Non-impulsive sounds can be brief or prolonged and continuous or intermittent, but typically do not have a high peak pressure with rapid rise time (ANSI 1995; NIOSH 1998).

The sound pressure generated by an impact hammer is classified as an impulsive sound. The sound is generally a short duration per blow, but with a relatively high noise level. Sound pressure from a vibratory hammer is classified as non-impulsive. Vibratory hammers typically produce a continuous sound at a lower level. Vibratory pile installation produces a sound with peak pressures lower than those generated by impact pile driving (Caltrans 2017). Standard metrics used to evaluate construction noise impacts include peak sound level (Peak), cumulative sound exposure level (SEL), and root mean square (RMS) sound pressure levels (Caltrans 2017). The discussion of construction noise in this document is focused on underwater noise that may affect marine mammal species.

Methodology

The NMFS Southeast Regional Office (NMFS-SERO) “Pile Driving Calculator” tool (henceforth referenced as “NMFS-SERO Tool”) was used to estimate the underwater noise levels produced during the installation of bridge piles. Input and output data from the tool are generally discussed in the subsequent sections. Full results from the NMFS-SERO Tool are provided in Appendix F.

The specific effects of construction noise on marine mammals are discussed in more detail in Section 7 of this document. A map is included in Appendix F that depicts approximate distances from the bridge pile installation that can be used as a reference for the potential impact distances as described in Section 7 of this document.

Impact Pile Driving

The previously documented “worst-case” scenario for the project assumed the contractor would use impact hammers to install the steel construction casings to their final depths after vibratory methods reached refusal. After coordination and consultation with NMFS, **SCDOT will now require the contractor to use only vibratory hammers and augers for the installation of the steel casings for drilled shaft columns. No impact hammers will be used to install the steel casings for drilled shaft piers.**

The “worst-case” scenario for impact pile driving activities assumes the contractor will install the temporary work trestle and bridge supports for the secondary connector bridge between Hog Island and Jenkins Island with an impact hammer. As documented in Table 6-2 (Section 6.1.3) the temporary work trestle is estimated to require 400 24-inch diameter steel pipe piles in estuarine habitats. The conceptual design for the permanent connector bridge requires the installation of 30 24-inch prestressed concrete piles in estuarine habitats.

The installation of 24-inch concrete piles and 24-inch steel pipe piles are expected to follow a similar workflow. An estimated 800 blows per pile may be required to properly set a single pile. The installation of one pile is expected to take approximately one hour. It is expected four to five piles could be installed during the same day with a break in pile driving as the bent is constructed. Table 6-7 presents the estimated unattenuated sound pressure levels for impact pile driving for the project as determined by the NMFS-SERO Pile Driving Calculator. The pile driving output can be found in Appendix F.

Table 6-7: Estimated Unattenuated Noise Levels for Impact Pile Driving

Type	Estimated Strikes Per Pile	Sound Pressure Level (dB)		
		Peak	SEL	RMS
24-inch Prestressed Concrete	800	185 dB	160 dB	170 dB
24-inch Steel Pipe	800	203 dB	178 dB	189 dB

Vibratory Pile Driving

The refined “worst-case” scenario for vibratory pile driving assumes the installation of the permanent steel casing required for drilled shafts will use a vibratory hammer. When using a vibratory hammer each of the casings could be completed within approximately three hours. As shown in Table 6-3, the conceptual design includes 24 72-inch diameter casings, 112 96-inch diameter casings, and 16 120-inch diameter casings in estuarine habitats. Using the general construction sequence outlined in Section 6.1.5, it is expected a maximum of two casings could be installed per day, with subsequent casings on each bent being installed, and the remainder of drilling and concrete pouring process occurring in the following days.

Vibratory hammers will also likely be used during the demolition and removal of the four existing US 278 bridges over Mackay and Skull Creeks. As shown in Table 6-5 there are 1,248 18-inch concrete piles and 380 20-inch concrete piles that will be removed. It is assumed between four to six concrete piles could be removed per day. Time required for extraction may vary greatly but could require up to 30 minutes per pile. Documented sound values for the removal of concrete piles could not be located, but they are expected to be similar to the levels produced by wooden piles as documented by the NMFS-SERO Tool (NMFS-SERO 2021), as they are similarly sized and nonmetallic.

The NMFS-SERO Tool does not contain noise data for the vibratory installation of 96 or 102-inch steel casings. NMFS-SERO personnel provided guidance in which they developed a ratio approach using known data for 72-inch steel casings to estimate noise measurements for 96-inch and 120-inch casings (Appendix B and Appendix F). These data were entered into the NMFS-SERO Tool to determine project specific noise levels. Table 6-8 presents the estimated unattenuated sound pressure levels for vibratory pile driving and demolition for the project (refer to Appendix F).

Table 6-8: Estimated Unattenuated Underwater Noise Levels Associated with Vibratory Pile Driving

Construction Type	Pile Type	Sound Pressure Level (dB)		
		Peak	SEL	RMS
Installation	72-inch Steel Pipe	195 dB	180 dB	180 dB
	96-inch Steel Pipe	200 dB	192 dB	195 dB
	120-inch Steel Pipe	194 dB	186 dB	192 dB
Demolition/Removal	18-inch Concrete	176 dB	165 dB	165 dB
	20-inch Concrete	176 dB	165 dB	165 dB

Auger Usage

The use of an auger will be required for the installation of all drilled shafts. Using an auger to remove the soil and rock from within the casings will produce a non-impulsive noise that will contribute to the increased levels of underwater noise during construction. An auger may be used for up to eight hours per day as part of the drilled shaft installation process. A total of 152 drilled shafts will be installed in estuarine habitats.

The best available noise data comes from a study of in-water noise produced during the installation of drilled-shaft columns using auger bits in Bechers Bay, Santa Rosa Island, California (Dazey et. al 2012), that found the sound levels at the source ranged from 121-184.5 dB with an average noise level of 154.2 dB.3 The "sea floor" at Bechers Bay consisted of sand, rock, and other geographic features similar to the conditions in Mackay Creek and Skull Creek. Table 6-9 provides the estimated underwater noise levels associated with the use of an auger.

Table 6-9: Estimated Unattenuated Underwater Noise Levels Associated with Auger Usage

Total Number of Drilled Shafts	Estimated Use per Day (hours)	Sound Pressure Level (dB)		
		Peak	SEL	RMS
152	8 hours	185 dB	199 dB	154 dB

Noise Attenuation Methods

Noise attenuation methods are generally used to reduce noise impacts associated with impact pile driving. The use of vibratory hammers instead of an impact hammer has been shown to have a 10 to 20dB reduction compared to unattenuated impact hammer sound levels (Caltrans 2017). Other standard methods of noise attenuation for impact pile driving include use of bubble curtains, pile caps, or cushion blocks. A method of noise attenuation commonly referred to as "slow starts" do not necessarily have quantifiable metrics that can be used to determine their effectiveness. However, these methods can be used to give any listed animals the opportunity to leave an area prior to full-force pile driving (NMFS-SERO 2018). These methods include:

- "Ramp up" method - pile driving starts at a very low force and gradually builds up to full force
- "Dry firing" method - operating the pile hammer by dropping the hammer with no compression
- "Soft start" method - noise from hammers is initiated for 15 seconds, followed by a 1-minute waiting period – this sequence is repeated multiple times.

Table 6-10 provides a brief description and the effectiveness of standard noise attenuation methods based on Information from the FHWA/NMFS Programmatic Agreement for Projects in NC, SC, and GA (NMFS-SERO 2018).

Table 6-10: Standard Noise Attenuation Methods

Sound Treatment	Description	Effectiveness	
		Reduction	Metric
Bubble curtain or bubble tree	Air bubbles used to block sound	5-20+ dB	Peak, SEL, RMS
Confined bubble curtain	A fabric, solid, or tubular curtain is used to confine bubbles	9-22 dB	Peak, RMS
Pile caps	Micarta caps used between the impact piling head and the pile to reduce noise	1-8 dB	Peak, SEL, RMS
Wood pile cushions	A block of wood used between the pile head and pile to reduce noise (often used with a pile cap).	11-26 dB	Peak, SEL, RMS

Potential Species Effects

Physiological and behavioral impacts to aquatic species have been documented due to the sound pressure generated when installing bridge piles utilizing an impact hammer or vibratory hammer (Caltrans 2017). There is a potential of severe effects (e.g. temporary or permanent hearing loss) when animal exposure to a high source level occurs close to the source; however, the magnitude and probability of most effects generally decrease with increasing distance from the source. The potential for impacts may be reduced by implementing active mitigation measures such as noise attenuation (Caltrans 2017).

Underwater noise produced from installation of the temporary work trestle pipe piles, bridge support piles, and permanent steel casings for the drilled shafts may temporarily or permanently affect some protected aquatic species, specifically, during the installation or removal of structures in the main, open water channels (estuarine unconsolidated bottom) of Mackay Creek and Skull Creek. Marine mammal species that may occur and that are known to occur in the project action area are expected to utilize this open-water environment more frequently than the other aquatic habitats.

In an open-water environment like the main channels of Mackay Creek and Skull Creek, marine mammal species would be able to move freely away from the noise without being forced to stay in areas where the noise levels over time could cause injury. It is anticipated that protected species will leave/avoid the construction area during pile/pier installation, especially if methods such as ramp up, dry firing, or soft starts are utilized (Weilgart 2007).

Table 6-11 presents a summary of the estimated attenuated noise levels resulting from installation and removal of the different temporary and permanent bridge support structures located in the aquatic environment. Varying water depths will occur during tide changes and these noise levels represent a constant water depth and thus the worst-case scenario for potential impacts. The results and data used for these calculations can be found in Appendix F.

Table 6-11: Estimated Attenuated Noise Levels for the Installation and Removal of All Bridge Support Structures

Construction Type	Bridge Support Type (Location)	Method	Total Number of Supports Per Habitat Type				Estimated Strikes Per Pile	Estimated Time Per Pile (minutes)	Number Installed or Removed Per Day	Proposed Sound Attenuation Method	Attenuated Sound Pressure Level (dB)		
			Estuarine emergent wetland	Estuarine sub-tidal unconsolidated bottom	Estuarine tidal creek	Intertidal non-vegetated flat					Peak	SEL	RMS
Installation	24-inch Concrete Pile (Connector Bridge)	Impact	7	-	10	13	800	60 min	5	Cushion Blocks, "Slow Start"	185 dB	170 dB	160 dB
	24-inch Steel Pipe (Temporary Trestle)	Impact	269	51	8	72	800	60 min	5	Cushion Blocks, "Slow Start"	203 dB	189 dB	178 dB
	72-inch Steel Pipe (Mackay Creek)	Vibration	15	5	-	4	-	180 min	2	Vibration	195 dB	180 dB	180 dB
	96-inch Steel Pipe (Mackay & Skull Creeks)	Vibration	16	70	1	25	-	180 min	2	Vibration	200 dB	192 dB	195 dB
	120-inch Steel Pipe (Skull Creek)	Vibration	-	16	-	-	-	180 min	2	Vibration	194 dB	186 dB	192 dB
	All Drilled Shafts (Mackay & Skull Creeks)	Auger	31	91	1	29	-	480 min	1	Confined to steel casing	185 dB	199 dB	154 dB
Demolition/ Removal	18-inch Concrete Pile (Mackay & Skull Creeks)	Vibration	400	-	-	13	-	60 min	6	Vibration	176 dB	165 dB	165 dB
	20-inch Concrete Pile (Mackay & Skull Creeks)	Vibration	140	112	-	274	-	60 min	6	Vibration	176 dB	165 dB	165 dB

6.2 BRIDGE FENDER SYSTEM

The proposed US 278 bridge will include a fender system to protect the bridge from damage by watercraft. The new fender system will be designed to accommodate all required uses of the waterway, including recreational watercraft, as well as larger vessels such as commercial fishing boats and tugboats. The fender elements would likely consist of rubber fenders, with a steel panel and polyethylene facing. The installation of prestressed concrete piles or wooden piles will be required to support the new fender systems.

Potential Habitat Impacts

Temporary impacts may include increased turbidity in the vicinity of construction activities. Turbidity is expected to be localized and will only be increased during the installation of bridge support structures. Turbid water will have no detectable effects on manatees or dolphins (Todd, V.L.G et al. 2015). **The contractor will be required to utilize all appropriate SCDOT BMPs for soil and erosion control during construction to minimize the potential impacts and effects of turbidity.**

The fender system has not yet been designed so impacts cannot be quantified at this time. However, the installation of additional concrete piles will be required to construct the bridge fender system. Installation of these piles may increase underwater noise in a similar manner as the other prestressed concrete piles described previously in Section 6.1.5. These piles would not be load bearing and therefore are not expected to require extensive pile strikes such as those on the permanent bridge system. It is expected that the installation of the fender system will result in a minimal increase to underwater noise and no additional analysis to include the fender system is proposed.

6.3 STORMWATER RUNOFF

The existing bridges over Mackay Creek and Skull Creek currently utilize scuppers that discharge bridge deck runoff directly into the waterbodies below. Mackay Creek and Skull Creek are both classified by SCDHEC as SFH (Figure 4, Appendix A). There are also oyster beds found throughout the estuarine habitats within the PSA. The SCDOT Stormwater Quality Design Manual (2014) requires the treatment of stormwater runoff to avoid or minimize potential impacts to maintain the high water quality levels required for Shellfish Harvesting Waters. A NPDES permit that includes a Stormwater Pollution Prevention Plan (SWPPP) will be required prior to the start of construction.

Potential Impacts

The existing bridges currently discharge directly into the waters of Mackay Creek and Skull Creek, where the stormwater runoff may decrease water quality and ultimately affect protected species. The waters of Mackay Creek and Skull Creek are currently classified as SFH by SCDHEC so bridge deck runoff may have little overall effect on these waterbodies. Nevertheless, to minimize the potential for water quality impacts, **SCDOT proposes to pre-treat future stormwater runoff from the proposed bridge deck prior to discharge into waters below the new US 278 bridge. Stormwater discharged within 1,000 feet of a shellfish bed will be pre-treated per the SCDOT Stormwater Quality Design Manual.**

7.0 MARINE MAMMAL EFFECTS ANALYSIS

The following section contains discussion about potential effects to marine mammal species that occur in the PSA. The MMPA defines “take” as: harassment, hunting, capturing, collecting, or killing (16 U.S.C. 1361). Harassment, as defined by the MMPA, includes “any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered (16 U.S.C. 1361).”

7.1 MARINE MAMMALS

7.1.1 West Indian manatee (*Trichechus manatus*)

Mackay Creek and Skull Creek and associated tidal creeks provide suitable summer West Indian manatee habitat within the PSA. West Indian manatees are known to occur in waters adjacent to Pinckney Island National Wildlife refuge near Daws Island and Port Royal Sound (USFWS 2011). According to SCDNR’s online SC Natural Heritage Species Reviewer, a West Indian manatee sighting was recorded approximately two miles northeast of the PSA in Skull Creek, and all open waters in the vicinity of the PSA are designated as potential areas for manatee occurrences (SCDNR 2021).

7.1.2 Bottlenose dolphin (*Tursiops truncatus*)

Mackay Creek and Skull Creek and associated tidal creeks provide suitable year-round bottlenose dolphin habitat within the PSA. A four-year study documented their year-round presence in Calibogue Sound and waters around Hilton Head Island (Gubbins 2002). Currently there are no data on the population in the Northern Georgia/Southern South Carolina Estuarine System Stock (NOAA-NMFS 2015).

7.2 TEMPORARY EFFECTS

7.2.1 Turbidity

Mackay Creek and Skull Creek and associated tidal creeks provide suitable foraging habitat for manatees and dolphins. Temporary impacts to the foraging habitat could occur in the form of siltation and turbidity during construction. The installation of the temporary work trestle pipe piles, pre-stressed concrete piles, and drilled shaft casings will temporarily increase turbidity in the water column. Removal of temporary work trestle piles and existing bridge supports will increase temporary turbidity. In-water installation of piles and drilled shafts will be intermittent construction activities and due to the water high velocity in the open channels as the result of tidal flow, it is anticipated that turbidity would dissipate rapidly. Additionally, **the contractor will be required to utilize all appropriate SCDOT BMPs for soil and erosion control during construction to minimize the potential impacts and effects of turbidity.** Turbid water will have no detectable effects on manatees or dolphins as they typically occupy turbid waters (Todd, V.L.G et al. 2015).

7.2.2 Underwater Construction Noise Effects

NMFS has developed affect thresholds for mid-frequency hearing cetaceans, which includes bottlenose dolphins. An acoustic tool specifically developed for cetaceans was also obtained from the NMFS-SERO website. Data derived from the SERO Tool (Section 6.1.6) is used to populate cells within the cetacean acoustic tool, which generates a distance from the pile installation site at which dolphins would be affected (see Appendix F). To assess potential effects of the project, the outputs from the cetacean acoustic tool were then compared to the NMFS predetermined noise level thresholds for marine mammals that occur in the project area.

Anthropogenic underwater noise has been shown to effect marine mammal communication, interfere with navigation, displacement of animals avoiding the noise source, interrupt foraging, and result in hearing damage (Weilgart 2007). NMFS has determined that the Permanent Threshold Shifts (PTS) for bottlenose dolphins is 198 dB SEL for vibratory installation (NOAA-NMFS 2018). Specific thresholds for acoustic effects to manatees have not been developed at this time. However, based on the estimated underwater noise levels for the project (see Section 6.1.6) bridge support pile installations and removal could affect the behavior and disrupt foraging and migrating manatees.

For pile installation using impact hammers, the cetacean acoustic tool uses both the SEL and Peak impulse to determine the PTS affect distances. NMFS has determined that the SEL threshold for impact installation to be 185 dB and a Peak threshold of 230 dB (NOAA-NMFS 2018). The estimated Peak noise for impact hammer installation of 24-inch steel and pre-stressed concrete piles were estimated to be 192 and 174dB (see Section 6.1.6), respectively, which is below the 230 dB PTS threshold. Therefore, the cetacean acoustic tool did not generate an affect threshold distance for these piles.

Table 7-1 provides the SEL for each of the pile types and sizes to be installed for construction of the temporary and permanent bridges, and the estimated threshold distance as determined by cetacean acoustic tool.

Table 7-1: Attenuated SEL and PTS Threshold Distances for Vibratory and Impact Hammer Installation

Construction Type	Pile Type	SEL (dB)	PTS Threshold Distance (feet)
Vibratory Installation	72-inch Steel Pipe	180 dB	1,212 ft
	96-inch Steel Pipe	192 dB	1,212 ft
	120-inch Steel Pipe	186 dB	348 ft
Impact Hammer	24-inch Steel Pipe	189 dB	3 ft
	24-inch Concrete	170 dB	0 ft

Increased underwater noise from the project would be intermittent and relatively short with an estimated maximum of eight hours per day during the use of an auger to construct the drilled shaft supports. **To minimize the potential effects on manatees and dolphins, “slow start” methods such as ramp up, dry firing, or soft starts, in combination with cushion blocks, will be used to minimize noise during the**

installation of piles when using an impact hammer. Additionally, SCDOT will require the contractor to use vibratory hammers and augers for the installation of the steel pipe casings for drilled shaft columns; no impact hammers will be used.

Appendix F provides a depiction of the approximate distances from the PSA that increased underwater noise may be increased. During the periods of increased underwater noise levels, it is reasonable to assume that manatees and dolphins, upon detecting the increase, will leave the area (Weilgart 2007); especially if methods such as ramp up, dry firing, or soft starts are utilized for impact pile driving. However, it is impossible to predict or state with certainty that there will be no occurrences of manatees within the estimated distances where noise impacts may affect the species.

Although increased underwater noise levels from the project may affect manatees and dolphins, the major noise producing activities will be relatively intermittent in nature. Studies have shown that bottlenose dolphins react to both impact and vibratory pile installation by avoiding the construction areas (Graham et al 2017). Following the installation of casings, a period of no in-water activity will occur while the construction equipment is remobilized or a bent is constructed. In addition, manatees will be able to resume normal activities during quiet periods between casing installations, and **for at least eight hours every night**. Based on the above information, it is anticipated any effects on manatees resulting from increased underwater noise during construction will be minimal.

7.2.3 Vessel Strikes

Vessel strikes pose a serious threat to the slow-moving manatee (USFWS 2001). Studies have shown that manatees can detect noise generated by boat motors but cannot determine the direction of the noise source (Mann et al 2014). Fast moving boats generate higher decibels but manatee reaction time is generally only 15 seconds, while slow moving boats generate less noise, and manatee reaction time is increased to 40 seconds, and the response is to seek deeper water and fewer strikes (Mann et al 2014, Rycyk et al. 2018). Vessel strikes of dolphins do occur, however due to the faster swimming speed of dolphins, strikes are infrequent (Wells, R, M. Scott. 1997).

Manatees and dolphins that utilize the waters of Mackay or Skull Creeks would commonly encounter vessel traffic associated with recreational and commercial vessels in an existing no wake zone; therefore, the manatees and dolphins have likely acclimated to existing levels of vessel activity. The project will require the use of barges and an increase in vessel traffic may be required over the life of the project (approximately three years). **To minimize potential effects to manatees, the USFWS Standard Manatee Conditions for In-Water Work (Appendix H) will be employed during construction. Precautionary measures will be implemented during construction to reduce the likelihood of vessel strikes of manatees and dolphins.**

7.3 EFFECTS DETERMINATION

Although increased underwater noise levels from the project **may affect** manatees and dolphins, the major noise producing activities will be relatively intermittent in nature. **To minimize the potential effects on manatees and dolphins, “slow start” methods such as ramp up, dry firing, or soft starts, in combination with cushion blocks, will be used during the installation of piles when using an impact hammer. Additionally, SCDOT will require the contractor to use vibratory hammers and augers for the installation of the steel pipe casings for drilled shaft columns. No impact hammers will be used to install the steel pipe casings for drilled shafts.**

Since manatees and dolphins are a mobile species, they are expected to move away from noise disturbances (Weilgart 2007) to similar habitat nearby and resume normal behaviors. In addition, manatees and dolphins will be able to resume normal activities during quiet periods between pile installations, and **for at least eight hours every night**. The project has adequate avenues for a manatee and dolphins to leave or avoid the project area during construction and increased levels of underwater noise. There is abundant habitat that manatees and dolphins can utilize for foraging or other life functions outside of the PSA during construction.

To minimize potential effects to manatees, the USFWS Standard Manatee Conditions for In-Water Work (Appendix G) will be employed during construction. Precautionary measures will be implemented during construction in summer months or early fall, as this is when the waterways would likely support increasing numbers of manatees.

The project is not anticipated to have any permanent effects on the West Indian manatee or bottlenose dolphin. Habitat loss is expected to be discountable. The abundance of available habitat within or adjacent to the action area, alternative migration routes and foraging habitat available to manatees and transient dolphins, and the species have the ability and are likely to leave or avoid the project area during construction.

8.0 CONSERVATION MEASURES

As coordination with resource and regulatory agencies progresses, Environmental Commitments will be developed and become part of the NEPA record. SCDOT and the contractor will be required to honor/implement SCDOT standard Environmental Commitments and those project specific commitments developed through agency coordination and the permitting process. A list of recommended Environmental Commitments specific to the federally protected species that may be affected by the project can be found at the end of this section.

8.1 EROSION, SEDIMENT, AND TURBIDITY CONTROL

SCDOT and/or the contractor will develop a SWPPP and obtain both a land disturbance permit and a National Pollutant Discharge Elimination System (NPDES) permit from the SCDHEC before construction can commence. Temporary silt/turbidity curtains will be installed prior to commencement of in-water work, where practicable, and in such a way the manatees and dolphin do not become entangled. The contractor will be required to utilize SCDOT Best Management Practices for soil and erosion control during construction.

Additionally, the limits of clearing, grading, or placement of fill in estuarine habitats will be delineated and shown on approved permitted plans by the USACE and the SCDHEC. SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill in wetlands.

8.2 POST CONSTRUCTION STORMWATER TREATMENT

The final project design will incorporate the conditions of SCDOT's General MS4 permit and Stormwater Quality Design Manual that includes pretreatment of post-construction stormwater runoff prior to discharge into receiving waters classified as SFH.

SCDOT proposes to pre-treat future stormwater runoff from the proposed bridge deck prior to discharge into waters below the new US 278 bridge. Stormwater discharged within 1,000 feet of a shellfish bed will be pre-treated per the SCDOT Stormwater Quality Design Manual.

8.3 BRIDGE SPAN LENGTH

The US 278 bridge design has undergone refinements since the analysis completed in July 2020. These refinements include a lengthening of bridge spans from 100 feet to 175 feet long, thereby reducing the number of bents and piles required to support the replacement bridge.

8.4 UNDERWATER NOISE REDUCTION

Through coordination with NMFS, noise levels associated with project construction indicated potentially severe noise related effects to marine mammal species. The project team then set out to review alternative construction methods to minimize potential impacts. After coordination with bridge construction contractors and project engineers, it was determined the most likely method of installation of the permanent steel casings is the use of a vibratory hammer and then auger as necessary to set the casing to its final depth, as discussed in Section 6.1.6. Therefore, **SCDOT will now require the contractor to use vibratory hammers and augers for the installation of the steel construction casings for drilled shaft columns.**

During construction, the potential effect of underwater noise impacts could be minimized by using “slow start” methods such as ramp up, dry firing, or soft starts, as well as cushion blocks, during the installation of piles using an impact hammer. Vibratory hammers for the installation and removal of all bridge support structures should be maximized when practicable.

If explosives are required for demolition, the contractor, SCDOT, and FHWA will be required to initiate additional coordination and consultation with the USFWS and NMFS.

8.5 PERMITTING REQUIREMENTS

The contractor will be required to adhere to all Special Conditions associated with all federal, state, and local permits required to construct the project. The expected permits and other authorizations required prior to beginning construction include an Individual USACE Section 404 permit, an Individual SCDHEC Section 401 Water Quality Certification, an Individual SCDHEC-OCRM Critical Area permit, and a USCG bridge permit.

8.6 USFWS AND NMFS CONSTRUCTION CONDITIONS

The contractor will be required to follow the USFWS Standard Manatee Conditions for In-Water Work (Appendix G). Precautionary measures will be implemented during construction in summer months or early fall when the waterways may support increasing numbers of manatees.

8.7 REPORTING

If SCDOT or the contractor discovers an injured, sick, or dead marine mammal, NMFS will be notified immediately by contacting the NMFS Stranding Coordinator for the Southeast Region. NMFS would be provided with the species or description of the animal(s), the condition of the animal (carcass condition

if deceased stranding), location, the date and time of first discovery, observed behaviors (if alive), and photo or video (if available). Any collision, injury, or mortality to manatees will also be reported immediately to the USFWS South Carolina Field Office.

8.8 RECOMMENDED ENVIRONMENTAL COMMITMENTS

Table 8-1 summarizes the effect minimization commitments listed in the previous sections of the document. These commitments are recommended to either avoid or minimize potential effects to all federally protected species. For species that may be affected by the project, these measures are intended to prevent the potential to adversely affect the species. **The contractor, SCDOT, and FHWA will be required to stay in compliance with all approved environmental conditions established in the EA as well as any special conditions established in the required permit authorizations.**

Table 8-1: Recommended Conservation and Effect Minimization Environmental Commitments

Recommended Environmental Commitment
<ul style="list-style-type: none"> SCDOT and/or the contractor will develop a Stormwater Pollution Prevention Plan (SWPPP) and obtain both a land disturbance permit and a National Pollutant Discharge Elimination System (NPDES) permit from the SCDHEC before construction can commence.
<ul style="list-style-type: none"> The contractor will adhere to all SCDOT construction and erosion and sediment control BMPs.
<ul style="list-style-type: none"> The limits of any clearing, grading, or fill in wetlands will be delineated and shown on approved permitted plans by the USACE and SCDHEC. SCDOT and the contractor will comply with all applicable permits and permit conditions for the placement of fill in wetlands.
<ul style="list-style-type: none"> The contractor will be required to maintain navigability during construction and will not be allowed to block the respective channels of Mackay or Skull Creeks.
<ul style="list-style-type: none"> The existing US 278 bridges will be removed in their entirety once construction of the new bridge is completed.
<ul style="list-style-type: none"> Non-hazardous demolition debris will be hauled off site and disposed of in accordance SCDOT policy and SCDHEC regulations.
<ul style="list-style-type: none"> If explosives are required for demolition, the contractor, SCDOT, and FHWA will initiate additional coordination and consultation with the USFWS and NMFS.
<ul style="list-style-type: none"> SCDOT will require the contractor to use only vibratory hammers and augers for the installation of the steel casings for drilled shaft columns. No impact hammers will be used to install the steel casings for drilled shafts.
<ul style="list-style-type: none"> SCDOT proposes to pre-treat future stormwater runoff from the proposed bridge deck prior to discharge into waters below the new US 278 bridge. Stormwater discharged within 1,000 feet of a shellfish bed will be pre-treated per the SCDOT Stormwater Quality Design Manual.
<ul style="list-style-type: none"> To minimize the potential effects on manatees and dolphin, the contractor will use “slow start” methods such as ramp up, dry firing, or soft starts at the beginning of bridge support structure installation activities.
<ul style="list-style-type: none"> Noise impacts will be attenuated/mitigated by using cushion blocks on pile caps for piles installed by impact pile driving.
<ul style="list-style-type: none"> The contractor will allow for a minimum of eight hours of “quiet hours” with no in water construction each night for the life of the project.
<ul style="list-style-type: none"> USFWS Standard Manatee Conditions for In-Water Work (Appendix G) will be employed during all in-water construction. Precautionary measures will be implemented during construction in summer months or early fall when the waterways may support increasing numbers of manatees.

<ul style="list-style-type: none"> The contractor, SCDOT, and FHWA will be required to stay in compliance with all approved environmental conditions established in the EA as well as any special conditions established in the required permit authorizations.
<ul style="list-style-type: none"> If SCDOT or the contractor discovers an injured, sick, or dead marine mammal, NMFS will be notified immediately by contacting the NMFS Stranding Coordinator for the Southeast Region. NMFS would be provided with the species or description of the animal(s), the condition of the animal (carcass condition if deceased stranding), location, the date and time of first discovery, observed behaviors (if alive), and photo or video (if available).
<ul style="list-style-type: none"> Any collision, injury, or mortality to manatees will be reported immediately to the USFWS South Carolina Field Office.

9.0 CONCLUSIONS

After completing a literature search, field surveys, and a habitat assessment, with the inclusion of the proposed effect minimization efforts, SCDOT and FHWA have determined the proposed project **may affect** manatees and dolphins that are known to occur within the project action area. The project will directly impact habitat which supports foraging, breeding, migration routes, or shelter for those species.

However, habitat loss is expected to be discountable, the abundance of available habitat within or adjacent to the action area, alternative migration routes and foraging habitat available to manatees and transient dolphins, and the species have the ability and are likely to leave or avoid the project area during construction. **SCDOT will implement the conservation measures described in Section 8, all environmental commitments as described in the EA, and will adhere to any special conditions prescribed under the required permit authorizations which will minimize the potential for harm, harassment, or other forms of “take” of marine mammals.**

Therefore, it has been determined that the project is **not likely to cause a disruption of natural behavioral patterns to meet the definition of harassment under the MMPA**. Additionally, the project is **not expected to result in the serious injury** of West Indian manatees or bottlenose dolphins. **Overall, the project is expected to result in a negligible impact to marine mammal species or stocks.**

The findings of this report should be submitted to the NMFS and USFWS for their review and concurrence of the determinations made above.

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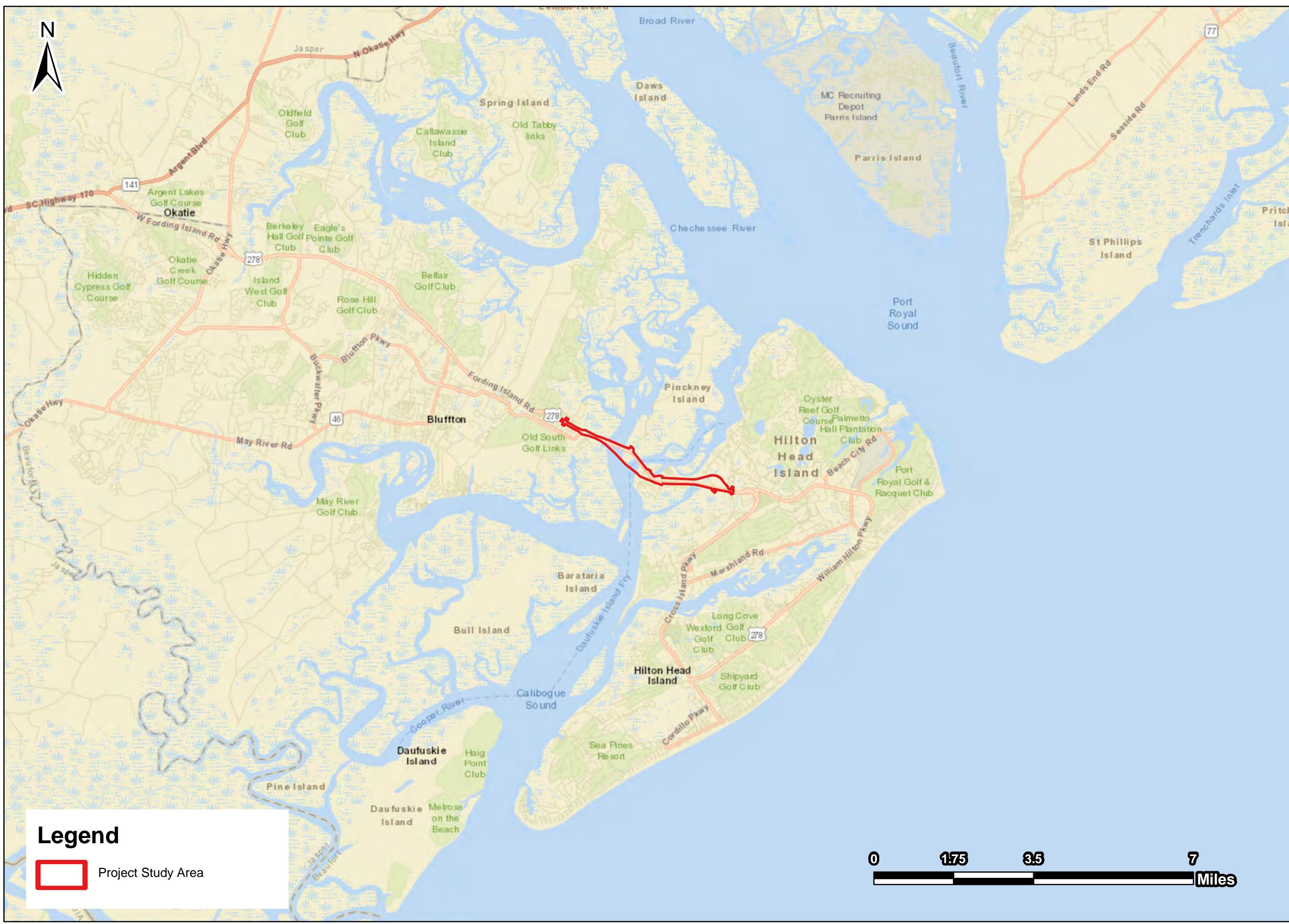
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APPENDIX A

PROJECT STUDY AREA MAPS AND FIGURES



Legend

 Project Study Area



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC

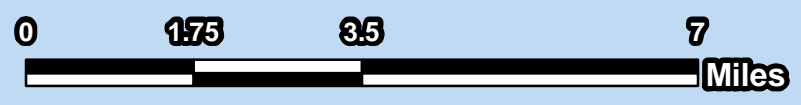


Date: January 19, 2021

Scale: 1 in = 2 miles

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
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Figure

1



Legend
 Project Study Area



Prepared For:



**US 278
 Corridor
 Improvements
 Project**

Beaufort County, SC



Date: October 28, 2020

Scale: 1 inch = 1,500 feet

Job No.: 18-002

Drawn By: ZCB	Checked By: AGM
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Figure
2

Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: October 28, 2020

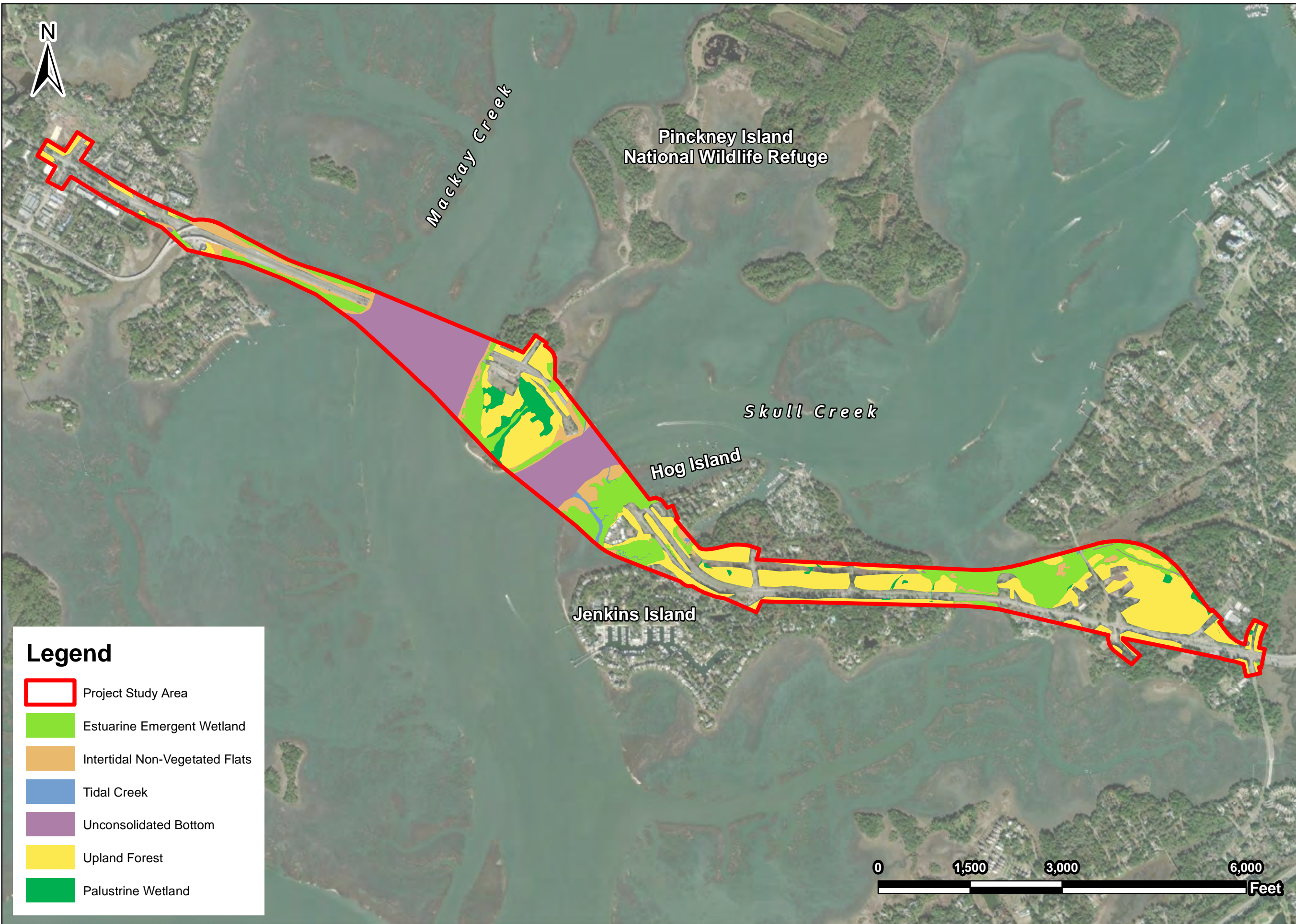
Scale: 1 inch = 1,500 feet

Job No.: 18-002







Drawn By: ZCB
Checked By: AGM

Figure

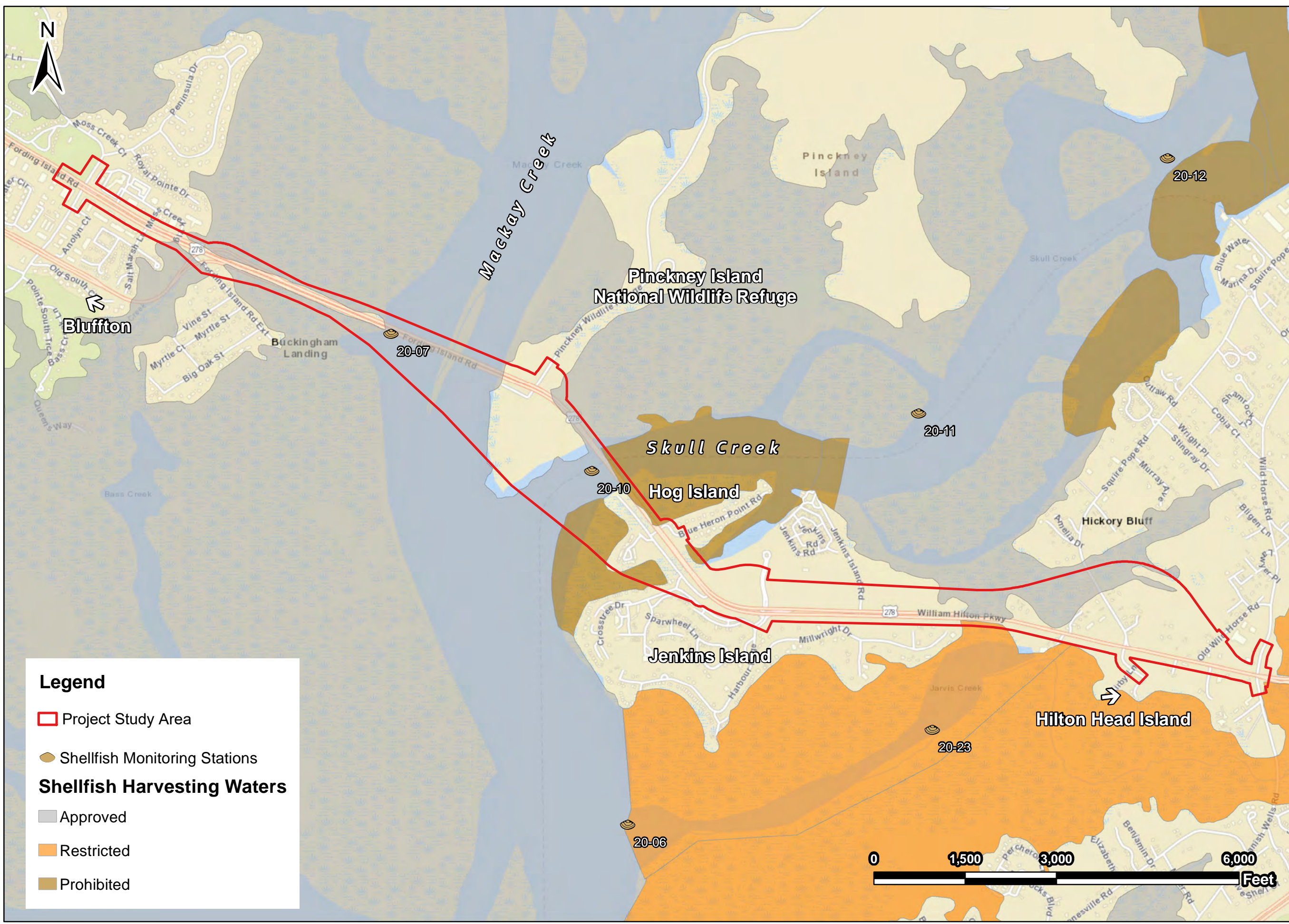
3



Legend

-  Project Study Area
-  Estuarine Emergent Wetland
-  Intertidal Non-Vegetated Flats
-  Tidal Creek
-  Unconsolidated Bottom
-  Upland Forest
-  Palustrine Wetland

0 1,500 3,000 6,000 Feet



Legend

- Project Study Area
- Shellfish Monitoring Stations

Shellfish Harvesting Waters

- Approved
- Restricted
- Prohibited



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: February 5, 2021

Scale: 1 in = 1,500 feet

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
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Figure
4



Legend

- Recommended Preferred Alternative 4A
- Construction Limits
- Proposed Bridge



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: February 5, 2021

Scale: 1 inch = 1,500 feet

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
------------------	--------------------

Figure
5

Prepared For:



**US 278
 Corridor
 Improvements
 Project**

Beaufort County, SC



Date:
 February 5, 2021

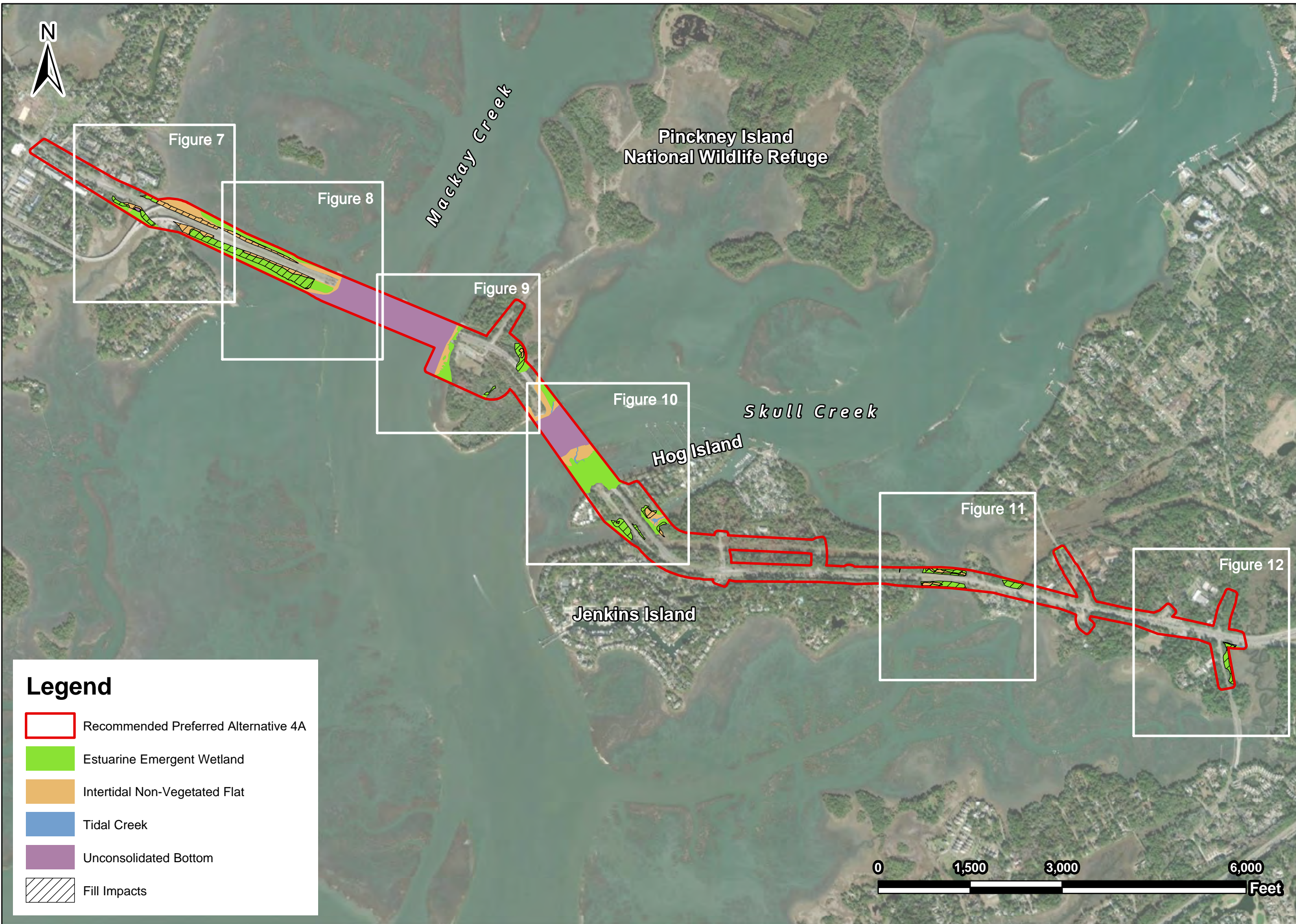
Scale:
 1 inch = 1,500 feet

Job No.:
 18-002






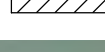
Drawn By: WCB	Checked By: AGM
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Figure

6



Legend

-  Recommended Preferred Alternative 4A
-  Estuarine Emergent Wetland
-  Intertidal Non-Vegetated Flat
-  Tidal Creek
-  Unconsolidated Bottom
-  Fill Impacts

0 1,500 3,000 6,000 Feet



Legend

- Recommended Preferred Alternative 4A
- Estuarine Emergent Wetland
- Intertidal Non-Vegetated Flat
- Unconsolidated Bottom
- Construction Limits
- Potential Fill Impacts
- Work Trestle & Piles (24" diameter)
- Proposed Bridge



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: February 5, 2021

Scale: 1 inch = 250 feet

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
---------------	-----------------

Figure

7



Legend

- Recommended Preferred Alternative 4A
- Estuarine Emergent Wetland
- Intertidal Non-Vegetated Flat
- Unconsolidated Bottom
- Construction Limits
- Potential Fill Impacts
- Work Trestle & Piles (24" diameter)
- Proposed Bridge



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: February 5, 2021

Scale: 1 inch = 250 feet

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
---------------	-----------------

Figure

8



Legend

- Recommended Preferred Alternative 4A
- Estuarine Emergent Wetland
- Intertidal Non-Vegetated Flat
- Tidal Creek
- Unconsolidated Bottom
- Construction Limits
- Potential Fill Impacts
- Work Trestle & Piles (24" diameter)
- Proposed Bridge



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date: February 5, 2021

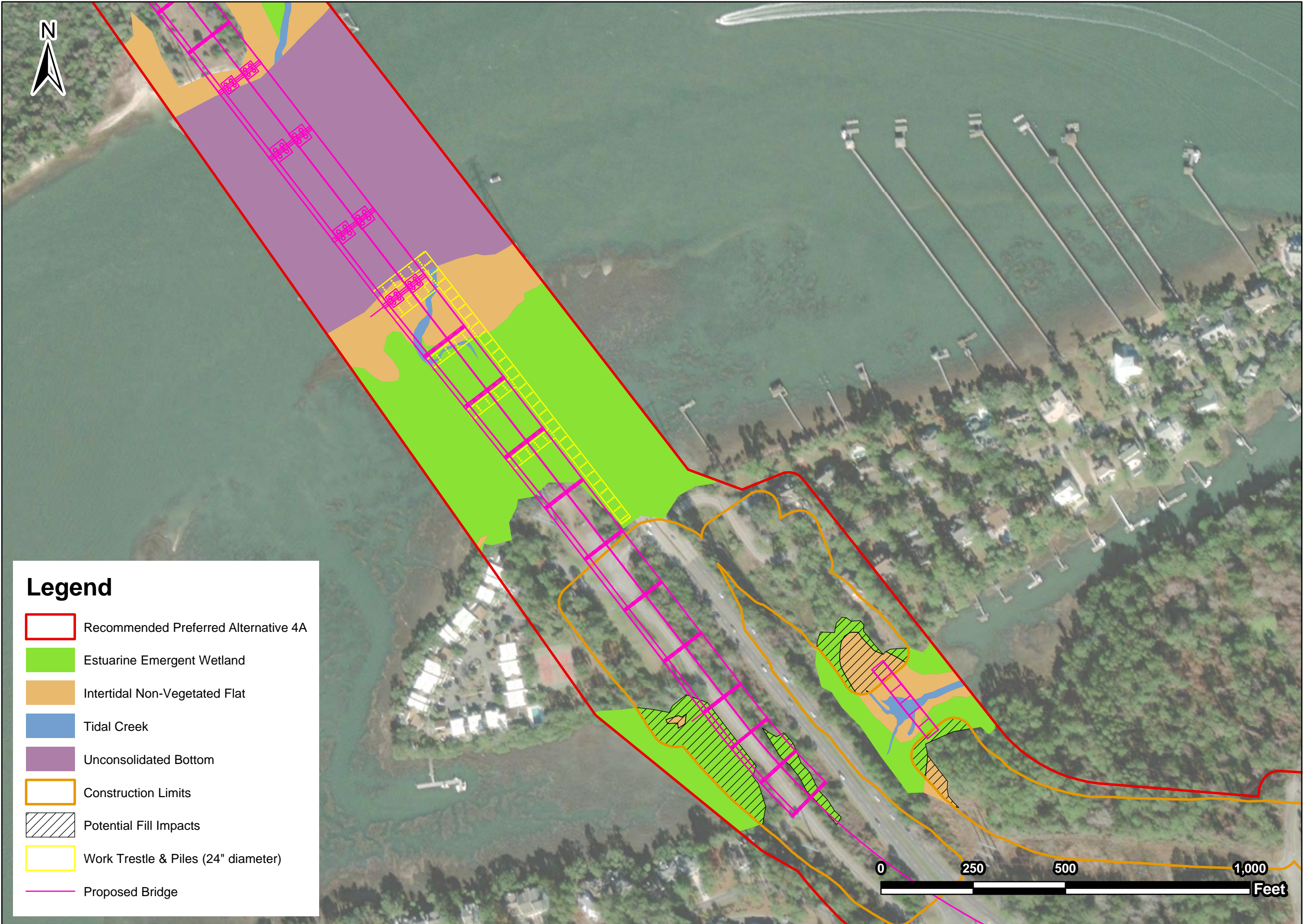
Scale: 1 inch = 250 feet

Job No.: 18-002

Drawn By: WCB	Checked By: AGM
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Figure

9



Legend

- Recommended Preferred Alternative 4A
- Estuarine Emergent Wetland
- Intertidal Non-Vegetated Flat
- Tidal Creek
- Unconsolidated Bottom
- Construction Limits
- Potential Fill Impacts
- Work Trestle & Piles (24" diameter)
- Proposed Bridge



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



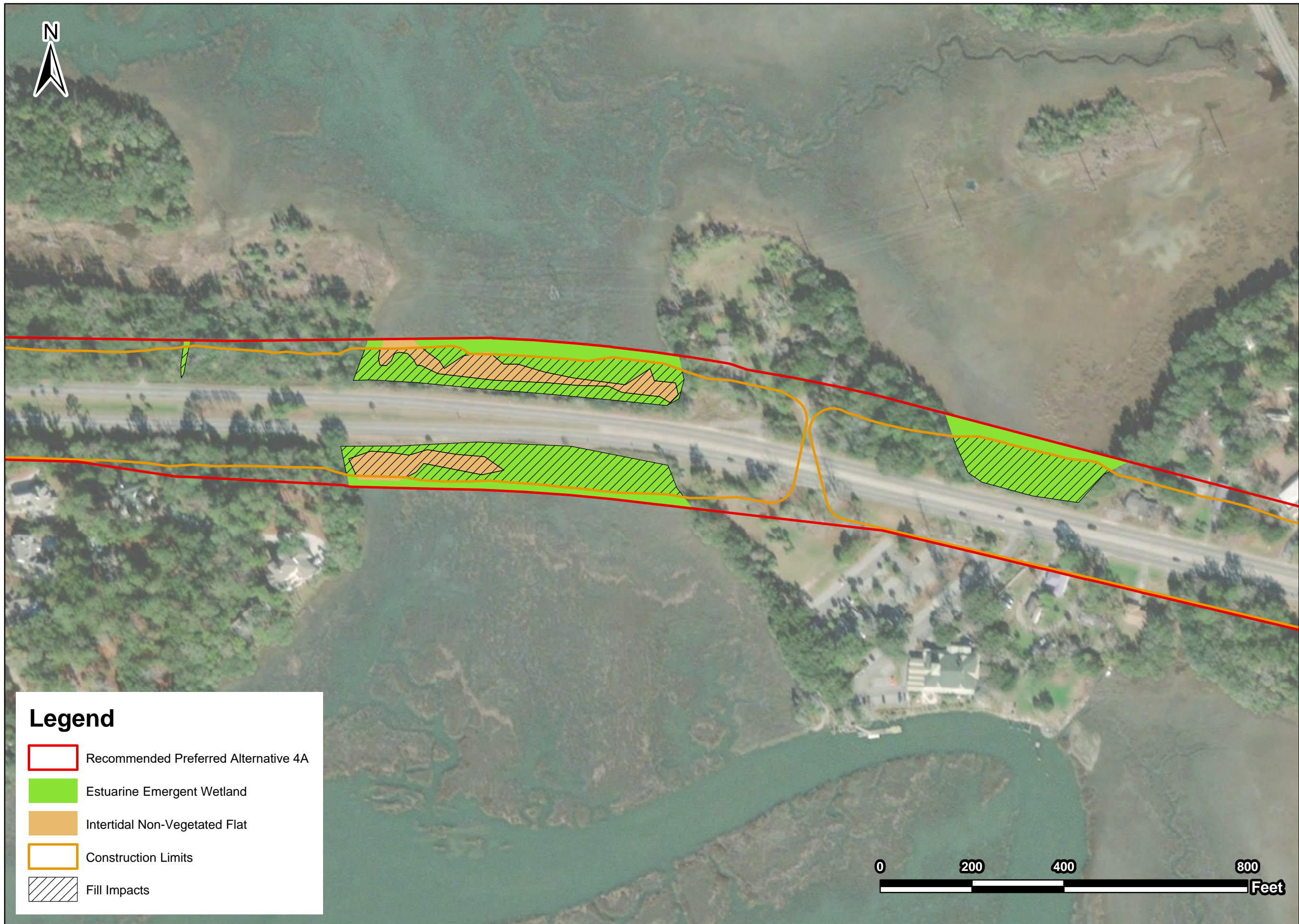
Date: February 5, 2021

Scale: 1 inch = 250 feet





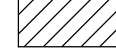
Job No.: 18-002

Drawn By: WCB	Checked By: AGM
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Figure
10



Legend

-  Recommended Preferred Alternative 4A
-  Estuarine Emergent Wetland
-  Intertidal Non-Vegetated Flat
-  Construction Limits
-  Fill Impacts



Prepared For:



US 278 Corridor Improvements Project

Beaufort County, SC



Date:
February 5, 2021

Scale:
1 inch = 200 feet

Job No.:
18-002

Drawn By: WCB	Checked By: AGM
------------------	--------------------

Figure

11



Legend

- Recommended Preferred Alternative 4A
- Estuarine Emergent Wetland
- Tidal Creek
- Construction Limits
- Fill Impacts



Prepared For:



**US 278
Corridor
Improvements
Project**

Beaufort County, SC



Date:
February 5, 2021

Scale:
1 inch = 200 feet

Job No.:
18-002

Drawn By: WCB	Checked By: AGM
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Figure

12



APPENDIX B

AGENCY CONSULTATION HISTORY



United States Department of the Interior



FISH AND WILDLIFE SERVICE

176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407
September 26, 2018

Mr. Henry Phillips
Project Manager
South Carolina Department of Transportation
P.O. Box 191
Columbia, SC 29202-0191

Re: Notice of Intent, US 278 Improvements, Beaufort County, SC
FWS Log No. 2018-CPA-0085

Dear Mr. Phillips:

The U.S. Fish and Wildlife Service (Service) has received the South Carolina Department of Transportation's (SCDOT) September 4, 2018, Notice of Intent (LOI) for the proposed US 278 corridor improvements in Beaufort County, South Carolina. The SCDOT is soliciting comments for consideration and incorporation into an Environmental Assessment (EA) which is being prepared pursuant to the National Environmental Policy Act of 1969, as amended (43 U.S.C. 4321 *et seq.*) (NEPA).

The SCDOT proposes improvements to a small section of the US 278 corridor leading to Hilton Head Island, Beaufort County, South Carolina. The project corridor is between US 278 intersections with Moss Creek Drive and Squire Pope Road, approximately 3.7 miles in length. There are four bridges along this corridor, two of which cross the Atlantic Intracoastal Waterway (AIWW). The east bound bridge over the AIWW is to be replaced. Access to the Pinckney Island National Wildlife Refuge (Refuge) and a public boat ramp is to be improved. The overall purpose of the project is to improve safety as well as increase capacity to improve mobility and reduce congestion.

The Service, in coordination with Beaufort County and the Federal Highways Administration since 2008, completed a Road Safety Audit and a Transportation Study Report for the Refuge. The reports highlighted the need for safer alternatives and improved access at the entrance of the Refuge off US 278 due to large traffic volumes and congestion accessing Hilton Head Island, South Carolina. The Refuge hosts more than 250,000 visitors annually and expects that easier and safer access will only support the ability for more visitors to use and enjoy the Refuge.

The Beaufort County Comprehensive Transportation Plan also identified plans to upgrade this section of US 278 from a four-lane to a six-lane section as part of planned safety improvements needed at this location. Upgrading the road section adjacent to the Refuge would benefit not only economic growth in Beaufort County but also the conservation efforts that are necessary for the sustainability of the Refuge.

RECEIVED
OCT 1 2018
Environmental Management
SCDOT
RECEIVED
OCT 1 2018
Environmental Management
SCDOT

Without specific plans, the Service cannot provide a thorough review of the potential impacts resulting from the demolition and subsequent reconstruction of the east bound bridge or of the planned improvements. In general however, we recommend the new bridge structure be placed on the same alignment. All mechanical equipment must be prohibited from entering the adjacent waterways and wetlands at any time and best managements practices (BMP) should be employed and maintained throughout the construction activities to prevent demolition debris or other petroleum based contaminants from entering Mackay Creek. Under bridge netting to capture falling debris and double row silt fencing along the upland edge to collect erosional sediment should also be incorporated into the bridge plans.

The Service recommends that SCDOT consider beneficial reuse of the demolished bridge concrete and reinforcement steel. One possible beneficial use would be to use the debris to create new artificial reefs, or supplement existing reefs, in South Carolina's coastal nearshore waters. The SCDOT should coordinate with the SC Department of Natural Resources, Marine Resources Division Artificial Reef Program prior to the bridge's demolition to assess the possibility and logistics of reusing the material.

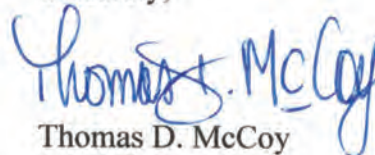
The Service recommends that SCDOT schedule a multi-agency pre-construction meeting at the project site. This site visit should be conducted early in the planning phases of this project to aid in identifying alternatives and appropriate BMPs that may be used to avoid potential impacts to the surrounding salt marsh habitat as well as the Pinckney NWR. It is imperative that SCDOT coordinate closely with the Savannah NWR staff throughout the planning phases to ensure access to the refuge is not impeded during construction.

For SCDOT's convenience, the Service has included a list of species that are currently protected under the Endangered Species Act of 1973 (ESA). This list includes species that are considered as a candidate for listing under the ESA and those that have been petitioned for listing under the ESA. Appropriate survey timeframes or windows for each species are included in the list. The species which have been petitioned for listing are considered "At-Risk Species" (ARS) and may occur in Beaufort County, South Carolina. Although there are no Federal protections afforded to ARS, please consider including ARS in your survey efforts. Incorporating proactive measures to avoid or minimize harm to ARS may improve their status and assist with precluding the need to list these species. Additional information on ARS can be found at:

<http://www.fws.gov/southeast/candidateconservation>.

The Service appreciates the opportunity to provide input at this early stage of the project's development. If you have any questions, please contact Mr. Mark Caldwell at (843) 727-4707 ext. 215, and reference FWS Log No. 2018-CPA-0085.

Sincerely,



Thomas D. McCoy
Field Supervisor

cc: Ms. Holly Gaboriault, Refuge Manager, Savannah Coastal Refuges Complex, SC

TDM/MAC

South Carolina List of At-Risk, Candidate, Endangered, and Threatened Species - Beaufort County

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Amphibian	Frosted flatwoods salamander (T, CH)	<i>Ambystoma cingulatum</i>	January 1-April 30	Larvae present in breeding ponds
	American wood stork (T)	<i>Mycteria americana</i>	February 15-September 1	Nesting season
	Bald eagle (BGEPA)	<i>Haliaeetus leucocephalus</i>	October 1-May 15	Nesting season
	Black-capped petrel (ARS)	<i>Pterodroma hasitata</i>	April-October	offshore water primarily
	Eastern black rail (ARS)	<i>Laterallus jamaicensis</i>	May-July	
Bird	Maccgillivray's seaside sparrow (ARS)	<i>Ammodramus maritimus maccgillivrayi</i>	May-June	
	Piping plover (T, CH)	<i>Charadrius melodus</i>	July 15-May 1	Migration and wintering
	Red-cockaded woodpecker (E)	<i>Picoides borealis</i>	April 1-July 31	Nesting season
	Red knot (T)	<i>Calidris canutus rufa</i>	August 1-May 31	Migration and wintering
Crustacean	None Found			
Fish	Atlantic sturgeon* (E)	<i>Acipenser oxyrinchus*</i>	February 1-April 30	Spawning migration
	Blueback herring* (ARS)	<i>Alosa aestivalis*</i>	Mid-January-mid May	Peak: March-April
	Shortnose sturgeon* (E)	<i>Acipenser brevirostrum*</i>	February 1-April 30	Spawning migration
Insect	Monarch butterfly (ARS)	<i>Danaus plexippus</i>	August-December	Overwinter population departs: March-April
	Finback whale* (E)	<i>Balaenoptera physalus*</i>	November 1-April 30	Off the coast
Mammal	Humpback whale* (E)	<i>Megaptera novaeangliae</i>	January 1-March 31	Migration off the coast
	Northern long-eared bat (T)	<i>Myotis septentrionalis</i>	Year round	Winter surveys not as successful
	Right whale* (E)	<i>Balaena glacialis</i>	November 1-April 30	Off the coast
	Tri-colored bat (ARS)	<i>Perimyotis subflavus</i>	Year round	Found in mines and caves in the winter
	West Indian manatee (T)	<i>Trichechus manatus</i>	May 15-October 15	In coastal waters
Mollusk	None Found			
Plant	Canby's dropwort (E)	<i>Oxypolis canbyi</i>	Mid-July-September	
	Ciliate-leaf tickseed (ARS)	<i>Coreopsis integrifolia</i>	August-November	
	Pondberry (E)	<i>Lindera melissifolia</i>	February-March	
	Raven's seedbox (ARS)	<i>Ludwigia ravenii</i>	June-October	
	Eastern diamondback rattlesnake (ARS)	<i>Crotalus adamanteus</i>	Most of the year	Peak: April-November
Reptile	Green sea turtle** (T)	<i>Chelonia mydas**</i>	May 1-October 31	Nesting and hatching
	Florida pine snake (ARS)	<i>Pituophis melanoleucus mugitus</i>	Most of year	
	Kemp's ridley sea turtle** (E)	<i>Lepidochelys kempii**</i>	May 1-October 31	In coastal waters
	Leatherback sea turtle** (E)	<i>Dermochelys coriacea**</i>	May 1-October 31	Nesting and hatching
	Loggerhead sea turtle** (T, CH)	<i>Caretta caretta**</i>	May 1-October 31	Nesting and hatching
	Southern hognose snake (ARS)	<i>Heterodon simus</i>	Most of the year	
	Spotted turtle (ARS)	<i>Clemmys guttata</i>	February-mid April	

South Carolina List of At-Risk, Candidate, Endangered, and Threatened Species - Beaufort County

- * Contact National Marine Fisheries Service (NMFS) for more information on this species
- ** The U.S. Fish and Wildlife Service (FWS) and NMFS share jurisdiction of this species
- ARS Species that the FWS has been petitioned to list and for which a positive 90-day finding has been issued (listing may be warranted); information is provided only for conservation actions as no Federal protections currently exist.
- ARS* Species that are either former Candidate Species or are emerging conservation priority species
- BGEPA Federally protected under the Bald and Golden Eagle Protection Act
- C FWS or NMFS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list these species
- CH Critical Habitat
- E Federally Endangered
- P or P - CH Proposed for listing or critical habitat in the Federal Register
- S/A Federally protected due to similarity of appearance to a listed species
- T Federally Threatened

These lists should be used only as a guideline, not as the final authority. The lists include known occurrences and areas where the species has a high possibility of occurring. Records are updated as deemed necessary and may differ from earlier lists.

For a list of State endangered, threatened, and species of concern, please visit <https://www.dnr.sc.gov/species/index.html>.



U.S. Department
of Transportation
**Federal Highway
Administration**

South Carolina

March 25, 2019

1835 Assembly Street, Suite 1270
Columbia, South Carolina 29201
803-765-5411
803-253-3989

In Reply Refer To:
HDA-SC

Dr. Roy E. Crabtree
Regional Administrator SE Regional Office
NOAA Fisheries
Attn: Kelly Shotts
263 13th Avenue South
St. Petersburg, FL 33701

Subject: Invitation to Become a Participating Agency for the Preparation of an
Environmental Assessment (EA) for the Proposed US 278 Corridor
Improvements Project in Beaufort County, South Carolina;
Federal Project Number P030450

Dear Dr. Crabtree:

The Federal Highway Administration (FHWA), in cooperation with the South Carolina Department of Transportation (SCDOT), is preparing an Environmental Assessment (EA) for the US 278 Corridor Improvements Project. The proposed project would make improvements to the US 278 corridor between Bluffton and Hilton Head Islands. The purpose of the proposed project is to increase capacity and reduce congestion along the U.S. 278 corridor from Moss Creek Drive to Squire Pope Road. The eastbound Mackay Creek Bridge, which crosses the Intracoastal Waterway, is structurally deficient and is scheduled to be replaced. Access to Pinckney Island National Wildlife Refuge and the C.C. Haigh, Jr. boat ramp would be improved as well (see attached study area map). A website for the project has been established and can be viewed at <https://www.scdot278corridor.com>.

Pursuant to Section 6002 of SAFETEA-LU, as amended by Section 1304 of the Fixing America's Surface Transportation (FAST) Act, participating agencies are responsible for identifying, as early as possible, any issues of concern regarding the project's potential environmental, social, or economic impacts. Section 6002 is intended to assure that agencies are fully engaged in the scoping of the project and the decisions regarding alternatives to be evaluated in detail in the NEPA analysis. In accordance with the SAFETEA-LU Section 6002, FHWA is in the process of identifying local, state, and federal agencies that may have an interest in the project.

The FHWA and SCDOT would like to take this opportunity to formally invite your agency to become a participating agency in the development of the EA. Areas of concern to be emphasized in the EA will include potential environmental impacts upon existing ecological resources, wetlands, water resources, historic and archaeological resources, parks and recreation facilities, noise and air, social and community character, hazardous/contaminated materials, cumulative and

indirect impacts, and potential impacts due to project construction. **Along with requesting your agency's participation as a Participating Agency, FHWA is also asking for any comments you may have on the Draft Purpose and Need statement, which is to "Improve Capacity and Reduce Congestion Along the U.S. 278 Corridor" and Draft Agency Coordination Plan (enclosure).**

Your agency's involvement in the proposed project would entail those areas under its jurisdiction. No direct writing or analysis by your agency will be necessary for this document unless you request to do so. We suggest that your agency's role in the development of the above project should include the following as they relate to your area of expertise:

1. Participate in coordination meetings as appropriate.
2. Consultation on any relevant technical studies that may be required for the project.
3. Timely review and comment on the environment document to reflect the views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

To become a Participating Agency with the FHWA, please respond to this office in writing with an acceptance or denial of the invitation within 30 days. If you accept, please identify the appropriate contact person within your organization for coordination. If your agency declines, please provide a written response that states your reason for declining the invitation, such as:

- Has no jurisdiction or authority with respect to the project;
- Has no expertise or information relevant to the project;
- Does not intend to submit comments on the project.

If you have any questions or would like to discuss in more detail the project or each agency's respective roles and responsibilities during the preparation of the EA, please contact Mr. J. Shane Belcher at 803-253-3187 or by e-mail at jeffrey.belcher@dot.gov.

Sincerely,



Emily O. Lawton
Division Administrator

Enclosures

ec: Ms. Kelly Shotts, NOAA Fisheries
Mr. Chad Long, SCDOT Environmental Division Manager
Mr. David Kelly, SCDOT RPG 1 NEPA Coordinator
Mr. Craig Winn, SCDOT Program Manager



U.S. Department
of Transportation
Federal Highway
Administration

South Carolina

March 25, 2019

1835 Assembly Street, Suite 1270
Columbia, South Carolina 29201
803-765-5411
803-253-3989

In Reply Refer To:
HDA-SC

Mr. Pace Wilber
South Atlantic Branch Supervisor
NOAA Fisheries
331 Fort Johnson Road
Charleston, SC 29412

Subject: Invitation to Become a Participating Agency for the Preparation of an Environmental Assessment (EA) for the Proposed US 278 Corridor Improvements Project in Beaufort County, South Carolina; Federal Project Number P030450

Dear Mr. Wilber:

The Federal Highway Administration (FHWA), in cooperation with the South Carolina Department of Transportation (SCDOT), is preparing an Environmental Assessment (EA) for the US 278 Corridor Improvements Project. The proposed project would make improvements to the US 278 corridor between Bluffton and Hilton Head Islands. The purpose of the proposed project is to increase capacity and reduce congestion along the U.S. 278 corridor from Moss Creek Drive to Squire Pope Road. The eastbound Mackay Creek Bridge, which crosses the Intracoastal Waterway, is structurally deficient and is scheduled to be replaced. Access to Pinckney Island National Wildlife Refuge and the C.C. Haigh, Jr. boat ramp would be improved as well (see attached study area map). A website for the project has been established and can be viewed at <https://www.scdot278corridor.com>.

Pursuant to Section 6002 of SAFETEA-LU, as amended by Section 1304 of the Fixing America's Surface Transportation (FAST) Act, participating agencies are responsible for identifying, as early as possible, any issues of concern regarding the project's potential environmental, social, or economic impacts. Section 6002 is intended to assure that agencies are fully engaged in the scoping of the project and the decisions regarding alternatives to be evaluated in detail in the NEPA analysis. In accordance with the SAFETEA-LU Section 6002, FHWA is in the process of identifying local, state, and federal agencies that may have an interest in the project.

The FHWA and SCDOT would like to take this opportunity to formally invite your agency to become a participating agency in the development of the EA. Areas of concern to be emphasized in the EA will include potential environmental impacts upon existing ecological resources, wetlands, water resources, historic and archaeological resources, parks and recreation facilities, noise and air, social and community character, hazardous/contaminated materials, cumulative and indirect impacts, and potential impacts due to project construction. **Along with requesting your**

agency's participation as a Participating Agency, FHWA is also asking for any comments you may have on the Draft Purpose and Need statement, which is to "Improve Capacity and Reduce Congestion Along the U.S. 278 Corridor" and Draft Agency Coordination Plan (enclosure).

Your agency's involvement in the proposed project would entail those areas under its jurisdiction. No direct writing or analysis by your agency will be necessary for this document unless you request to do so. We suggest that your agency's role in the development of the above project should include the following as they relate to your area of expertise:

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3. Timely review and comment on the environment document to reflect the views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

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- Has no expertise or information relevant to the project;
- Does not intend to submit comments on the project.

If you have any questions or would like to discuss in more detail the project or each agency's respective roles and responsibilities during the preparation of the EA, please contact Mr. J. Shane Belcher at 803-253-3187 or by e-mail at jeffrey.belcher@dot.gov.

Sincerely,



Emily O. Lawton
Division Administrator

Enclosures

cc: Ms. Cynthia Cooksey, NOAA Fisheries
Mr. Chad Long, SCDOT Environmental Division Manager
Mr. David Kelly, SCDOT RPG 1 NEPA Coordinator
Mr. Craig Winn, SCDOT Program Manager



UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

263 13th Avenue South

St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

F:SER/NS

Emily O. Lawton
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
1835 Assembly Street, Suite 1270
Columbia, South Carolina 29201

Attention: Shane Belcher

Dear Ms. Lawton:

NOAA's National Marine Fisheries Service (NMFS) has received your letter dated March 25, 2019, requesting our participation as a participating agency on the US 278 Corridor Improvements Project, pursuant to section 6002 of the Fixing America's Surface Transportation Act. Given our special expertise and jurisdiction by law under the Endangered Species Act, Marine Mammal Protection Act, and Magnuson Stevens Act, NMFS agrees to serve as a participating agency for this project. Due to staffing and travel constraints, our participation may be limited to our review and comment on draft National Environmental Policy Act documents, teleconferences, and occasional travel to meetings.

We appreciate your invitation to serve as a participating agency for the US 278 Corridor Improvements Project. Please direct project correspondence related to habitat impacts and/or Essential Fish Habitat consultation to Cynthia Cooksey at 219 Fort Johnson Rd., Charleston, SC 29412; by telephone (843) 460-9922, or by e-mail at cynthia.cooksey@noaa.gov. Please direct project correspondence related to sturgeon and/or Endangered Species Act coordination to Andy Herndon, at the letterhead address; by telephone (727) 824-5312, or by email at Andrew.herndon@noaa.gov. Please direct project correspondence related to dolphins and/or the Marine Mammal Protection Act to Jaclyn Daly, 1315 East-West Hwy, Silver Spring, MD 20910; by telephone at (301) 427-8438, or by email at Jaclyn.daly@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator





UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office

263 13th Avenue South

St. Petersburg, Florida 33701-5505

<http://sero.nmfs.noaa.gov>

cc:

GCERC, Renshaw, Lipsy

F/SER, Strelcheck, Blough, Silverman,

F/SER3, Bernhart,

F/SER4, Fay, Dale, Engleby

F/SER45, Wilber, Cooksey

OPR PR1, Daly

Files





ACE Meeting Notes – June 13, 2019

Attendees:

FHWA	Shane Belcher
NOAA	Cindy Cooksey (on phone)
USACE	Laura Boos Steve Brumagin Ivan Fannin
USEPA	
USFWS	Mark Caldwell (on phone) Russ Webb (on phone)
SCDAH	Elizabeth Johnson (on phone)
SCDHEC	Chuck Hightower
SCDHEC-OCRM	Josh Hoke (on phone) Chris Stout (on phone)
SCDNR	Tom Daniel Susan Davis (on phone) Greg Mixon
SCDOT	Chris Beckham Sean Connolly Siobhan Gordon Henry Phillips (on phone) Craig Winn
KCI	Phil Leazer
Three Oaks Engineering	Russell Chandler Heather Robbins Geni Theriot

Purpose of the Meeting:

Purpose was to present and discuss the alternative evaluation criteria, range of alternatives, and provide a coordination point for agencies as required by the 6002 EA process.

Change in project termini, has now extended from Squire Pope Road to Spanish Wells Road.

The intersection at Spanish Wells Road has already been improved which will allow for more logical tie-in to occur without additional intersection improvements. Traffic studies already extended to Spanish Wells Road. The change in termini was determined through coordination with SCDOT and FHWA.



Preliminary Alternative Evaluation Criteria:

The alternative evaluation criteria and the range of Alternatives is a coordination point for agencies. Preliminary range of alternatives was developed based on public comments from the September 2018 Public Meeting and additional stakeholder input. Some of the alternatives do not tie in at Spanish Wells Road but at other termini.

Purpose and Need is to address deficiency at Mackay Creek as well as increase capacity and reduce congestion.

TSM/TDM and Mass Transit will be considered as standalone but can be incorporated into the alternatives if they cannot move forward on their own.

First level of evaluation criteria:

- Wetlands – GIS layer – NWI, soils, topo, DEM, existing JD on Jenkins Island
- Protected lands – USGS PADUS, National Conservation Easement Database
- ROW – number of impacted parcels/properties, total acres outside existing R/W
- Neighborhoods – how the individual parcels are grouped together and “self-identify” as groups

Analyze alternatives based on the above criteria. For August ACE meeting the team will be able to explain which alternatives will be kept and which ones will be eliminated based on the criteria. The team plans to



present Reasonable Alternatives to the public in the Fall of 2019 following agency coordination. Currently there are seventeen (17) preliminary alternatives.

Reasonable Alternative Evaluation Criteria:

NOAA-NMFS requested to add habitat areas of particular concern (oyster and shellfish habitat) to the second level of evaluation criteria. NOAA also asked about utility impacts. Project Team explained that exact impacts are currently unknown. There are overhead power lines on both sides of the existing bridges over Mackay Creek, a large water line that feeds all of Hilton Head Island, and other known utilities. Discussions and coordination with utility companies have been started. Utility impacts will be further evaluated under the reasonable range of alternatives.

USACE recommended including a discussion of the practicability of alternatives. Document all decisions thoroughly. Project is an EA but follows the SAFETEA-LU 6002 Process and could easily be elevated to EIS if required. As portions of the document are available, they will be shared with cooperating and participating agencies. USACE asked if the route was a hurricane evacuation route. Project Team explained that SCDOT will require four lanes of traffic be open at all times during construction.

USFWS requested to include compatibility with the Pinckney Island National Wildlife Refuge (NWR) as an evaluation criterion. Pinckney Island National Wildlife Refuge prefers any new alignments considered stay south of existing roadway. This would be compatible with their future plans for additional access and parking. USFWS stated that there are no records of T&E on Pinckney Island NWR. Compatibility with NWR plans will be added to reasonable criteria or preliminary criteria.

SCDAH had no comments or concerns at this time.

SCDOT asked why the P&N was not in preliminary evaluation criteria. It was assumed that all preliminary alternatives meet P&N. Traffic studies will be completed on reasonable alternatives and is component of P&N. Use driving environmental factors as first level of evaluation criteria such as wetlands, National Wildlife Refuge and Environmental Justice communities. The USFWS' archaeologist has been contacted, but the team has not received a reply. The team is aware that the Pinckney Island NWR archaeologist needs to be involved in discussions. Will bring this up during meeting scheduled with NWR staff on June 25th.

SCDHEC & SCDHEC-OCRM requested the team include restrictive covenants on properties as an evaluation criterion. Inclusion of shellfish harvesting waters. OCRM areas of concern include archaeology, geographic area of particular concern (GAPC), EJ, and critical area. Shellfish harvesting leaseholders need to be informed. OCRM and SCDNR typically handle this as part of the Public Notice process for Critical Area permits.



SCDNR asked about the proposed corridor width. Project Team explained that it is currently four lanes, but the preliminary traffic numbers show that it needs to be six lanes. Different typical sections will be reviewed to avoid and minimize impacts in the reasonable/preferred alternative selections. SCDNR asked if Only the alternatives with new alignments would extend to Cross Island Parkway. Any work on Cross Island Parkway would be limited to tie-ins for those alternatives. Cross Island Parkway does not provide access on or off the island and traffic diverges at the expressway.

Next Steps:

- The following items will be added to the 2nd Evaluation Criteria:
 - Habitat Areas of Particular Concern
 - Compatibility with USFWS Refuge
 - Restrictive Covenants
- Alternative Matrix to explain alternatives eliminated from proposed reasonable alternatives to proposed preferred alternatives. Plan to present at August 2019 ACE meeting.
- Mitigation needs assessment to be conducted once reasonable alternatives identified and agency concurrence point completed.



Draft Schedule:

Milestones	Date
2019	
<i>Agency Project Kickoff and Scoping Meeting</i>	<i>February 14, 2019</i>
Send Letters Inviting Cooperating and Participating Agencies	March 25, 2019
Agencies review draft Purpose and Need Statement & Agency Coordination Plan	April-May2019
Coordination Point for Agency Coordination Plan and Purpose and Need Statement	May 2019
<i>Agency Meeting to discuss the alternative evaluation criteria, alternatives analysis process, and Preliminary Range of Alternatives</i>	<i>June 13, 2019</i>
Agencies Review the Preliminary Range of Alternatives for Coordination	June/July 2019
Coordination Point for Preliminary Range of Alternatives/Alternatives Carried Forward by Agencies	Summer 2019
Public Information Meeting	Fall 2019
Continued Coordination with Agencies on specific resources (i.e. Permitting, EFH, Section 106, Section 7, etc.)	Fall-Winter 2019
2020	
<i>Agency Meeting to discuss Reasonable Alternatives and Preferred Alternative</i>	<i>Spring 2020</i>
Agency Meeting and Coordination Point for Preferred Alternative by Agencies	Spring 2020
Submit Preliminary Jurisdictional Determination to USACE & Critical Area to SCDHEC-OCRM	Summer 2020
Pre-Application Meeting with USACE and SCDHEC	Summer/Fall 2020
Draft EA issued; Joint USACE Individual Permit and USCG Public Notices	Fall 2020
Public Hearing	Fall/Winter 2020
2021	
Prepare Final NEPA Decision	Early 2021
FHWA Issues Final NEPA Decision	Early 2021
USACE and USCG Issue Permit Decisions	Early 2021



ACE Meeting Notes – August 8, 2019

Attendees:

FHWA	Shane Belcher
NOAA	Cindy Cooksey (on phone)
USACE	Christopher Mims Ivan Fannin
USEPA	
USFWS	Megan Cook (on phone)
SCDAH	Joe Wilkinson
SCDHEC	Logan Ress (on phone) Chuck Hightower (on phone)
SCDHEC-OCRM	
SCDNR	Tom Daniels (on phone)
SLCOG	Kyle Kelly (on phone) Jake Whitmire
SCDOT	Sean Connolly Siobhan Gordon Micky Queen Vince McCarron Megan Groves David Kelly
KCI	Phil Leazer Eric Burgess
Three Oaks Engineering	Russell Chandler Heather Robbins Geni Theriot

Purpose of the Meeting:

Purpose was to present and discuss the full range of preliminary alternatives, the evaluation criteria and present the proposed reasonable alternatives. The evaluation criteria used to get from preliminary to reasonable alternatives was reviewed. These criteria include:

- Purpose & Need
 - Structural Deficiency



- GIS Wetlands
- Right-of-Way
- Neighborhoods
- Protected Lands
- Consistent with Pinckney Island National Wildlife Refuge (PINWR) purposes

The meeting continued with a brief explanation of the materials sent to the agencies and printed for those in attendance which included the alternatives matrix, the alternatives development flowchart, the project handout as well as a alternatives matrix summary developed and provided to those in the room. The matrix summary will be provided to those on the call with the meeting summary. Please note on the matrix summary document, the alternatives that are proposed to be eliminated are in grey.

Preliminary Range of Alternatives to Proposed Reasonable Alternatives

The Preliminary Range of Alternatives were discussed by using a KML (Google Earth) file for a visual representation of each alternative. Each alternative was outlined by the Preliminary Range of Alternatives Summary Sheet (attached) and any additional notes are recorded below.

Alternative 1:

- Reminder that the original purpose of the project was to replace the structurally deficient eastbound Mackay Creek bridge. The project has grown to include the full corridor between Moss Creek and Spanish Wells.
- If funding falls through, the eastbound Mackay Creek bridge will still be replaced.
- FHWA (Shane) noted one of the reasons access improvements at Pinckney Island are because SCDOT is trying to incorporate improvements for the access/egress issues on Pinckney Island. The County has a plan to apply for a grant to improve access to Pinckney Island and this is an opportunity to tie the two projects together and incorporate the long-range plans of the refuge.
- Beaufort County plans to submit for a FLAP grant to improve access to Pinckney Island.
- SCDOT (Sean) asked if the justification provided was enough to eliminate according to USACE and the other agencies in attendance.
- USACE (Chris) did indicate the provided justification was adequate.

Alternative 2:

- A reminder that USFWS has indicated they prefer the alternatives that remain close to existing alignment.
- No comments received during the discussion of this alternative.

Alternative 3a: No comments received during the discussion of this alternative.



Alternative 3b:

- This alternative was eliminated because it had a bigger footprint and the potential impacts were greater than 3a.
- SCDOT (Sean) states he thinks the elimination justification is pretty self-explanatory and asked if it was enough for eliminating for permit application?
- USACE (Chris) responded that it was hard to get too specific on each alternative right now because the level of review is still so broad.
- FHWA (Shane) Some of the bigger issues on the Spanish Wells end is the Environmental Justice impacts are bigger.
- SCDOT (Sean) asked if at this time if anyone saw any red flags in terms of process.
- USACE (Chris) agrees that based on what he sees now he does not see any red flags.
- SCDOT (Sean) stated he just wants to make sure everyone is comfortable with the justification for removing the ones we think are not practical.
- Three Oaks (Heather) reviewed the evaluation criteria again and pointed out the additional criteria that was added after the June ACE Meeting.
 - Consistency with PINWR Purposes was added to the Preliminary Alternatives Evaluation Criteria.
 - Shellfish Harvesting Waters and Essential Fish Habitat have been added to the Evaluation Criteria for the Reasonable Alternatives.
- SCDOT (Sean) asks that if there are things you were good with in June but you aren't anymore let us know.
- Three Oaks (Russell) asks USACE if they would like to see the Alternatives Matrix as a separate appendix to the permit document. The NEPA document is a standard appendix but the matrix could be a standalone appendix for ease of reference.
- USACE (Chris) responded that the NEPA document will discuss the elimination in detail and if they had questions, they could reference the matrix.
- SCDOT (Sean) asked USACE to make sure the chart had everything they need in it if they plan to use it for reference.

Three Oaks (Heather) specified we want everyone to agree on what is being carried forward, so we do want feedback.

Alternative 4a:

- Pinckney Island access is a little different in this alternative.
- It was also noted that there is a slightly different configuration by Windmill Harbor.
- No comments received during the discussion of this alternative.

Alternative 4b:

- This alternative tried to keep the existing boat ramp on Pinckney Island



- It was noted that USFWS expressed concern with getting farther away from existing alignment.
- No comments received during the discussion of this alternative.

Alternative 4c:

- USFWS concerns regarding future infrastructure maintenance and safety with this alternative being too far south.
- No comments received during the discussion of this alternative.

Alternative 4d:

- SCDOT (Sean) asks for clarification on the USFWS concerns in regards to infrastructure and financial responsibility.
- Three Oaks (Heather) explains that everything at grade will be the responsibility of USFWS to maintain in the future.
- SCDOT (Sean) asked if we had documentation of USFWS concerns for justification of elimination of these alternatives.
- Three Oaks (Heather) stated we had the concerns documented in the summaries from these meetings. The federal land transfer process was briefly discussed. USFWS also advised it would be easier to get a compatibility determination for the NEPA document the closer to existing alignment the project stays.

Alternative 4e: No comments received during the discussion of this alternative.

Alternative 4f:

- This alternative avoids Pinckney Island but eliminated because 4d improves Pinckney Island access.
- No comments received during the discussion of this alternative.

Alternative 5a:

- This alignment goes the farthest north of all alternatives.
- USFWS does not want Pinckney Island bisected to the north
- This alternative also has impacts to SCDNR's Victoria Bluff Heritage Preserve
- No comments received during the discussion of this alternative.

Alternative 5b:

- FHWA (Shane) pointed out that the reason we are looking at these off the wall alternatives is because SCDOT and the consultants were charged with looking at alternatives to address the county/town concerns.

Alternative 6a: No comments received during the discussion of this alternative.



Alternative 6b:

- The public wanted tie into the Bluffton Parkway
- No comments received during the discussion of this alternative.

Alternative 6c:

- The only change between 6b and 6c is that the curves were buttoned up a little more with this alternative.
- No comments received during the discussion of this alternative.

Alternative 6d: No comments received during the discussion of this alternative.

Alternative 6e: No comments received during the discussion of this alternative.

Alternative 7:

- This alternative is similar to Alternative 4a until it reaches Jenkins Island. The town wanted us to look at using the existing transmission line easement at the Jenkins Island tie in.
- Three Oaks (Heather) points out that if we move it there it avoids some of the Environmental Justice impacts and could tie into the proposed Jenkins Island improvements.
- NOAA (Cindy) asks where the transmission lines would go?
- Three Oaks (Heather) explains we need farther evaluation to determine if it will be eliminated or carried forward. Utilities are included in the next level of evaluation criteria and a detailed utilities and cost analysis will occur.

Alternative 8:

- This alternative still uses the transmission line but connects to the alignment of Alternative 4d.
- SCDOT (Sean) points out that 7 & 8 take from 4a & 4d until transmission lines. He asks if there is any way to tie back down before the hump?
- KCI (Eric) and Three Oaks (Heather) respond that this would cause greater impacts to the EJ communities.
- USACE (Ivan) asked if the owners of the marsh land have commented on this yet?
- Three Oaks (Heather) answered that they will see it at the PIM. Ivan explained that there was history here where these property owners have been told they couldn't touch this land because it is marsh and points out they may have an issue with being told a highway is now going to be built there.

General Discussion

- Three Oaks (Heather):
 - If we have agreement on reasonable we propose to rename them for the PIM so they are sequential (RA1-RA6).



- We will use the new names moving forward in all discussions.
- At the PIM we will show the spaghetti map and the 6 reasonable alternatives.
- We will plan to return in the spring of 2020 to walk through the detailed analysis and propose a preferred alternative.
- In the Spring of 2020, we will have more details on when PJD will be submitted to USACE.
- Draft EA is anticipated to be submitted in Fall of 2020.
- SCDOT (Sean) asks if USFWS expressed anything about purchasing additional land?
- Three Oaks (Heather) responded that this had not been mentioned in our discussions with them. They had mentioned future improvements such as a visitor's center and additional parking.
- FHWA (Shane) also confirmed no discussion of expansion had occurred.
- Sean asked USFWS (Megan) to confirm and she did through email.
- FHWA (Shane) states that USFWS is a cooperating agency. The compatibility determination for the NEPA document is needed for the Federal Land access program. The goal is to write the NEPA document to meet the needs of USFWS, USACE and USCG.
- USFWS (Megan) expressed some confusion on the final determination on if they were a participating or cooperating agency.
- FHWA (Shane) stated USFWS was confirmed as a cooperating agency by Holly. Megan will let Shane know if she needs any additional documentation.
- SCDOT (Sean) asked USACE if the update for the SOP for mitigation was complete?
- USACE (Chris) stated it was still going through QA/QC.
- SCDOT (Sean) asked if we anticipated impacts to be fill, shading or clearing?
- Three Oaks (Russell) answered that the impacts have not been quantified to that level at this time.
- SCDOT (Sean) asked USACE if they still had to wait on OCRM to bless the PJD before they could approve it?
- USACE (Chris) stated the process has been modified to allow the PJD to move forward without OCRM approval.
- Three Oaks (Russell) noted the plan was to submit the PJD with maps, then to a site visit followed by the generation of the plat.
- SCDNR will consider any impacts to SCDNR properties.
- SCDNR is checking to see if they have any properties they are interested in acquiring within the area
- SHPO will wait to see the report to determine what is present.



ACE Meeting Notes – March 12, 2020

Attendees:

FHWA	Shane Belcher
NOAA	Cindy Cooksey (on phone)
USACE	Christopher Mims (on phone) Steve Brumagin (on phone)
USEPA	Alya Singh-White (on phone)
USFWS	Mark Caldwell (on phone)
SCDAH	Joe Wilkinson
SCDHEC	
SCDHEC-OCRM (CZC)	Chris Stout (on phone)
SCDNR	Susan Davis
SCDOT	Craig Winn Chris Beckham David Kelly Ed Frierson Jackie Galloway
KCI	Phil Leazer
Three Oaks Engineering	Russell Chandler Heather Robbins Geni Theriot

Purpose of the Meeting:

Purpose was to present a project update, discuss the reasonable alternatives and revisions since the last agency meeting, discuss preliminary EFH assessment and future mitigation planning.

Old Business

Agencies were asked if they had any questions/concerns with Carolina Crossroad 404 (b) 1 responses progressing

USACE stated once final mitigation plan is received a 15-day review will occur.

No other questions/concerns were voiced.



US 278 Corridor Improvements

Alternatives Analysis

- Project recap/update was provided
- Agencies were provided the presentation seen today prior to the meeting
- In August we showed the reasonable alternatives, the project team is currently evaluating these alternatives and plan to have analysis complete by summer.
- 17 preliminary alternatives were developed originally and were narrowed down to 6 reasonable alternatives
- Public input led to revisions to the alternatives resulting in 9 reasonable alternatives
 - RA 4 modified to 4a with closer interchange to existing Pickney based on previous coordination with USFWS and coordination call with Waccamaw
 - RA 5 & 6 modified to pull off utility easement to minimize potential high costs of impacting utilities resulting in 5a and 6a
 - Hog Island Connector was added to all alternatives to facilitate more efficient ingress/egress during construction
- Preliminary impact calculations show RA 2, RA 3 and RA 4a are rising to the top. Impacts are still being evaluated so all 9 reasonable alternatives are still under analysis.
- NOAA-NMFS and USFWS expressed concern with the impacts expected from adding the Hog Island connector and expansion of project outside of existing right-of-way in this area.
- USFWS and NOAA-NMFS expressed concern with portions of the loop on Pinckney Island with proposed impacts to saltmarsh. NOAA needs justification for any proposed new causeway.
- Agencies asked if this loop over the saltmarsh could be a flyover but it was explained that due to elevations this was not constructible
- USFWS asked if existing US 278 could be used instead of the proposed loop concept was not constructible due to elevation constraints.

Essential Fish Habitat

NOAA-NMFS has no comments/questions and offers a site visit

Mitigation Needs Assessment

- Looking at existing landscape
- The range of credit needs was developed based on lowest level of impacts and highest level of impacts for all 9 reasonable alternatives
 - 23-62 freshwater credits
 - 203-396 tidal credits
- The agencies were asked if they knew of any on-site mitigation opportunities.
 - SCDNR does not have any on-site mitigation opportunities
 - SCDNR & USFWS expressed concern with the number of tidal credits



- SCDNR, NMFS, USFWS and USACE like onsite restoration
- USACE reminds to avoid & minimize and does not consider removal of causeway as mitigation without including a restoration component
- SCDOT is not sure they would propose onsite mitigation for all of mitigation
- The mitigation needs assessment is a snapshot of where we are in the design concept, efforts to avoid an minimize will be incorporated into the preferred alternatives. At this stage, the #'s are representative of all 9 reasonable alternatives and include both permanent and temporary impacts.
 - Credit range is conservative and may get smaller as alternatives are refined.
- USACE states they see a benefit of PRM for this project versus wiping out the available credits
- During the May ACE meeting, we plan to provide the full matrix of impacts for review

Action Items

- Provide justification to NMFS and USFWS for the following
 - Hog Island Connector and why it isn't shifting south of utility easement vs the northern alignment the project team is currently proposing
 - Why the Hog Island Connector is part of the US 278 project
- Continue refining alternatives analysis matrix to define preferred alternative
- Begin investigation of potential mitigation opportunities within the project watershed

From: [Beckham, Chris](#)
To: ["charleston_regulatory@fws.gov"](mailto:charleston_regulatory@fws.gov)
Cc: [Kelly, David P.](#)
Subject: US 278 Corridor Improvement Project
Attachments: [US 278 Biological Evaluation Final Draft 071620.pdf](#)

To whom it may concern,

The South Carolina Department of Transportation (SCDOT) on behalf of the Federal Highway Administration (FHWA), is requesting consultation with USFWS for species under their jurisdiction in compliance with Section 7 of the Endangered Species Act (ESA) for the above referenced project. Please find the attached copy of the Biological Assessment with Appendices. If you have any questions or need any additional information about this project, please let me know.

Thanks,

Chris Beckham
SCDOT
Environmental Services Office
Office: (803) 737-1332
Mobile: (803) 609-9464



United States Department of the Interior



FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

July 28, 2020

Mr. Chris Beckham
Environmental Services
S.C. Department of Transportation
P.O. Box 191
Columbia, SC 29202-0191

Re: S.C. Department of Transportation, Biological Evaluation, US-278 Corridor
Improvements, Beaufort County, FWS Log # 2018-CPA-0085

Dear Mr. Beckham:

The South Carolina Ecological Services Field Office for the U.S. Fish and Wildlife Service (Service) received the South Carolina Department of Transportation's (SCDOT) Biological Evaluation (BE) for the US-278 Corridor Improvements in Beaufort County, SC. The BE has evaluated potential impacts to threatened and endangered (T&E) species protected under the Endangered Species Act of 1973 (ESA). The SCDOT is seeking our review of the BE and its findings for inclusion into an Environmental Impact Statement (EIS) being developed for I-526 West project the pursuant to the National Environmental Policy Act of 1969.

The project includes replacement of the eastbound Mackay Creek Bridge and replacement of the three other bridges located within the PSA. The three additional bridges to be replaced include the westbound Mackay Creek, the eastbound Skull Creek, and the westbound Skull Creek bridge. Improved access to the Pinckney Island National Wildlife Refuge and the C.C. Haigh, Jr. boat ramp is also proposed as part of this project. Potential impacts to the environment will include construction of new bridges, the placement of clean fill material for construction and improvements to bridge approach, new roads, and/or realignment of existing roads for community access, and finally the demolition of the existing bridges.

The BE provided a list of all 16 T&E species known to occur in Beaufort County. A more in depth review was afforded to T&E species that may occur in project area based upon the presence of potentially suitable habitat. The SCDOT identified 11 species under the jurisdiction of the Service that may occur in the project area; the red knot, piping plover, eastern black rail, Atlantic sturgeon, shortnose sturgeon, West Indian manatee, American wood stork, and four species of sea turtles. Field reconnaissance by SCDOT personnel did not find any T&E species in the corridor but did find suitable habitat for the eight species. Therefore, a determination of "may effect, not likely to adversely affect" was made for all 11 T&E species that may occur in the project area. The Service recommends that SCDOT contact the National Oceanic and Atmospheric Administration regarding consultation requirements for the Atlantic and shortnose sturgeon.

Upon review of your information the Service concurs with SCDOT's determination regarding the species under our jurisdiction. For those species in which SCDOT determined the project would have, "no effect" consultation is not required. Please note that obligations under the ESA must be reconsidered if: (1) new information reveals impacts of this identified action may affect any federally listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner, which was not considered in this assessment; or (3) a new species is listed or critical habitat is designated that may be affected by the identified action.

Please visit our Web site: <https://www.fws.gov/southeast/pdf/fact-sheet/south-carolina-species-list-by-county.pdf> for a list of species that have been petitioned for listing under the ESA, as well as Candidate Species or collectively referred to as "At-Risk Species" (ARS) for South Carolina. Although there are no Federal protections afforded to ARS, please consider including them in your project planning. Incorporating proactive measures to avoid or minimize harm to ARS may improve their status and assist with precluding the need to list these species. Additional information on ARS can be found at:

<http://www.fws.gov/southeast/candidateconservation>

The Service appreciates the opportunity to provide input at this early stage of the US 278 project development. If you have any questions regarding our comments, please do not hesitate to contact Mr. Mark Caldwell of the South Carolina Ecological Services Field Office at mark_caldwell@fws.gov or (843) 727-4707 ext. 215 and reference FWS Log# 2018-CPA-0085.

Sincerely,



Thomas D. McCoy
Field Supervisor

TDM/MAC

BEAUFORT COUNTY

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Amphibians	Frosted flatwoods salamander (T, CH)	<i>Ambystoma cingulatum</i>	January 1-April 30	Larvae present in breeding ponds
	American wood stork (T)	<i>Mycteria americana</i>	February 15-September 1	Nesting season
Birds	Bald eagle (BGEPA)	<i>Haliaeetus leucocephalus</i>	October 1-May 15	Nesting season
	Black-capped petrel (ARS)	<i>Pterodroma hasitata</i>	April-October	Offshore water primarily
	Eastern black rail (P)	<i>Laterallus jamaicensis jamaicensis</i>	April-June	Minimum of five surveys/survey point
	Piping plover (T, CH)	<i>Charadrius melodus</i>	July 15-May 1	Migration and wintering
	Red-cockaded woodpecker (E)	<i>Picoides borealis</i>	March 1-July 31	Nesting season
	Red knot (T)	<i>Calidris canutus rufa</i>	August 1-May 31	Migration and wintering
	Saltmarsh sparrow (ARS)	<i>Ammospiza caudacuta</i>	Fall/winter	Fall/winter surveys
			None Found	
Crustaceans				
Fishes	Atlantic sturgeon* (E)	<i>Acipenser oxyrinchus*</i>	February 1-April 30	Spawning migration
	Shortnose sturgeon* (E)	<i>Acipenser brevirostrum*</i>	February 1-April 30	Spawning migration
Insects	Monarch butterfly (ARS)	<i>Danaus plexippus</i>	August-December	Overwinter population departs: March-April
	Finback whale* (E)	<i>Balaenoptera physalus*</i>	November 1-April 30	Off the coast
Mammals	Humpback whale* (E)	<i>Megaptera novaengliae</i>	January 1-March 31	Migration off the coast
	Little brown bat (ARS)	<i>Myotis lucifugus</i>	Year round	Found in trees, rock crevices, and under bridges
	Northern long-eared bat (T)	<i>Myotis septentrionalis</i>	Year round	Winter surveys not as successful
	Right whale* (E)	<i>Balaena glacialis</i>	November 1-April 30	Off the coast
	Sei whale* (E)	<i>Balaenoptera borealis</i>		
	Sperm whale* (E)	<i>Physeter macrocephalus</i>		
	Tri-colored bat (ARS)	<i>Perimyotis subflavus</i>	Year round	Found in mines and caves in the winter
	West Indian manatee (T)	<i>Trichechus manatus</i>	May 1-November 15	In coastal waters
Mollusks				
		None Found		

BEAUFORT COUNTY

CATEGORY	COMMON NAME/STATUS	SCIENTIFIC NAME	SURVEY WINDOW/ TIME PERIOD	COMMENTS
Plants	American chaffseed (E)	<i>Schwalbea americana</i>	May-August	1-2 months after a fire
	Ciliate-leaf tickseed (ARS)	<i>Coreopsis integrifolia</i>	August-November	
	Pondberry (E)	<i>Lindera melissifolia</i>	February-March	
	Eastern diamondback rattlesnake (ARS)	<i>Crotalus adamanteus</i>	Most of the year	Peak: April-November
Reptiles	Florida pine snake (ARS)	<i>Pituophis melanoleucus mugitus</i>	Most of year	
	Green sea turtle ** (T)	<i>Chelonia mydas **</i>	May 1-October 31	Nesting and hatching
	Kemp's ridley sea turtle ** (E)	<i>Lepidochelys kempii**</i>	May 1-October 31	In coastal waters
	Leatherback sea turtle ** (E)	<i>Derموchelys coriacea **</i>	May 1-October 31	Nesting and hatching
	Loggerhead sea turtle ** (T, CH)	<i>Caretta caretta **</i>	May 1-October 31	Nesting and hatching
	Southern hognose snake (ARS)	<i>Heterodon simus</i>	Most of the year	
	Spotted turtle (ARS)	<i>Clemmys guttata</i>	February-mid April	

* Contact National Marine Fisheries Service (NMFS) for more information on this species.

** The U.S. Fish and Wildlife Service (FWS) and NMFS share jurisdiction of this species.

ARS Species that the FWS has been petitioned to list and for which a positive 90-day finding has been issued (listing may be warranted); information is provided only for conservation actions as no Federal protections currently exist.

ARS* Species that are either former Candidate Species or are emerging conservation priority species.

BGEPA Federally protected under the Bald and Golden Eagle Protection Act

C FWS or NMFS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list these species.

CH Critical Habitat

E Federally Endangered

P or P – CH Proposed for listing or critical habitat in the Federal Register

S/A Federally protected due to similarity of appearance to a listed species

T Federally Threatened

These lists should be used only as a guideline, not as the final authority. The lists include known occurrences and areas where the species has a high possibility of occurring. Records are updated as deemed necessary and may differ from earlier lists.

For a list of State endangered, threatened, and species of concern, please visit <https://www.dnr.sc.gov/species/index.html>.

From: Beckham, Chris <BeckhamJC@scdot.org>
Sent: Friday, February 19, 2021 9:46 AM
To: 'Mark_Caldwell@fws.gov'
Cc: Belcher, Jeffery - FHWA; Kelly, David P.; Heather Robbins; Russell Chandler; Winn, Craig L.
Subject: US 278 Corridor Improvements ESA Consultation
Attachments: USFWS Cover Letter - US 278 Biological Evaluation Version 3 with Addendum - 02-19-21.pdf; US 278 Biological Evaluation Version 3 with Addendum 02-19-21 (003).pdf

Mark,

On July 28, 2020, SCDOT received a concurrence letter from the US Fish and Wildlife Service on the biological evaluation for the US 278 Corridor Improvement Project in Beaufort County. Since receiving the letter, there have been revisions to the project footprint and changes in the status of one listed species that was evaluated in the previous biological evaluation. Due to these changes, SCDOT is requesting additional consultation with your office for the subject project. The attached cover letter summarizes the changes to the project. Although there were no changes to the effect determination for any of the listed species, the attached biological evaluation contains updated project information to be considered in your review. If you have any questions or need additional information, please let me know.

Thanks for your assistance with this project!

Chris Beckham
SCDOT
Environmental Services Office
Office: (803) 737-1332
Mobile: (803) 609-9464



United States Department of the Interior



FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

March 3, 2021

Mr. Chris Beckham
Environmental Services
S.C. Department of Transportation
P.O. Box 191
Columbia, South Carolina 29202-0191

Re: S.C. Department of Transportation, Amended Biological Evaluation, US-278 Corridor Improvements, Beaufort County, FWS Log # 2018-CPA-0085

Dear Mr. Beckham:

The South Carolina Ecological Services Field Office for the U.S. Fish and Wildlife Service (Service) received the South Carolina Department of Transportation's (SCDOT) amended Biological Evaluation (BE) for the US-278 Corridor Improvements in Beaufort County, South Carolina. The BE was amended due to project changes and the recent listing of the eastern black rail as a federally threatened species. Potential impacts to the eastern black rail was assessed. The SCDOT is seeking our review of the amended BE and its findings for inclusion into an Environmental Impact Statement (EIS) being developed for the US-278 project pursuant to the National Environmental Policy Act of 1969.

Since the submission of the original BE in July 2020, there have been revisions to the Recommended Preferred Alternative 4A footprint and design elements that required additional analysis regarding the potential effects on species protected under the Endangered Species Act of 1973 (ESA). The eastern black rail (*Laterallus jamaicensis*) gained Federal protection under the ESA in November 2020, after the original BE was published. Therefore, SCDOT has revised the BE to reflect the changes required to meet design standards and the updated status of the eastern black rail.

Upon review of the original project and the aforementioned changes, SCDOT has determined that project *may affect, but is not likely to adversely affect* the eastern black rail. The Service concurs with SCDOT's determination regarding the eastern black rail. Please note that our July 28, 2020, concurrence letter covering other T&E species that may be in the project area remains valid. However, obligations under the ESA must be reconsidered if: (1) new information reveals impacts of this identified action may affect any federally listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner, which was not considered in this assessment; or (3) a new species is listed or critical habitat is designated that may be affected by the identified action.

The Service appreciates the opportunity to provide input at this stage of the US 278-project development. If you have any questions regarding our comments, please do not hesitate to contact Mr. Mark Caldwell of the South Carolina Ecological Services Field Office at mark_caldwell@fws.gov or (843) 300-0426 and reference FWS Log# 2018-CPA-0085.

Sincerely,

Thomas D. McCoy

Thomas D. McCoy
Field Supervisor

TDM/MAC



APPENDIX C

PHOTOGRAPHS OF HABITATS WITHIN THE PROJECT STUDY AREA

SITE PHOTOGRAPHS



Facing northeast. Estuarine emergent wetlands (lower left) along the mainland causeway; Mackay Creek (center); and forested uplands and palustrine forested wetlands on Pinkney Island (upper right).



Facing north northeast. Mackay Creek (center) and Pinkney Island National Wildlife Refuge (right).



Facing northwest. Skull Creek (foreground) and Pinkney Island (background) with forested uplands and palustrine wetlands.



Facing northwest. Estuarine emergent wetlands and intertidal unvegetated flats on the west side of Hog Island.



Facing northwest. Intertidal unvegetated flats between Hog Island and Pinkney Island.



Facing southeast. Disturbed areas and upland forests on Hog Island.



Facing northwest. Estuarine emergent wetland along Blue Heron Point Road between Hog Island (center) and Jenkins Island (foreground).



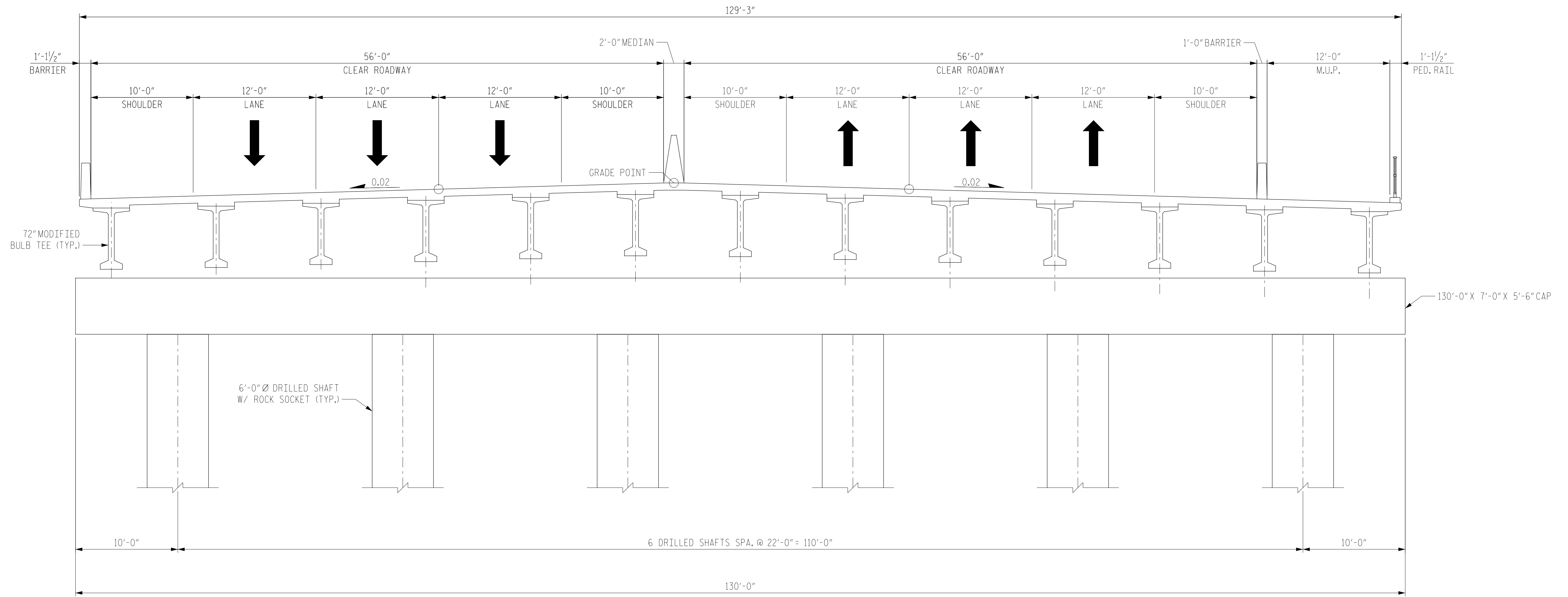
Palustrine forested wetland (left) and palustrine emergent wetland (right) on Pinkney Island.



APPENDIX D

PROPOSED BRIDGE TYPICAL SECTIONS


BRIDGE PLANS ID	SHEET NO.
X	



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BY	CHK.	DATE	

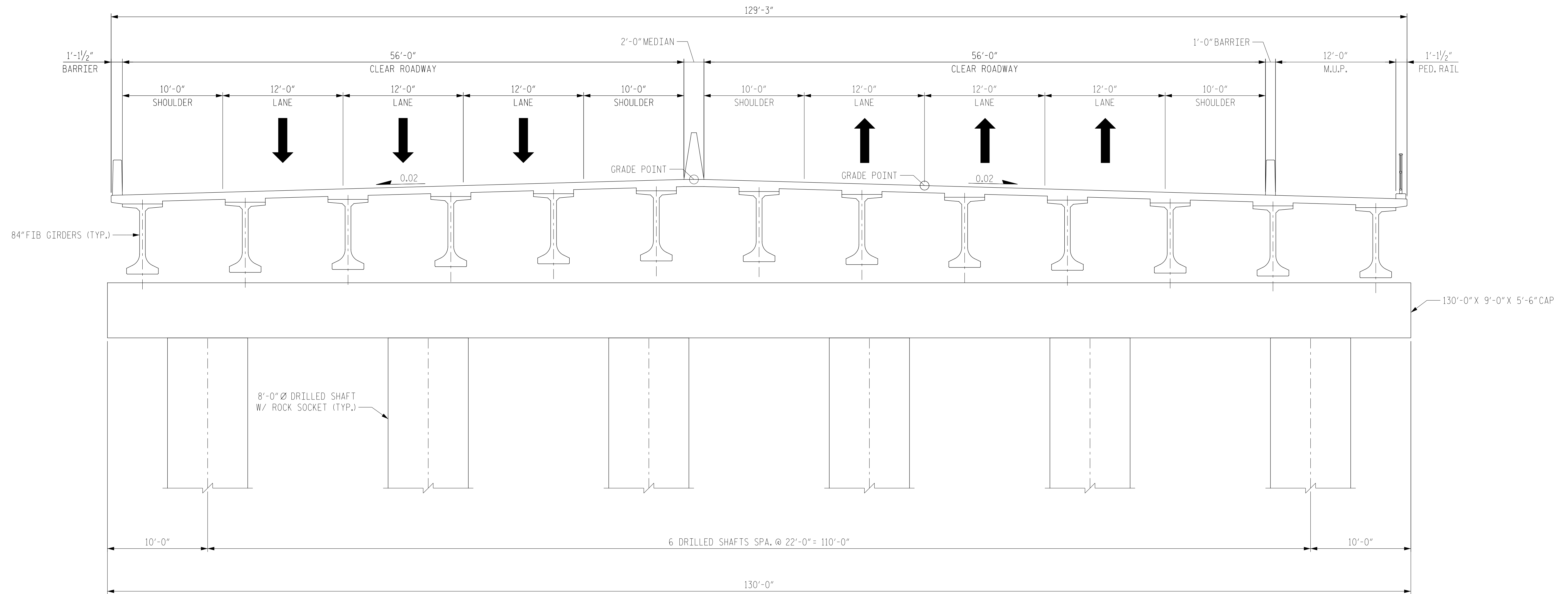

KCI TECHNOLOGIES
 ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

ELEVATION
(BENTS 1-7 & 44-46)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278

BRIDGE PLANS ID	SHEET NO.
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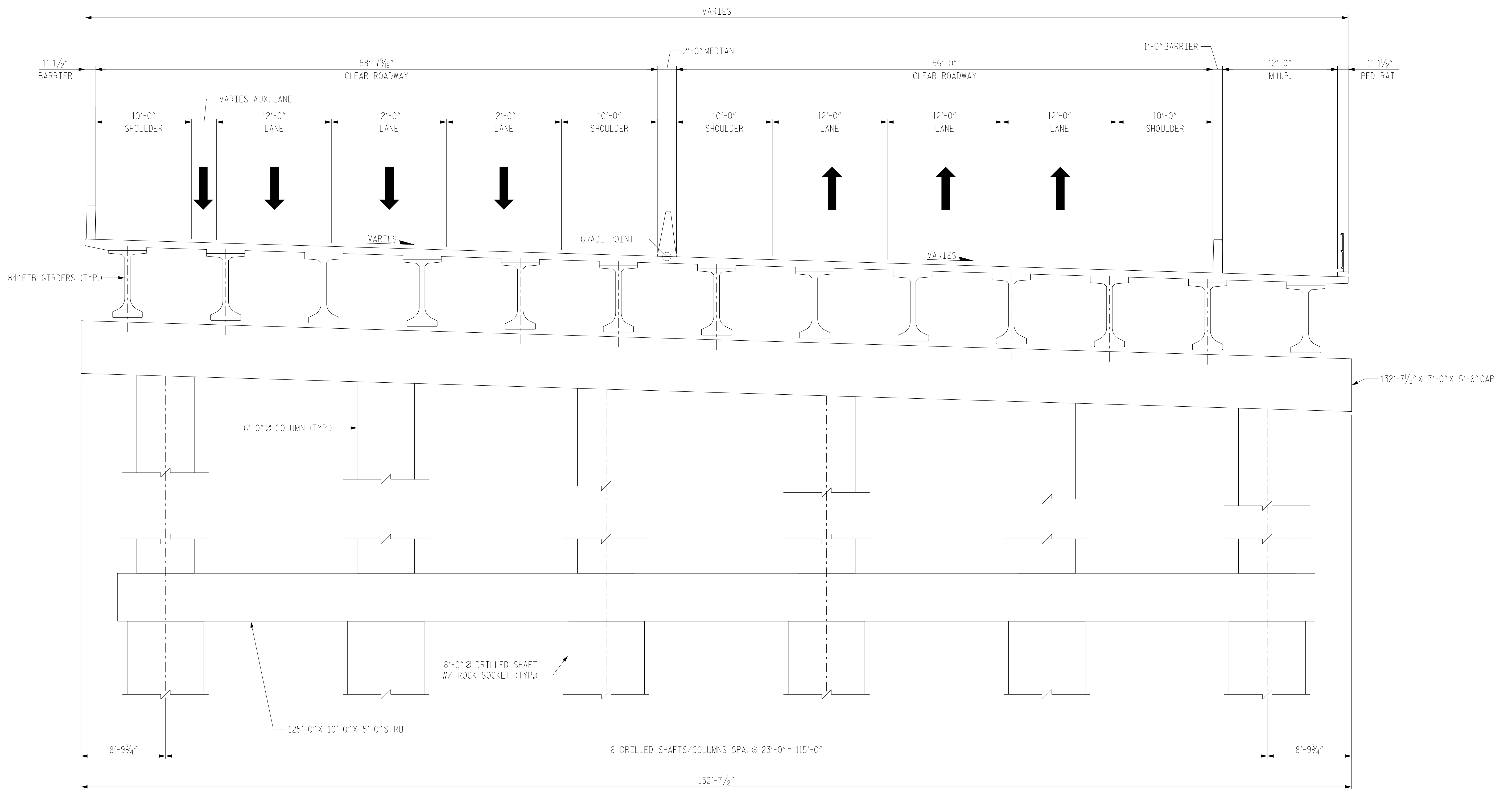
SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ELEVATION (BENTS 8-13)

US 278 CORRIDOR IMPROVEMENT
OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT ROUTE US 278


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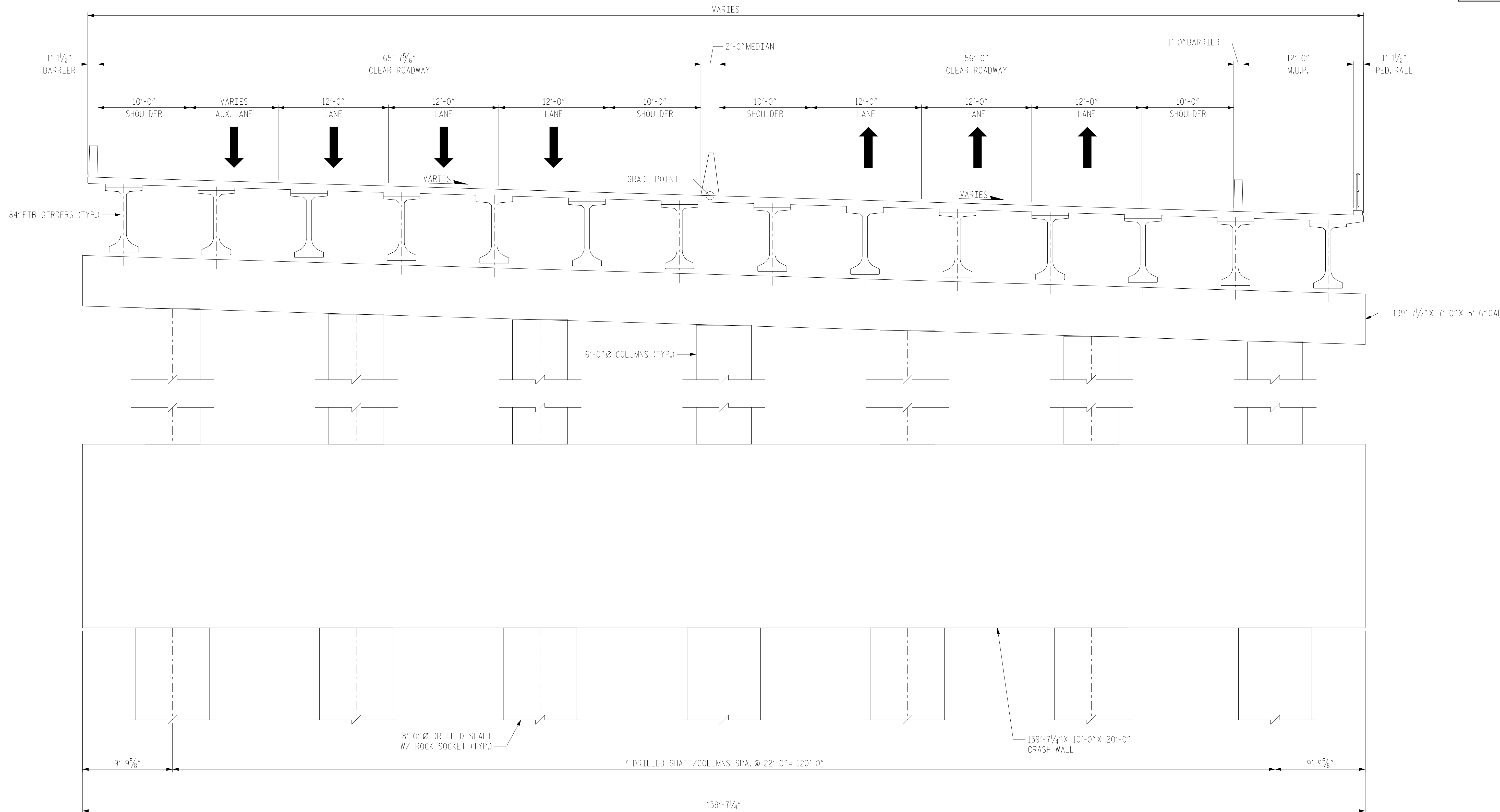

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ELEVATION (BENT 14)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT	ROUTE US 278
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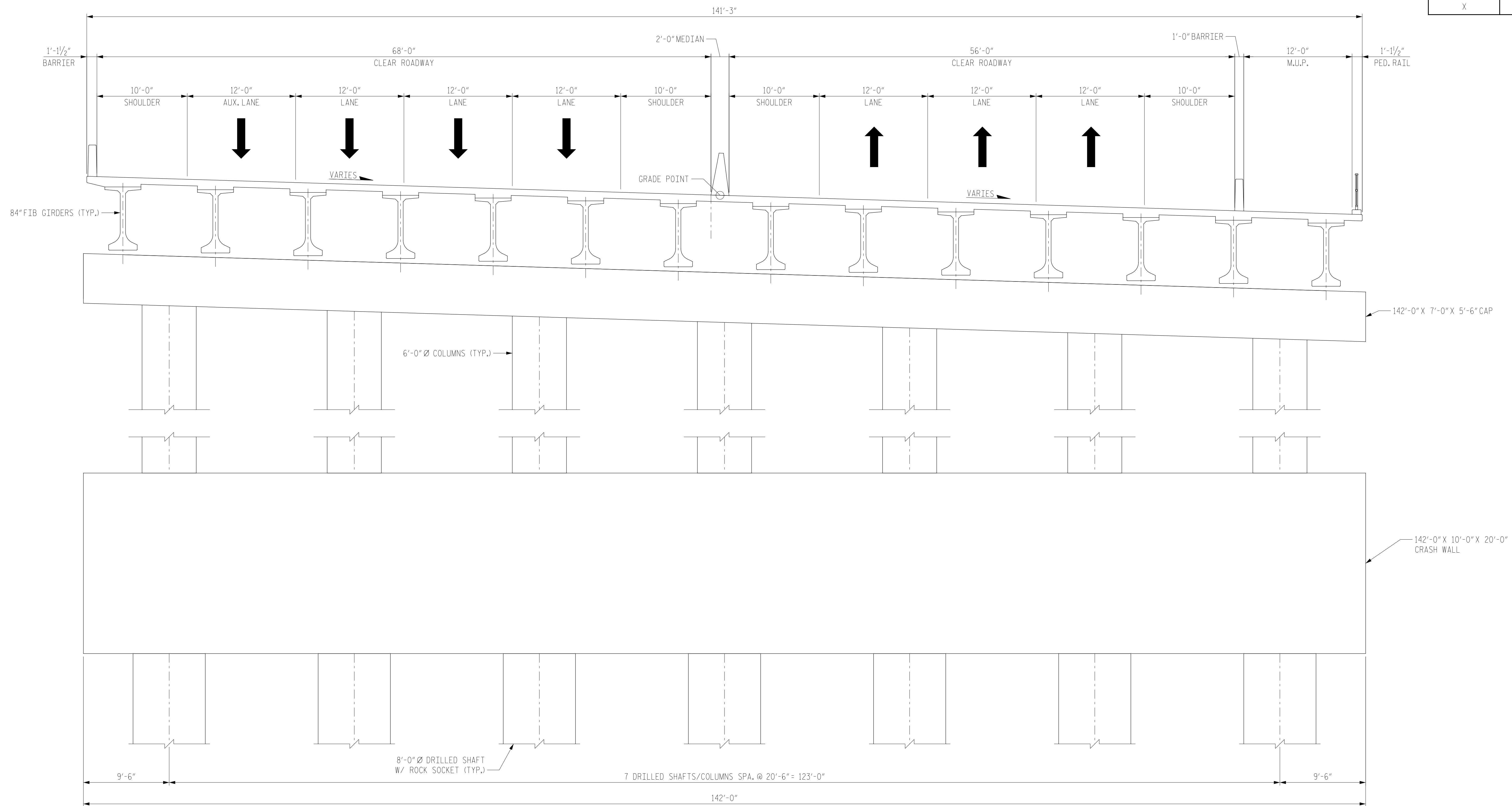

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 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 15)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278

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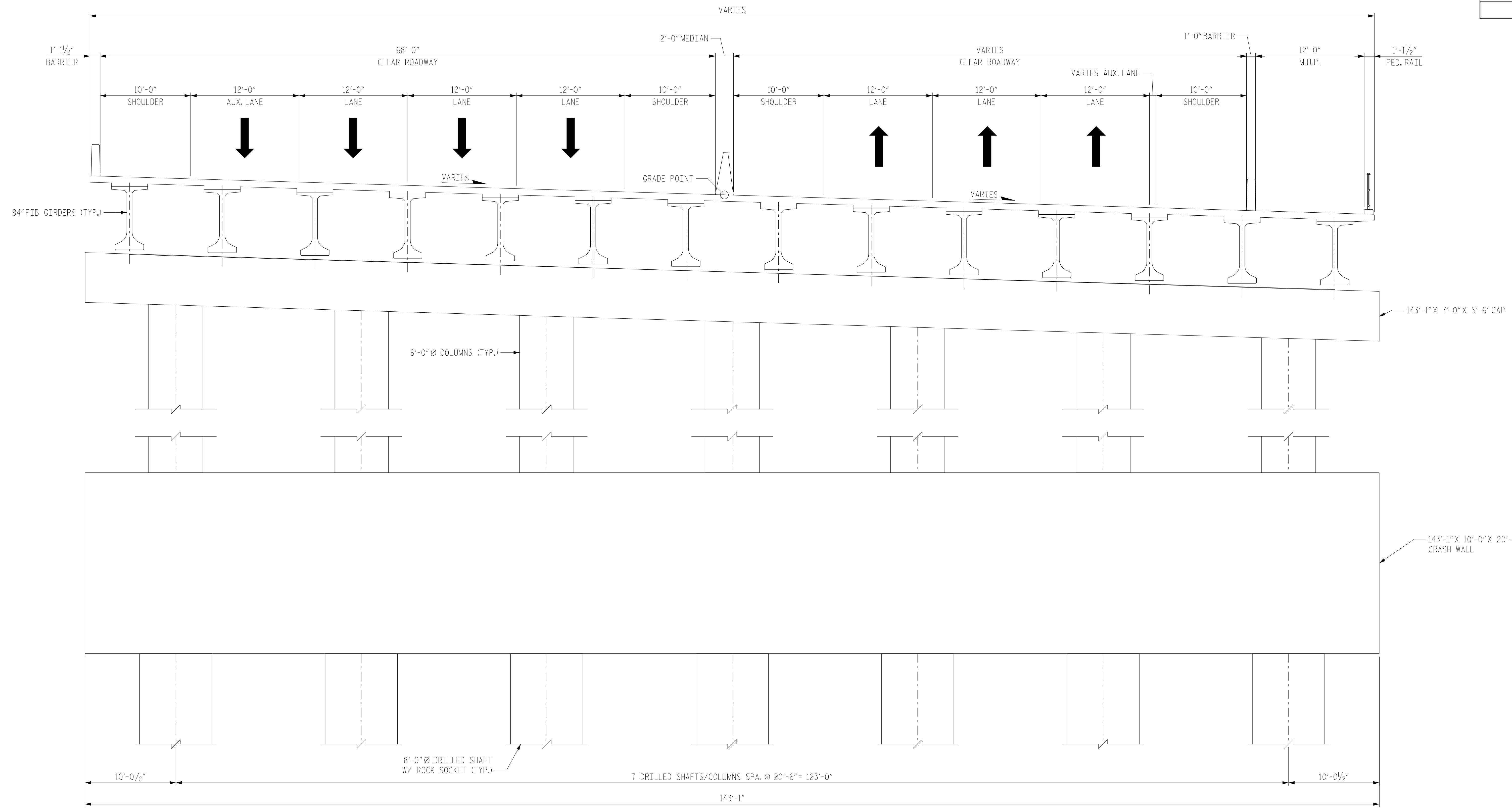
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SOUTH CAROLINA
DEPARTMENT OF TRANSPORTATION

**ELEVATION
(BENTS 16 & 17)**
US 278 CORRIDOR IMPROVEMENT
OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT ROUTE US 278


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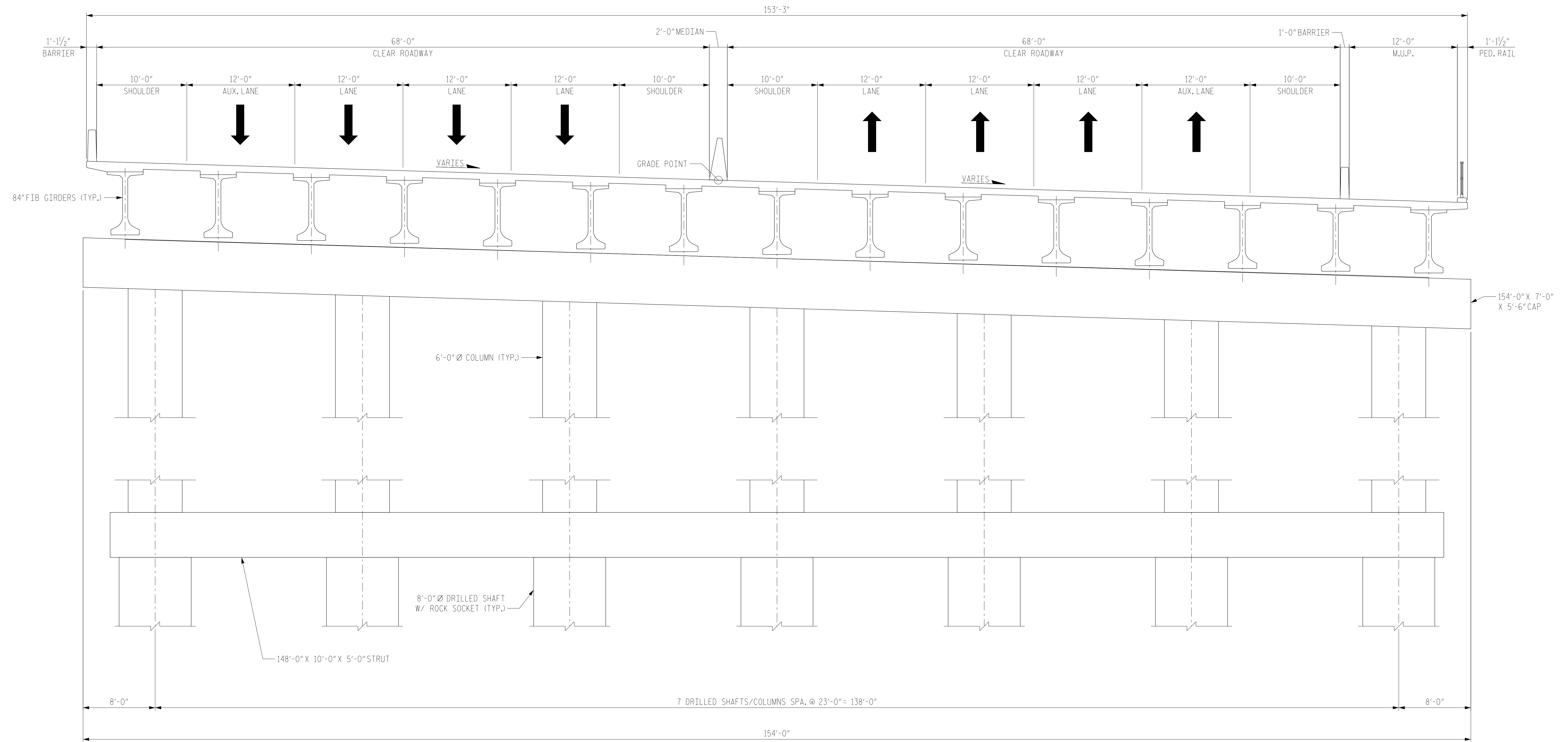

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ELEVATION (BENT 18)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT ROUTE US 278

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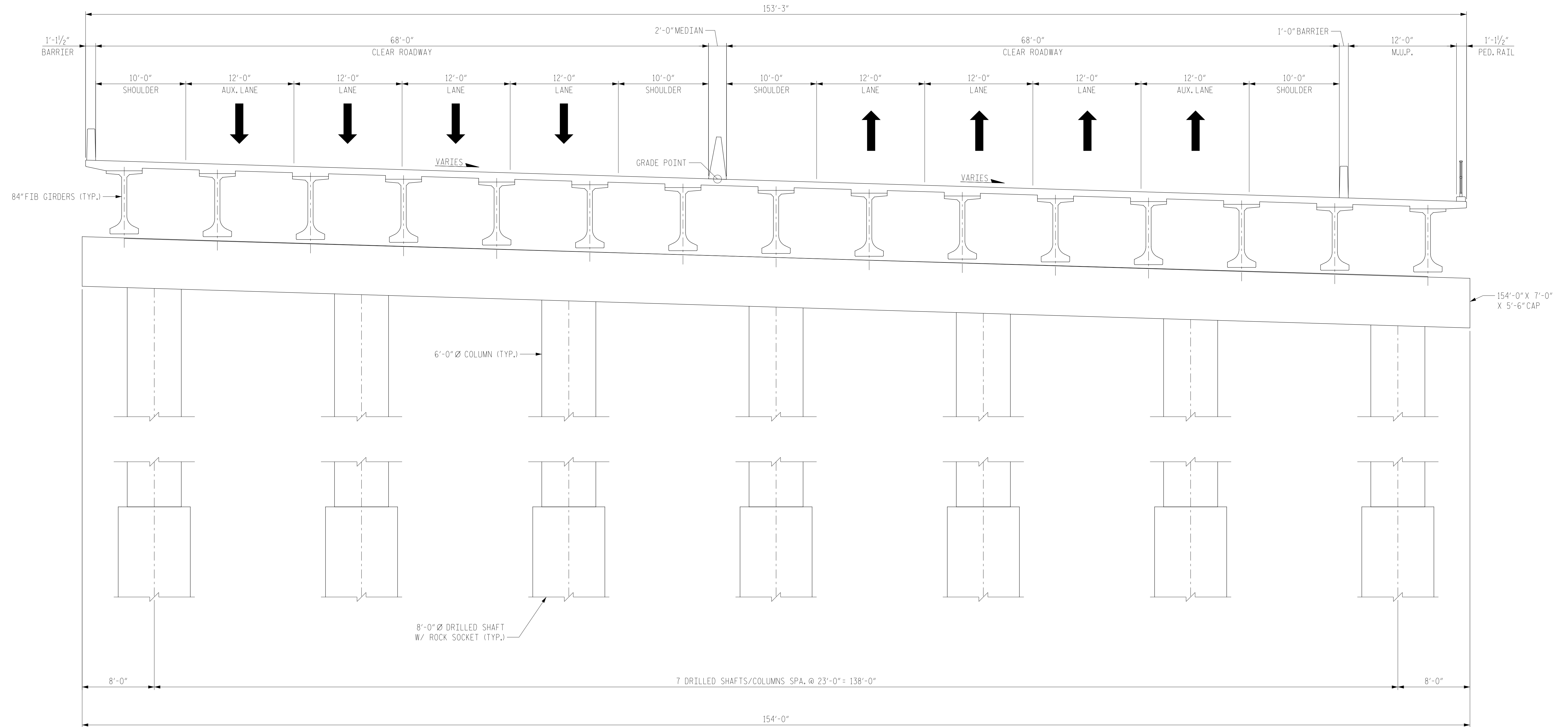
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 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 19)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278

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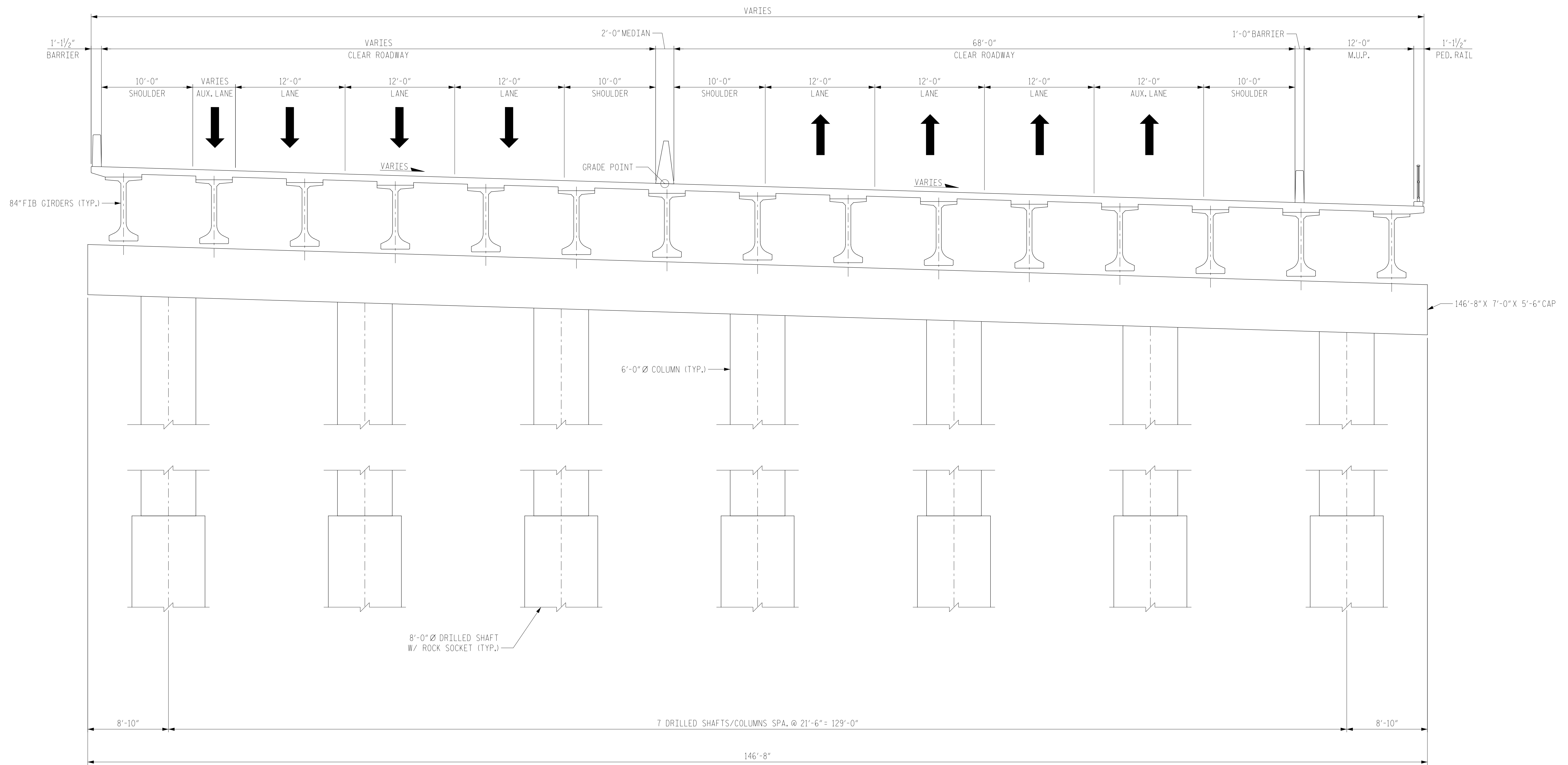
SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENTS 20-26)

US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278


BRIDGE PLANS ID	SHEET NO.
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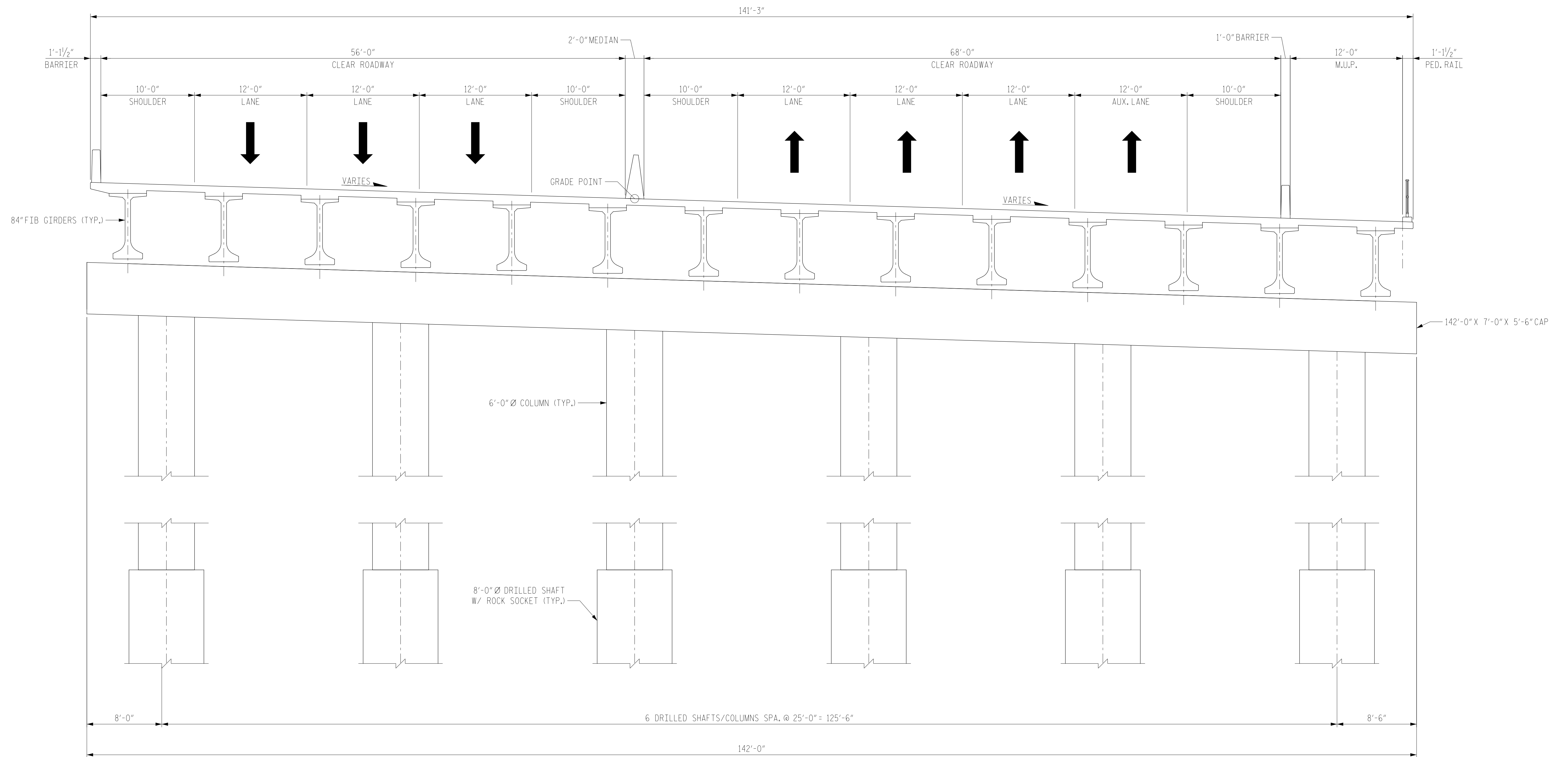

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 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 27)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278

BRIDGE PLANS ID	SHEET NO.
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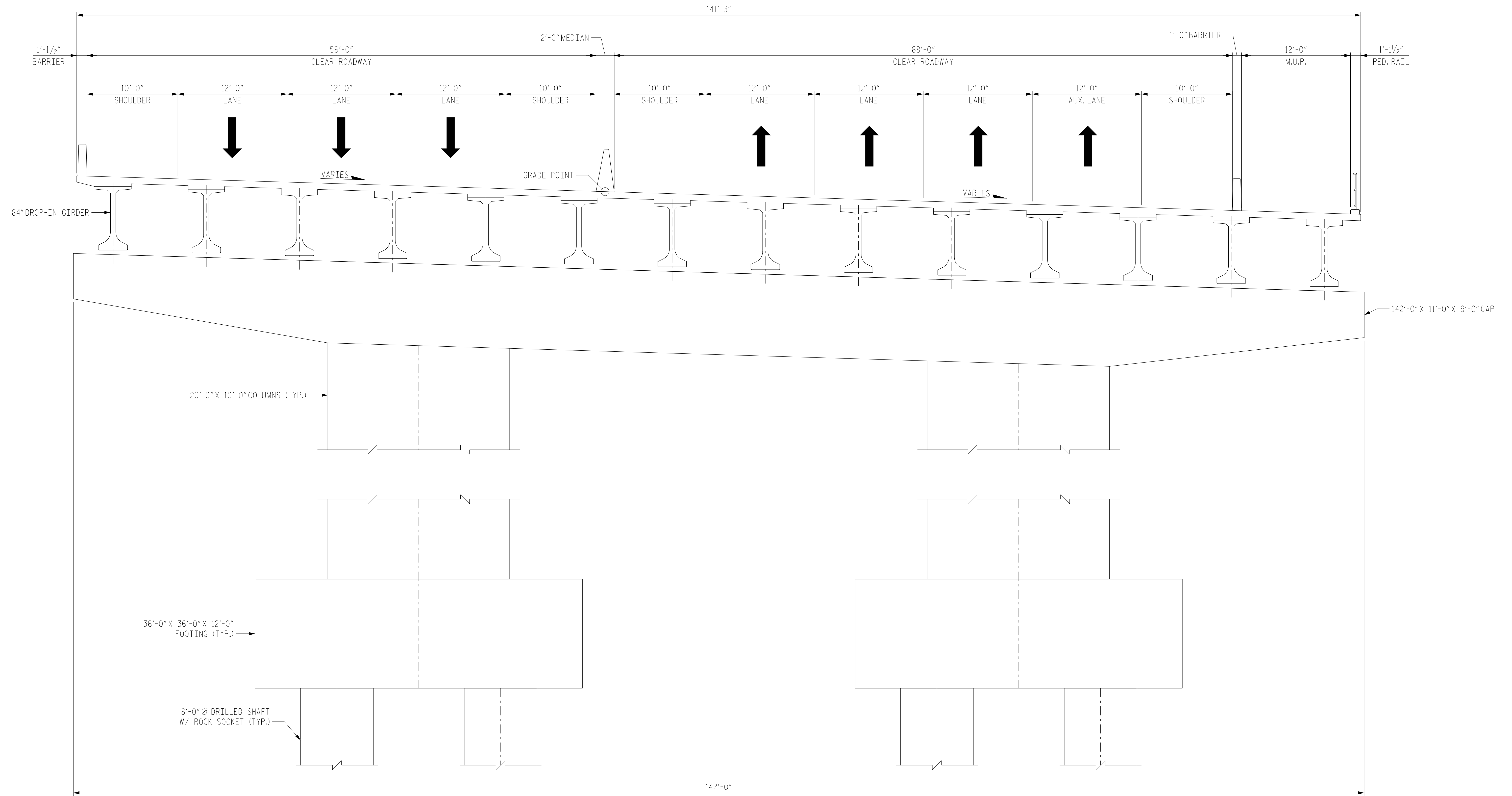
SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

**ELEVATION
 (BENTS 28-31)**

US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT ROUTE US 278


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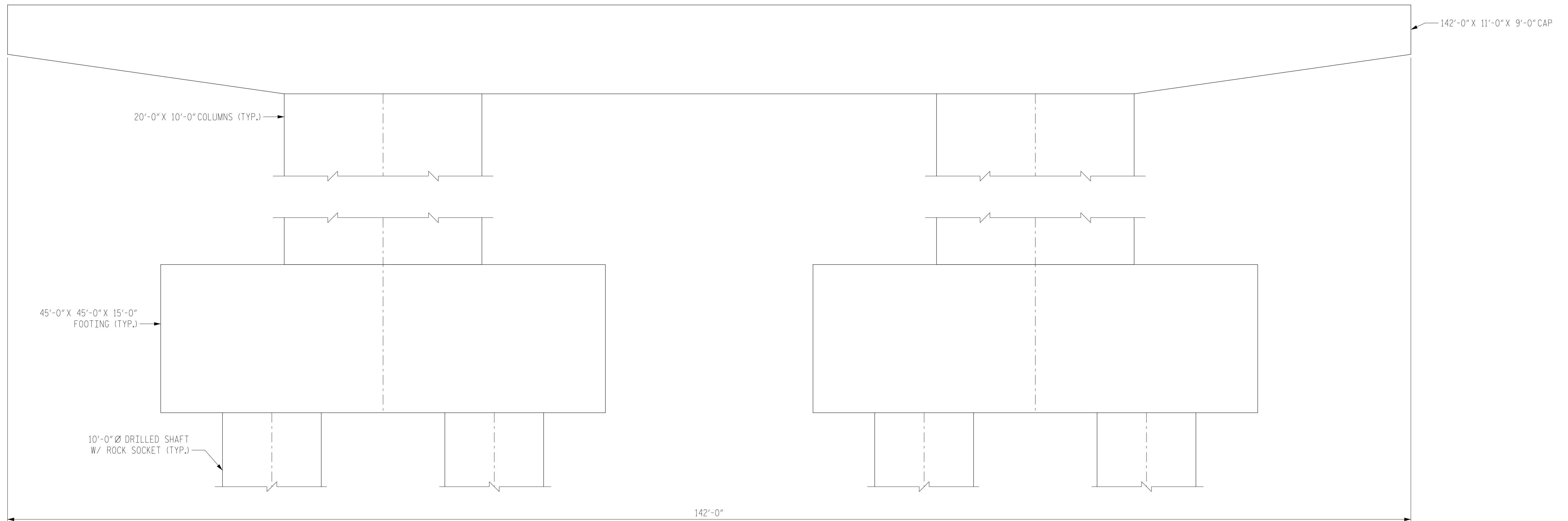
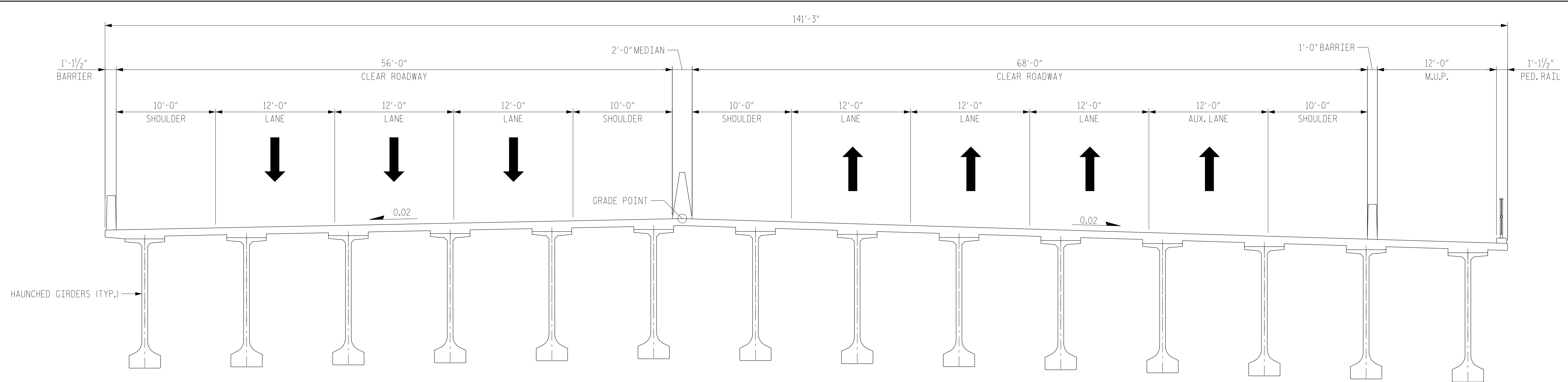

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SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 32)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY BEAUFORT ROUTE US 278

BRIDGE PLANS ID	SHEET NO.
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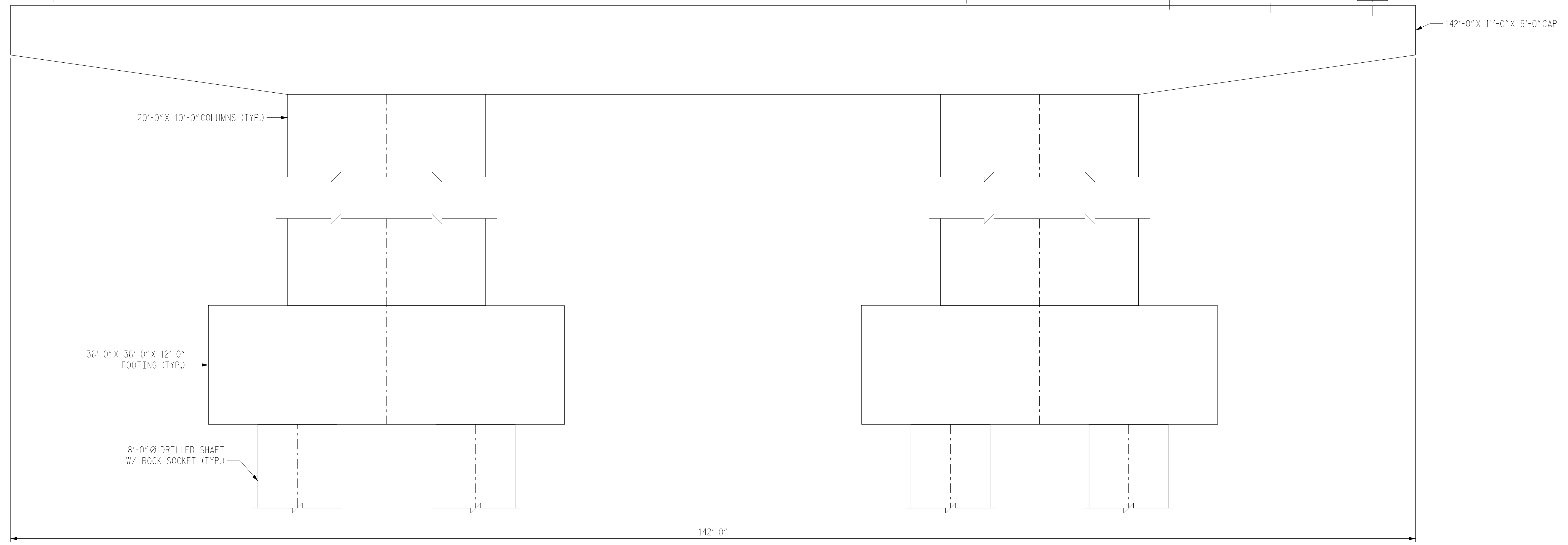
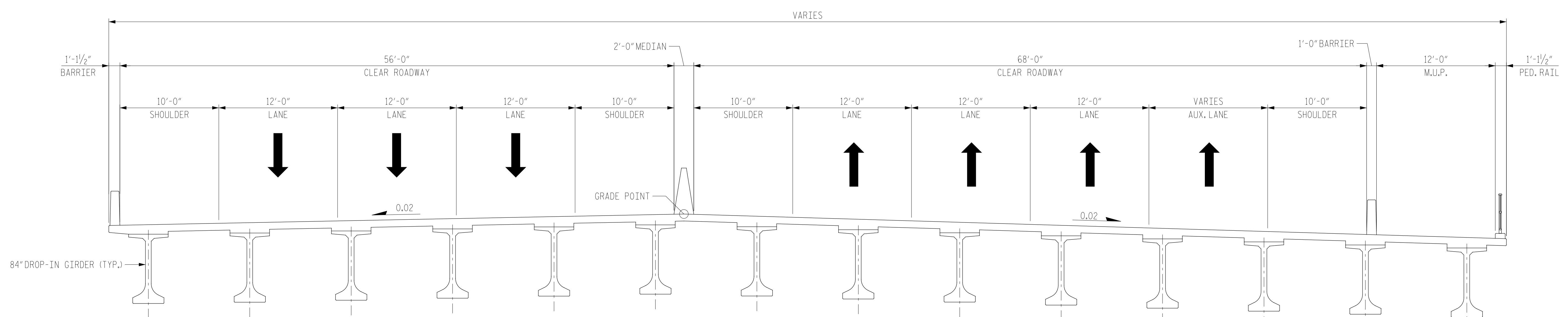
KCI TECHNOLOGIES
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SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

ELEVATION
 (BENTS 33 & 34)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278


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BY	CHK.	DATE	

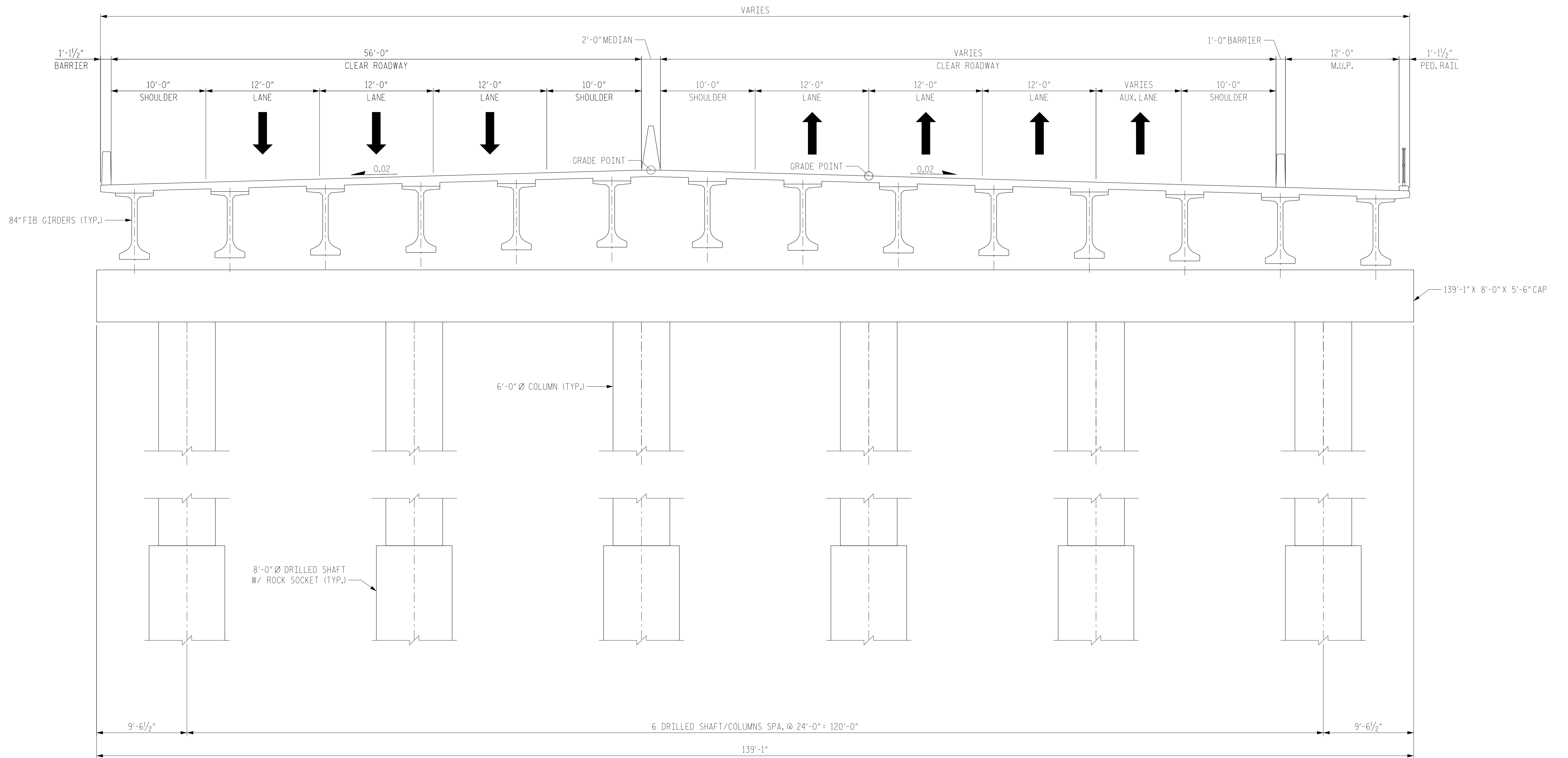

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 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 35)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278


BRIDGE PLANS ID	SHEET NO.
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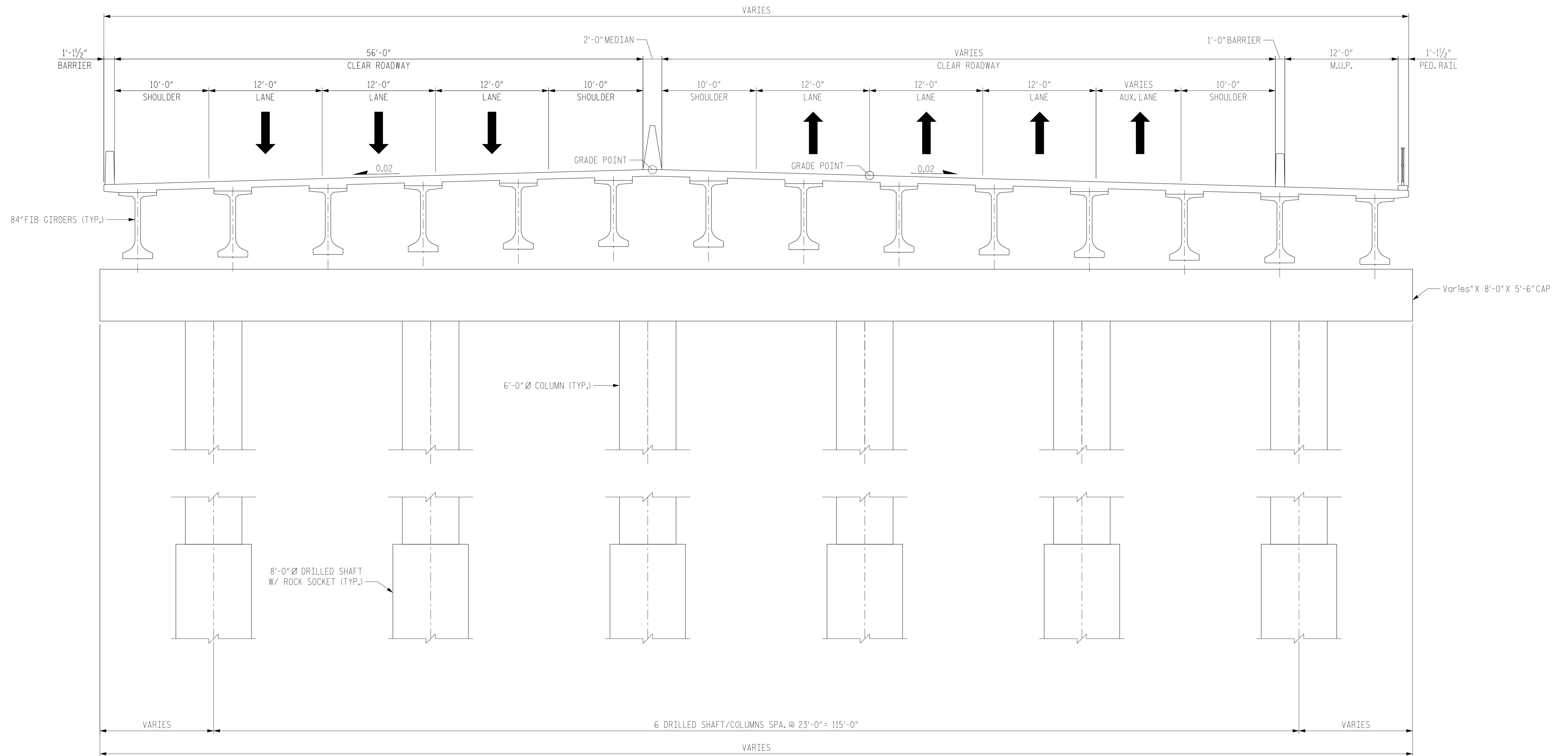

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 ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

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 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENT 36)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278


BRIDGE PLANS ID	SHEET NO.
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CONCEPTUAL PLANS

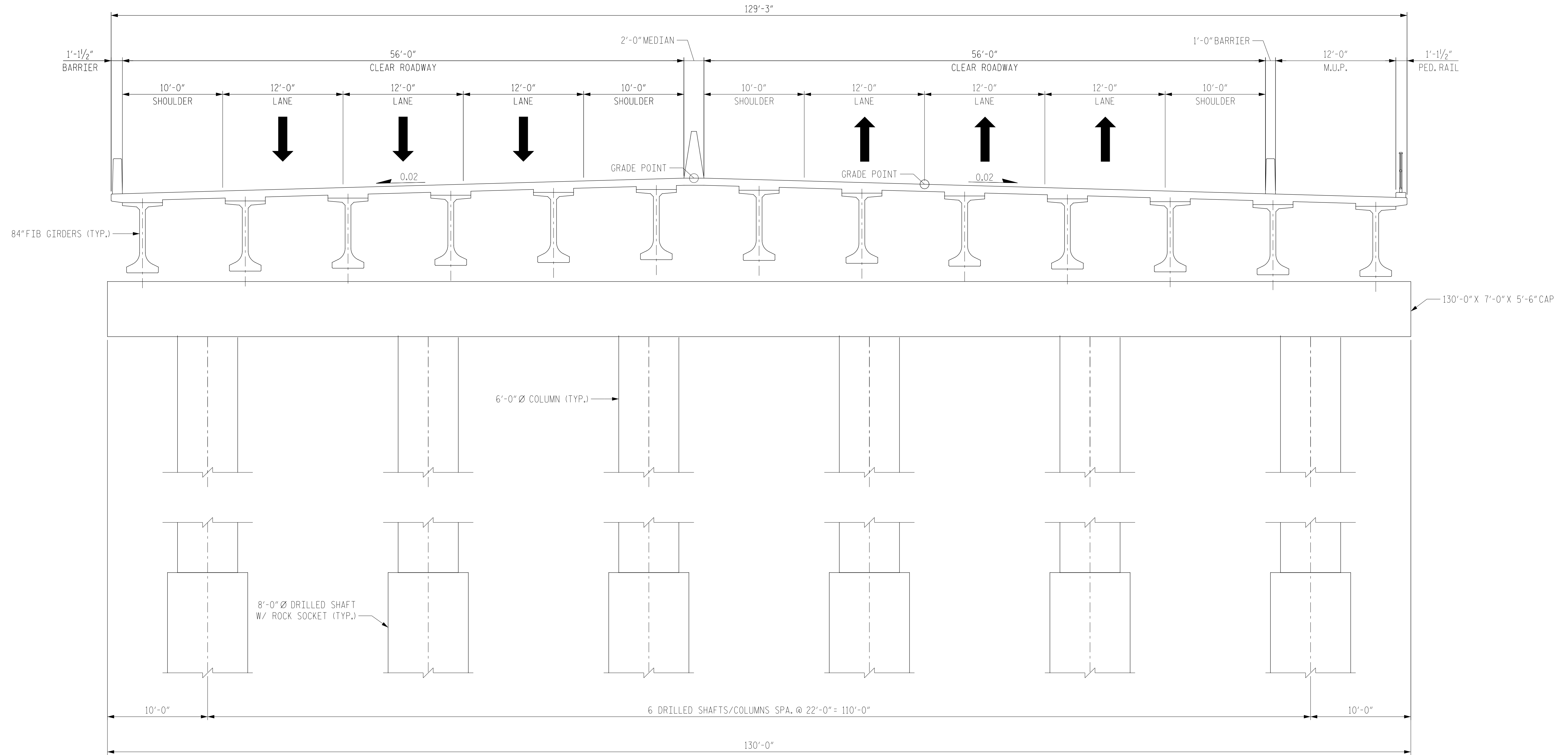
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KCI TECHNOLOGIES
 ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
ELEVATION
(BENT 37 & 38)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278


BRIDGE PLANS ID	SHEET NO.
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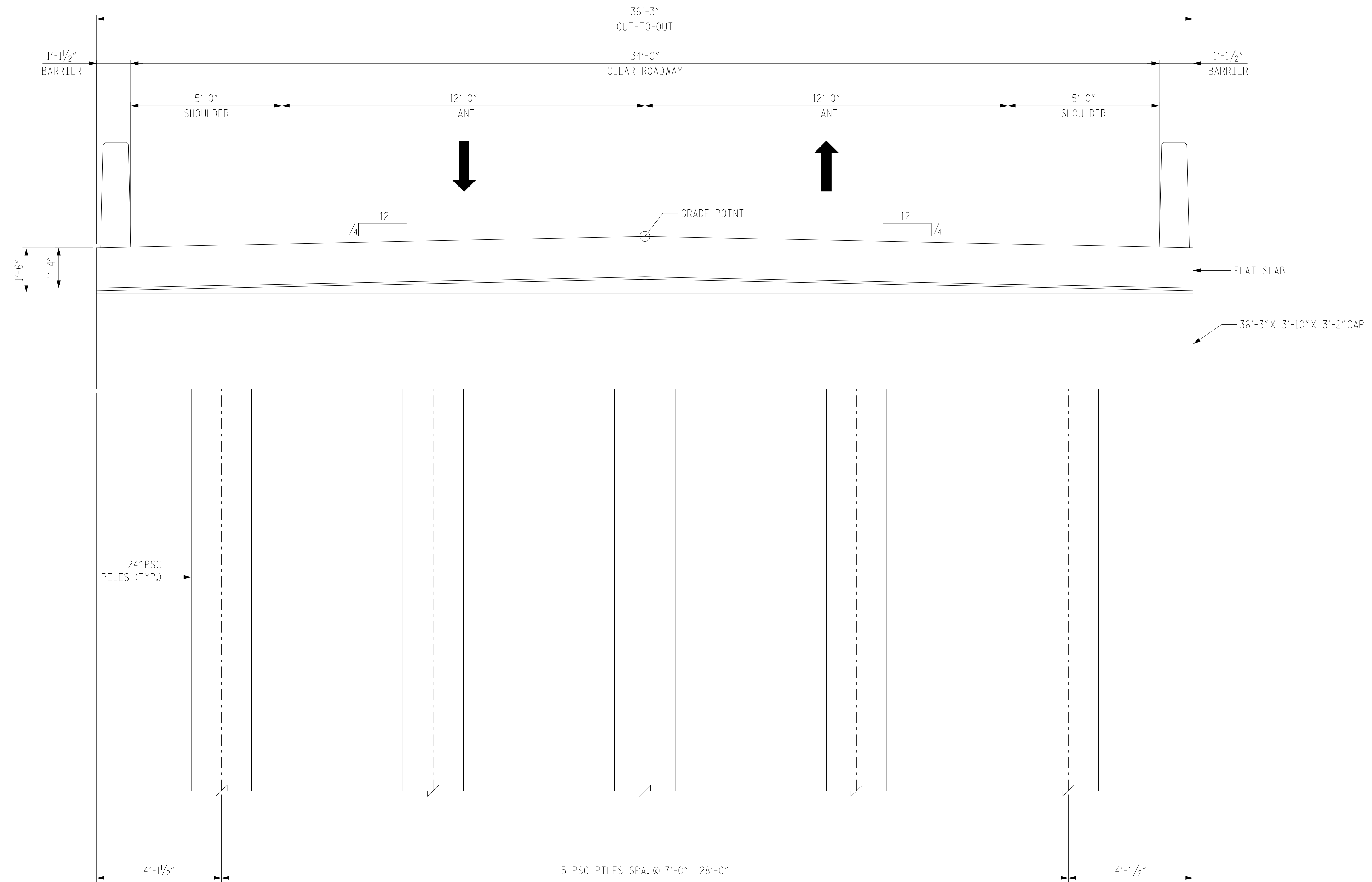

KCI TECHNOLOGIES
 ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

SOUTH CAROLINA
 DEPARTMENT OF TRANSPORTATION

ELEVATION (BENTS 39-43)
 US 278 CORRIDOR IMPROVEMENT
 OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: US 278

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BY	CHK.	DATE	

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DEPARTMENT OF TRANSPORTATION

BENT ELEVATION

S-7-772 (BLUE HERON POINT RD EXT)
OVER INTERCOASTAL WATERWAY

COUNTY: BEAUFORT ROUTE: S-7-772

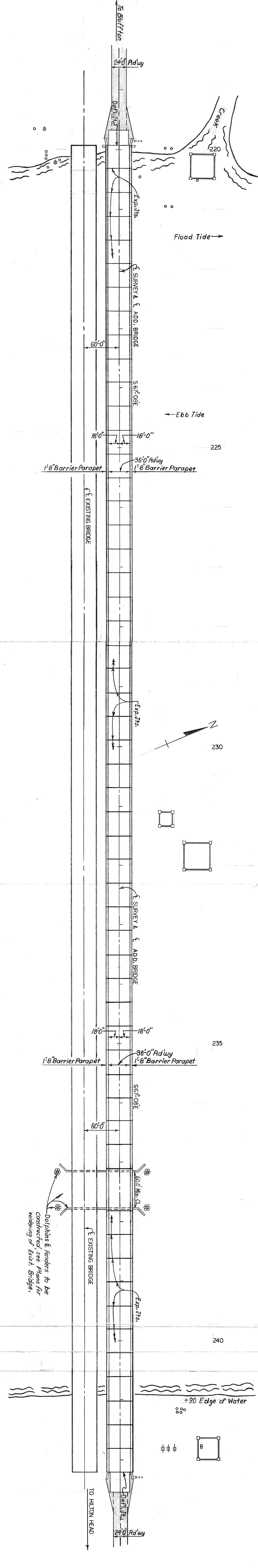


APPENDIX E

EXISTING US 278 BRIDGES OVER

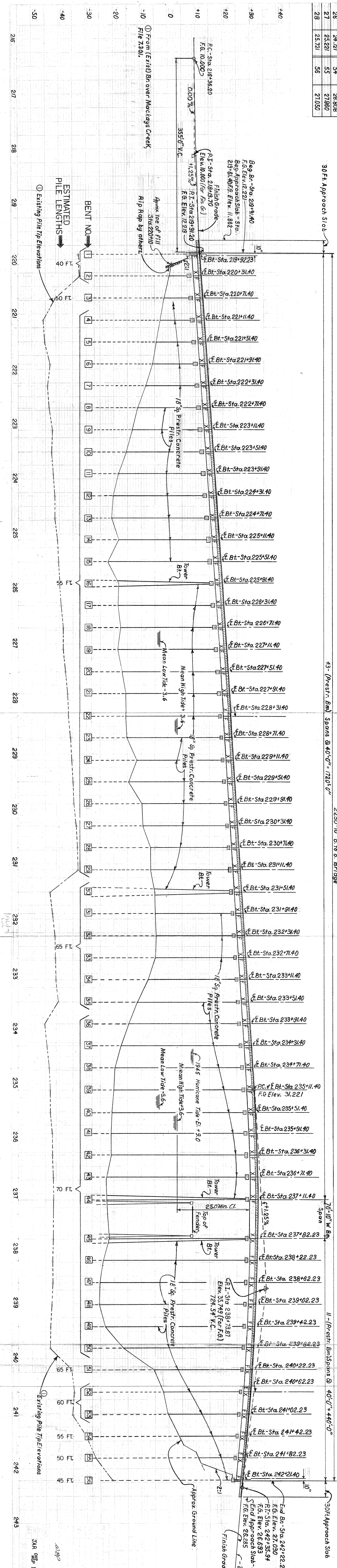
MACKAY CREEK AND SKULL CREEK PROFILES

BENT NO.	ELEV.	BENT NO.	ELEV.
1	12.232	29	28.221
2	12.721	30	28.721
3	13.221	31	27.221
4	13.721	32	27.721
5	14.221	33	28.221
6	14.721	34	28.721
7	15.221	35	29.221
8	15.721	36	29.721
9	16.221	37	30.221
10	16.721	38	30.721
11	17.221	39	31.221
12	17.721	40	31.721
13	18.221	41	32.221
14	18.721	42	32.721
15	19.221	43	33.221
16	19.721	44	33.721
17	20.221	45	34.221
18	20.721	46	34.721
19	21.221	47	35.221
20	21.721	48	35.721
21	22.221	49	36.221
22	22.721	50	36.721
23	23.221	51	37.221
24	23.721	52	37.721
25	24.221	53	38.221
26	24.721	54	38.721
27	25.221	55	39.221
28	25.721	56	39.721



BEAUFORT 7418 U.S. 278 7 21

NOTES:
 Datum: Mean Sea Level = Elev. 0.0.
 Design Speed = 60 M.P.H.
 For Summary of Quantities, see SA 9.
 Construct Curb & Gutter with Catch Basin
 and Slope Drain on Left Side of
 Roadway, or 6'6" End of Bridge and
 Construct Curb & Gutter on Right Side
 of Roadway, or 6'6" End of Bridge.
 For Standard Notes & Details, see SA
 9 & 5.

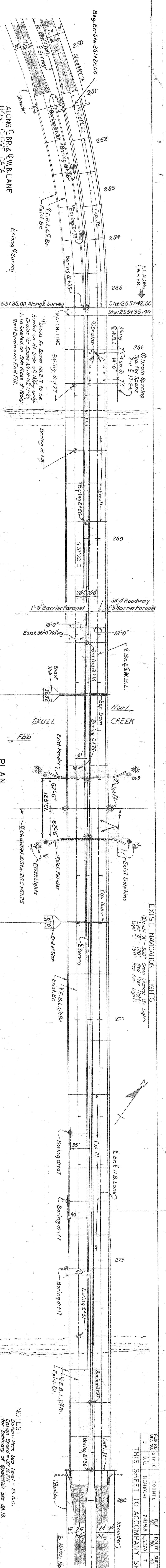


PLAN AND PROFILE
 FOR ADD. BRIDGE OVER
 MACKAYS CREEK
 SCALE: 1" = 50' (HORIZ) 1" = 20' (VERT)

JAR 11-79
 7-418
 BEAUFORT U.S. 278 1-80

PROJECT NO.	STATE	COUNTY	FILE NO.	SHEET NO.	TOTAL SHEETS
3	S.C.	BEAUFORT	7419.3	US278	7
THIS SHEET TO ACCOMPANY SH. 8.			DATE	BY	APPROVED BY
			7.4.19.3	W.S.P.	W.S.P.

EXIST. NAVIGATION LIGHTS
 Light A - 360° Green
 Light B - 180° Red
 Light C - 180° Red
 Light D - 180° Red



ALONG CURVE & W.B.LANE
 HOR. CURVE DATA
 P.I. Sta. 250+30.00
 D = 31.18' (18\"/>

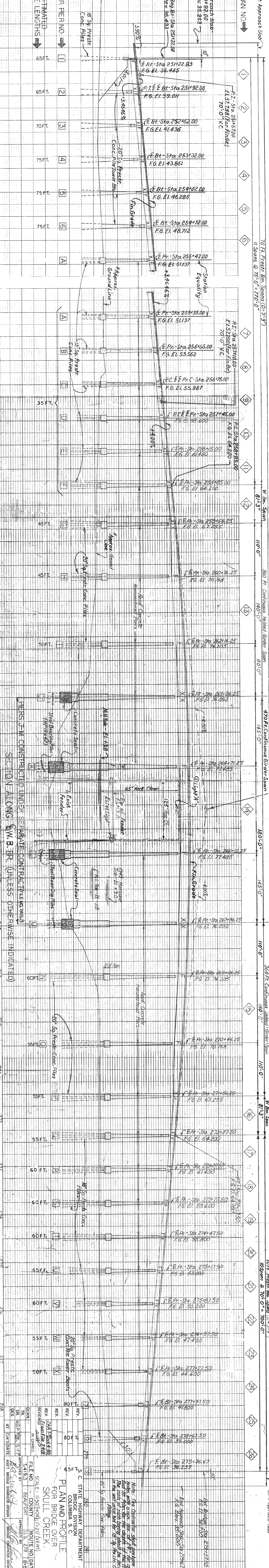
NOTE: Stationing shown on this sheet is along E.B.R. & W.B.L. unless otherwise indicated.

NOTE: This light to be removed from this side of existing bridge and installed as shown. See Special Provisions.

NOTE: For SH. 19 and E Details see SH. 19. For existing bridge details see SH. 19. Note that curve is shifted with centerline and pipe slopes shown is read on the side of roadway of End Br. only.

NOTES:
 Datum Mean Sea Level = El. 0.0.
 For quantity of quantities see SH. 19.
 All work affecting navigation during construction shall be in accordance with the requirements of the U.S. Dept. of the Army and the U.S. Coast Guard.

PLAN AND PROFILE FOR SKULL CREEK
 S.C. STATE HIGHWAY DEPARTMENT
 COLUMBIA S.C.
 REV. 10/19/10
 FILE NO. 7419.3
 COUNTY BEAUFORT
 ROUTE NO. 278
 DATE 10/19/10
 DRAWN BY W.S.P.
 CHECKED BY W.S.P.
 DESIGNED BY W.S.P.
 APPROVED BY W.S.P.



30 FT. Approach Slab
 70 FT. Prest. Br. Spans (2 = 3'3\"/>

**70 FT. Prest. Br. Spans (2 = 3'3\"/>
 11 Spans @ 70'-0\"/>**

W. Br. Span
 81'-3\"/>

360 Ft. Continuous Welded Girder Span
 140'-0\"/>

470 Ft. Continuous Girder Span
 145'-0\"/>

360 Ft. Continuous Welded Girder Span
 140'-0\"/>

W. Br. Span
 81'-3\"/>

**70 Ft. Prest. Br. Spans (2 = 3'3\"/>
 10 Spans @ 70'-0\"/>**

30 Ft. Approach Slab

PLAN AND PROFILE FOR SKULL CREEK
 S.C. STATE HIGHWAY DEPARTMENT
 COLUMBIA S.C.
 REV. 10/19/10
 FILE NO. 7419.3
 COUNTY BEAUFORT
 ROUTE NO. 278
 DATE 10/19/10
 DRAWN BY W.S.P.
 CHECKED BY W.S.P.
 DESIGNED BY W.S.P.
 APPROVED BY W.S.P.



APPENDIX F

UNDERWATER NOISE ANALYSIS RESULTS

Title	US 278 Corridor Improvements - 24-inch Pipe Piles
Description	The contractor will install 24-inch pipe piles to support temporary work trestles for bridge construction access in estuarine emergent wetlands adjacent to Mackay and Skull Creeks. The trestles will be built from the top down eliminating the need for temporary fill, timber mats, or barges in the wetland habitats for trestle construction access. A total of 400 piles will be required to support the 40-
Assumptions	A total of 400 pipe piles will be required for the temporary structures. 800 strikes per pile is anticipated with 4 to 5 piles being installed each day. Wooden cushion blocks and air bubble curtains will be used to mitigate the potential noise impacts. Assume water is 5 meters deep. Noise reduction of 26 was used for wood cushion blocks.

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of strikes required to drive a single pile to final depth (from the Action Agency's description or from the No. Strikes per Pile Data tab)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)
For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise request information from the Action Agency or search the internet for another source.
 B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 B34: Enter any noise reduction (from unattenuated noise levels) due to noise abatement methods. See the Noise Abatement Data Tab.
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of strikes per pile	800
Number of piles per day	5
Estimated number of strikes per day	4000

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured single strike level	203	178	189
Distance from source (m)	10	10	10
Noise reduction due to abatement (dB)	26		

← The pre-filled values are the most common--be s

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	15
Cumulative SEL at measured distance	203

Calculated Acoustic Values Used by the Model			
Measurement	Peak	SEL	RMS
Single Strike Levels	192	167	178
Distance from source (m)	1	1	1

Calculated Distances					
	Onset of Physical Injury			Fish Behavior	Sea Turtle Behavior
	Peak	Cumulative SEL dB**			
	Sea Turtles & Fish	Sea Turtles & Fish ≥ 2 g	Fish < 2 g	RMS dB	RMS dB
Threshold value	206	187	183	150	160
Distance to threshold (meters)	0	11.69607095	13.59356391	73.56422545	15.84893192
Distance to threshold (US Standard)	0.0 ft	38.373 ft	44.598 ft	241.352 ft	51.998 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

Title	US 278 Corridor Improvements - 24-inch Pre-stressed Concrete Piles
Description	The contractor will install 24-inch pre-stressed concrete piles to support connector bridge in estuarine emergent wetlands, a tidal creek, and intertidal non-vegetated flats between Jenkins and Hog Islands. A total of 30 piles will be required to support the connector bridge. An impact hammer will be utilized in conjunction with wooden cushion blocks to install 4 to 5 piles per day. It is
Assumptions	A total of 30 pre-stressed concrete piles will be required for the bridge. 800 strikes per pile is anticipated with 4 to 5 piles being installed each day. Wooden cushion blocks or air bubble curtains will be used to mitigate the potential noise impacts. Assume water is 5 meters deep. Noise reduction of 26 was used for wood cushion blocks

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of strikes required to drive a single pile to final depth (from the Action Agency's description or from the No. Strikes per Pile Data tab)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)

For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise request information from the Action Agency or search the internet for another source.

B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 B34: Enter any noise reduction (from unattenuated noise levels) due to noise abatement methods. See the Noise Abatement Data Tab.
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of strikes per pile	800
Number of piles per day	5
Estimated number of strikes per day	4000

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured single strike level	185	160	170
Distance from source (m)	10	10	10
Noise reduction due to abatement (dB)	26		

← The pre-filled values are the most common--be

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	15
Cumulative SEL at measured distance	185

Calculated Acoustic Values Used by the Model			
Measurement	Peak	SEL	RMS
Single Strike Levels	174	149	159
Distance from source (m)	1	1	1

Calculated Distances					
	Onset of Physical Injury			Fish Behavior	Sea Turtle Behavior
	Peak	Cumulative SEL dB**			
	Sea Turtles & Fish	Sea Turtles & Fish ≥ 2 g	Fish < 2 g	RMS dB	RMS dB
Threshold value	206	187	183	150	160
Distance to threshold (meters)	0	0.737972187	0.857695899	3.981071706	0.857695899
Distance to threshold (US Standard)	0.0 ft	2.421 ft	2.814 ft	13.061 ft	2.814 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

Title	US 278 Corridor Improvements - 72-Inch Steel Casing
Description	The contractor will install 24 72-inch steel casings with a vibratory hammer in Mackay Creek to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casing and seat it into bedrock, if required.
Assumptions	3 hours(10,800 seconds) per casing to install; 2 casings installed per day

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of seconds of vibration to drive a single pile to final depth (from the Action Agency's description)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)
For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise contact the Action Agency or search the internet for another source.

B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of seconds of vibration per pile	10800
Number of piles per day	2
Estimated number of seconds per day	21600

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured peak levels at the indicated distance	195	180	180
Measurement distance from source (m)	10	10	10
Calculated levels at the source	210	195	195

← The pre-filled values are the most common--be

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	15
Cumulative SEL at measured distance	223

Calculated Distances					
	Onset of Physical Injury			Fish Behavior	Sea Turtle Behavior
	Peak	Cumulative SEL dB**		RMS	RMS
	Sea Turtles & Fish	Sea Turtles & Fish ≥ 102 g	Fish < 102 g	dB	dB
Threshold value	206	234	191	150	160
Distance to threshold (meters)	1.847849797	1.948210296	1000	1000	215.443469
Distance to threshold (US Standard)	6.062 ft	6.392 ft	3280.84 ft	3280.84 ft	706.836 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

Title	US 278 Corridor Improvements - 96-Inch Steel Casing
Description	The contractor will install 112 96-inch steel casings in Mackay and Skull Creeks with a vibratory hammer to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casings and seat it into bedrock, if required.
Assumptions	3 hours(10,800 seconds) per casing to install; Maximum of 2 casings per day

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of seconds of vibration to drive a single pile to final depth (from the Action Agency's description)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)
For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise contact the Action Agency or search the internet for another source.

B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of seconds of vibration per pile	10800
Number of piles per day	2
Estimated number of seconds per day	21600

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured peak levels at the indicated distance	200	192	195
Measurement distance from source (m)	10	10	10
Calculated levels at the source	220	212	215

← The pre-filled values are the most common--be

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	20
Cumulative SEL at measured distance	235

Calculated Distances					
	Onset of Physical Injury			Fish Behavior RMS dB	Sea Turtle Behavior RMS dB
	Peak Sea Turtles & Fish	Cumulative SEL dB** Sea Turtles & Fish ≥ 102 g	Cumulative SEL dB** Fish < 102 g		
Threshold value	206	234	191	150	160
Distance to threshold (meters)	5.011872336	11.67419318	1258.925412	1778.27941	562.3413252
Distance to threshold (US Standard)	16.443 ft	38.301 ft	4130.333 ft	5834.25 ft	1844.952 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

Title	US 278 Corridor Improvements - 120-Inch Steel Casing
Description	The contractor will install 16 120-inch steel casings with a vibratory hammer in Skull Creek to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casings and seat it into bedrock, if required.
Assumptions	3 hours(10,800 seconds) per casing to install; 2 casings per day

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of seconds of vibration to drive a single pile to final depth (from the Action Agency's description)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)
For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise contact the Action Agency or search the internet for another source.

B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of seconds of vibration per pile	10800
Number of piles per day	2
Estimated number of seconds per day	21600

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured peak levels at the indicated distance	194	186	192
Measurement distance from source (m)	10	10	10
Calculated levels at the source	214	206	212

← The pre-filled values are the most common--be

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	20
Cumulative SEL at measured distance	229

Calculated Distances					
	Onset of Physical Injury			Fish Behavior	Sea Turtle Behavior
	Peak	Cumulative SEL dB**			
	Sea Turtles & Fish	Sea Turtles & Fish ≥ 102 g	Fish < 102 g	RMS dB	RMS dB
Threshold value	206	234	191	150	160
Distance to threshold (meters)	2.511886432	5.850956585	630.9573445	1258.925412	398.1071706
Distance to threshold (US Standard)	8.241 ft	19.196 ft	2070.07 ft	4130.333 ft	1306.126 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

Title	US 278 Corridor Improvements - All Drilled Shafts (Auger)
Description	The use of an auger will be required for the installation of all drilled shafts. Using an auger to remove the soil and rock from within the casings will produce a non-impulsive noise that will contribute to the increased levels of underwater noise during construction. An auger may be used for up to eight hours per day as part of the drilled shaft installation process. A total of 152 drilled shafts will be installed in estuarine habitats.
Assumptions	Up to 8 hours(10,800 seconds) per shaft; 1 shaft per day Auger noise information: Dazey, E., McIntosh, B., Brown, S., and Dudzinski, K.M. 2012. Assessment of Underwater Anthropogenic Noise Associated with Construction Activities in Bechers Bay, Santa Rosa Island, California. Journal of Environmental Protection. 3: 1286-1294.

Instructions:

Input: Fill in the green colored cells

B1: Enter a descriptive title for the analysis.
 B2: Enter complete information about the pile driving operation, including the type of pile, size of pile, pile driver type, noise attenuation, hours of operation, etc.
 B3: Enter any assumptions you need to make about the choice of parameter values, project methods, environment, etc.
 B26: Enter the number of seconds of vibration to drive a single pile to final depth (from the Action Agency's description)
 B27: Enter the maximum number of piles to be installed in a single day (from the Action Agency's description of the project)
For the next 6 values, use the information on the Pile Driving Noise Data tab if possible, otherwise contact the Action Agency or search the internet for another source.
 B32: Enter the estimated single strike peak pressure (dB re: 1µPa)
 B33: Enter the distance (m) from the pile where B7 was measured
 C32: Enter the estimated single strike SEL (dB re: 1µPa²s). If no direct measurement is available, use peak pressure minus 25 dB
 C33: Enter the distance (m) from the pile where C9 was measured
 D32: Enter the estimated single strike RMS pressure (dB re: 1µPa). If no direct measurement is available, use peak pressure minus 15 dB
 D33: Enter the distance (m) from the pile where D9 was measured
 B38: Enter the transmission loss constant (attenuation with distance), which depends on the model used:
 For deep water (depth is greater than the cSEL radius of effect) use the spherical model attenuation constant = 20
 For shallow water use a cylindrical model attenuation constant = 10 to 15; use 15 if unknown.
 If you use an attenuation constant that was reported with the noise data, be sure that the depth profile and bottom type of your project is similar to the project that generated the data.

Output: Read the values in the blue cells in the Calculated Distances Table

Pile Driving Parameters	
Number of seconds of vibration per pile	28800
Number of piles per day	1
Estimated number of seconds per day	28800

Acoustic Measurements			
Measurement	Peak	SEL	RMS
Measured peak levels at the indicated distance	185	154	160
Measurement distance from source (m)	10	10	10
Calculated levels at the source	200	169	175

← The pre-filled values are the most common--be

Model Assumptions	
Effective Quiet	150
Transmission loss constant (15 if unknown)	15
Cumulative SEL at measured distance	199

Calculated Distances					
	Onset of Physical Injury			Fish Behavior	Sea Turtle Behavior
	Peak	Cumulative SEL dB**		RMS	RMS
	Sea Turtles & Fish	Sea Turtles & Fish ≥ 102 g	Fish < 102 g	dB	dB
Threshold value	206	234	191	150	160
Distance to threshold (meters)	0	0.043610894	18.47849797	46.41588834	10
Distance to threshold (US Standard)	0.0 ft	0.143 ft	60.625 ft	152.283 ft	32.808 ft
** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet)					

From: [Sarah Garvin - NOAA Affiliate](#)
To: [Gordon Murphy](#)
Cc: [Chris Beckham \(BeckhamJC@scdot.org\)](#); [Russell Chandler](#)
Subject: Re: SERO-2020-02072 US 278 Improvements
Date: Thursday, January 28, 2021 9:11:24 AM
Attachments: [image001.png](#)

Good morning --

Basically, the best way to calculate vibratory impacts for these pilings is to calculate a ratio using the largest pile size for which we have both impact and vibratory noise data. In this case, it is 72" steel piles. We then multiply that value by the impact data we have available for 96" steel piles and 126" steel piles.

Here is the ratio I calculated for each noise value for 72" vibratory : 72" impact:

Peak = 0.91121495

SEL = 0.98901099

RMS = 0.95238095

For 96" steel piles, I calculated the following vibratory sound values:

Peak = 0.91121495 X 220 = 200 db

SEL = 0.98901099 X 195 = 192 db

RMS = 0.95238095 X 205 = 195 db

For 126" steel piles, I calculated the following vibratory sound values:

Peak = 0.91121495 X 213 = 194 db

SEL = 0.98901099 X 188 = 186 db

RMS = 0.95238095 X 202 = 192 db

Using the vibratory sound values calculated for the largest steel pile size (i.e., 126"), and assuming 2 piles installed per day at 3600 seconds of vibration per pile, I am getting the following impacts:

Peak injury = 5.2 ft radius

Cumulative SEL injury = 7.7 ft radius for sea turtles and fish > 102 g; 5,678.148 ft radius for fish < 102 g

Fish behavior impacts = 20,700.7 ft radius

Sea turtle behavior = 4459.831 ft radius

With a peak injury radius of that size, it is well within the 50 ft observation radius required by NMFS' Sea Turtle and Sawfish Construction Conditions; HOWEVER, the radius for injury to smaller fish (< 102 g; therefore, juveniles) is over 1 mile. That is concerning, as are the behavior impact radiuses.

Let me know if my calculations make sense and if you have additional questions.

Sarah

On Wed, Jan 27, 2021 at 10:28 AM Sarah Garvin - NOAA Affiliate <sarah.garvin@noaa.gov> wrote:
I was using the impact data for my analysis, because that is the installation method described in my current documentation for the proposed project. Thus, I did not go searching for vibratory numbers.

Let me see what I can find to help you out.

Sarah

On Wed, Jan 27, 2021 at 10:10 AM Gordon Murphy <gordon.murphy@threeoaksengineering.com> wrote:

Good morning Sarah.

We have been working with the acoustic tool this week and realized that there is no data for vibratory installation of 96" or 120" steel pipes in the Pile Driving Noise Data tab. Only impact data for these two sizes are in the spread sheet. Can you provide us with the data that you are using for your analysis?

Thanks again for your assistance.

Gordon

From: Sarah Garvin - NOAA Affiliate <sarah.garvin@noaa.gov>

Sent: Friday, January 22, 2021 9:16 AM

To: Gordon Murphy <gordon.murphy@threeoaksengineering.com>

Cc: Chris Beckham (BeckhamJC@scdot.org) <BeckhamJC@scdot.org>; Russell Chandler <russell.chandler@threeoaksengineering.com>

Subject: Re: SERO-2020-02072 US 278 Improvements

I am here for any questions!

And just one caveat about the tool: NOAA HQ is updating the national noise guidance and it's not yet been released, so the calculator may change at some point. What I sent is the current calculator; however it may change based on national policy. The goal is national consistency.

Thanks,
Sarah

On Thu, Jan 21, 2021 at 8:25 PM Gordon Murphy <gordon.murphy@threeoaksengineering.com> wrote:

Thank you Sarah.

I may have a question or two as we dive into the acoustic tool.

Take care,
Gordon

From: Sarah Garvin - NOAA Affiliate <sarah.garvin@noaa.gov>

Sent: Thursday, January 21, 2021 5:24 PM

To: Gordon Murphy <gordon.murphy@threeoaksengineering.com>

Cc: Chris Beckham (BeckhamJC@scdot.org) <BeckhamJC@scdot.org>; Russell Chandler <russell.chandler@threeoaksengineering.com>

Subject: Re: SERO-2020-02072 US 278 Improvements

Gordon --

I received your voicemail and I apologize for the late reply. I attached a copy of the noise calculator. I tried the link on our website and it did not work for me. Please let me know if the attached Excel file opens for you.

Thanks,
Sarah

On Thu, Jan 21, 2021 at 9:31 AM Gordon Murphy <gordon.murphy@threeoaksengineering.com> wrote:

Good morning Sarah.

As a follow up to the voicemail I left for you this morning, we are wondering what noise acoustic tool that you used for your noise level estimations for the US 278 project. Since your noise levels didn't match ours, we would like to re-run the tool with updated information received from the engineers. We used the GARFO acoustic tool, but noticed that the southeast office website has an acoustic tool available for download. However, we are not able to open the downloaded spread sheet and receive an error message about the file extension.

If the GARFO acoustic tool is not what we should be using, would it be possible for you to email the correct tool to us?

Thanks in advance,

Gordon Murphy

Senior Environmental Scientist
Three Oaks Engineering
1022 State Street
Cacye, SC 29033
(803) 447-0547



E: STATIONARY SOURCE: Impulsive, Intermittent

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isopleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	US 278 Corridor Improvements, Beaufort Co., SC - 24-inch Steel Piles
PROJECT/SOURCE INFORMATION	Data used to populate cells in Step 3 of this form was taken from the attenuated noise output from the SERO acoustic tool that was utilized to determine potential project effects on sturgeon and sea turtles under Section 7 of the ESA.
PROJECT CONTACT	The contractor will install 24-inch pipe piles to support temporary work trestles for bridge construction access in estuarine emergent wetlands adjacent to Mackay and Skull Creeks. The trestles will be built from the top down eliminating the need for temporary fill, timber mats, or barges in the wetland habitats for trestle construction access. A total of 400 piles will be required to support the 40-foot wide main trestle and 35-foot wide fingers. An impact hammer will be utilized in conjunction with wooden cushion blocks to install 4 to 5 piles per day. 800 strikes per pile is anticipated. Wooden cushion blocks and air bubble curtains will be used to mitigate the potential noise impacts.
PROJECT CONTACT	Shane Belcher (FHWA) - 803.253.3187

Please include any assumptions

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)[‡]	2	NMFS suggested default
--	---	------------------------

[‡] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 71), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD 12 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E2 if SEL-based source levels are not available.

E1: METHOD TO CALCULATE PK AND SEL_{cum} (SHOT/PULSE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

SEL_{cum}		PK	
Source Level (L_{E,p}, single ping/pulse/shot)	167	Source Level (L_{p,0-pk})	192
Activity Duration (hours) within 24-h period	5		
Number of pulses in 1-h period	800		
Propagation loss coefficient	15		
Number of pulses in 24-h period	4000		
10 log (number of pulses)	36.02		

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL_{cum} Threshold	183	185	155	185	203
PTS Isopleth to threshold (meters)	21.6	0.8	25.7	11.6	0.8
PK Threshold	219	230	202	218	232
PTS PK Isopleth to threshold (meters)	NA	NA	NA	NA	NA

"NA": PK source level is ≤ to the threshold for that marine mammal hearing group.

E: STATIONARY SOURCE: Impulsive, Intermittent

VERSION 2.2: 2020

KEY

	Action Proponent Provided Information
	NMFS Provided Information (Technical Guidance)
	Resultant Isoleth

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	US 278 Corridor Improvements, Beaufort Co., SC - 24-inch Pre-stressed Concrete Piles
PROJECT/SOURCE INFORMATION	Data used to populate cells in Step 3 of this form was taken from the attenuated noise output from the SERO acoustic tool that was utilized to determine potential project effects on sturgeon and sea turtles under Section 7 of the ESA. The contractor will install 24-inch pre-stressed concrete piles to support connector bridge between Jenkins and Hog Islands. A total of 32 piles will be required to support the connector bridge. An impact hammer will be utilized in conjunction with wooden cushion blocks to install 4 to 6 piles per day. It is anticipated that each pile would require 800 strikes to install to the proper depth. 800 strikes per pile is anticipated with 4 to 5 piles being installed each day. Wooden cushion blocks will be used to mitigate the potential noise impacts. Assume water is 5 meters deep. Noise reduction of 26 was used for wood cushion blocks.
PROJECT CONTACT	Shane Belcher (FHWA) - 803.253.3187

Please include any assumptions

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz) [‡]	2	NMFS suggested default
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[‡] Broadband: 95% frequency contour percentile (kHz); For appropriate default WFA: See INTRODUCTION tab

† If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 71), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

NOTE: METHOD 12 is PREFERRED method when SEL-based source levels are available (because pulse duration is not required). Only use method E2 if SEL-based source levels are not available.

E1: METHOD TO CALCULATE PK AND SEL_{cum} (SHOT/PULSE EQUIVALENT) PREFERRED METHOD (pulse duration not needed)

SEL _{cum}	
Source Level ($L_{E,p}$, single ping/pulse/shot)	149
Activity Duration (hours) within 24-h period	5
Number of pulses in 1-h period	800
Propagation loss coefficient	15
Number of pulses in 24-h period	4000
10 log (number of pulses)	36.02

PK	
Source Level ($L_{p,0-pk}$)	174

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS*

*Impulsive sounds have dual metric thresholds (SEL_{cum} & PK). Metric producing largest isopleth should be used.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
SEL _{cum} Threshold	183	185	155	185	203
PTS Isoleth to threshold (meters)	1.4	0.0	1.6	0.7	0.1
PK Threshold	219	230	202	218	232
PTS PK Isoleth to threshold (meters)	NA	NA	NA	NA	NA

"NA": PK source level is \leq to the threshold for that marine mammal hearing group.

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY							
	Action Proponent Provided Information						
	NMFS Provided Information (Technical Guidance)						
	Resultant Isopleth						

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	US 278 Corridor Improvements, Beaufort Co., SC - 72-inch Steel Casings						
PROJECT/SOURCE INFORMATION	Data used to populate cells in Step 3 of this form was taken from the attenuated noise output from the SERO acoustic tool that was utilized to determine potential project effects on sturgeon and sea turtles under Section 7 of the ESA.						
Please include any assumptions	The contractor will install 24 72-inch steel casings in Mackay Creek to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casing and seat it into bedrock if required. 3 hours (10,800 seconds) per casing to install; 2 casings installed per day						
PROJECT CONTACT	Shane Belcher (FHWA) - 803.253.3187						

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

Weighting Factor Adjustment (kHz)[‡]	2.5	NMFS default value					
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	195						
Number of piles within 24-h period	2						
Duration to drive a single pile (minutes)	180						
Duration of Sound Production within 24-h period (seconds)	21600						
10 Log (duration of sound production)	43.34						
Transmission loss coefficient	15						
Distance of sound pressure level (L_{rms}) measurement (meters)	10						

NOTE: The User Spreadsheet tool provides a means to estimate distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS						
	Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
	SEL_{cum} Threshold	199	198	173	201	219
	PTS Isopleth to threshold (meters)	4,167.2	369.3	6,161.2	2,533.0	177.8

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY							
	Action Proponent Provided Information						
	NMFS Provided Information (Technical Guidance)						
	Resultant Isoleth						

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	US 278 Corridor Improvements, Beaufort Co., SC - 72-inch Steel Casings						
PROJECT/SOURCE INFORMATION	Data used to populate cells in Step 3 of this form was taken from the attenuated noise output from the SERO acoustic tool that was utilized to determine potential project effects on sturgeon and sea turtles under Section 7 of the ESA.						
Please include any assumptions	The contractor will install 112 96-inch steel casings in Mackay and Skull Creeks to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours (180 minutes) to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casings and seat it into bedrock if required. Maximum of 2 casings installed per day.						
PROJECT CONTACT	Shane Belcher (FHWA) - 803.253.3187						

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)[‡]	2.5	NMFS default value					
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[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	195						
Number of piles within 24-h period	2						
Duration to drive a single pile (minutes)	180						
Duration of Sound Production within 24-h period (seconds)	21600						
10 Log (duration of sound production)	43.34						
Transmission loss coefficient	15						
Distance of sound pressure level (L_{rms}) measurement (meters)	10						

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS							
	Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
	SEL_{cum} Threshold	199	198	173	201	219	
	PTS Isoleth to threshold (meters)	4,167.2	369.3	6,161.2	2,533.0	177.8	

A.1: Vibratory Pile Driving (STATIONARY SOURCE: Non-Impulsive, Continuous)

VERSION 2.2: 2020

KEY							
	Action Proponent Provided Information						
	NMFS Provided Information (Technical Guidance)						
	Resultant Isoleth						

STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE	US 278 Corridor Improvements, Beaufort Co., SC - 120-inch Steel Casings						
PROJECT/SOURCE INFORMATION	Data used to populate cells in Step 3 of this form was taken from the attenuated noise output from the SERO acoustic tool that was utilized to determine potential project effects on sturgeon and sea turtles under Section 7 of the ESA.						
Please include any assumptions	The contractor will install 16 120-inch steel casings in Skull Creek to construct drilled shaft piers for the new US 278 bridge. It is anticipated that each casing will take 3 hours (180 minutes) to vibrate into the substrate until refusal. An auger will be used to remove sediment from the casings and seat it into bedrock if required. Maximum of 2 casings installed per day.						
PROJECT CONTACT	Shane Belcher (FHWA) - 803.253.3187						

Specify if relying on source-specific WFA, alternative weighting/dB adjustment, or if using default value

STEP 2: WEIGHTING FACTOR ADJUSTMENT

Weighting Factor Adjustment (kHz)[‡]	2.5	NMFS default value					
--	-----	--------------------	--	--	--	--	--

[‡] Broadband: 95% frequency contour percentile (kHz) OR Narrowband: frequency (kHz); For appropriate default WFA: See INTRODUCTION tab

[†] If a user relies on alternative weighting/dB adjustment rather than relying upon the WFA (source-specific or default), they may override the Adjustment (dB) (row 48), and enter the new value directly. However, they must provide additional support and documentation supporting this modification.

STEP 3: SOURCE-SPECIFIC INFORMATION

Sound Pressure Level (L_{rms}), specified at "x" meters (Cell B30)	192						
Number of piles within 24-h period	2						
Duration to drive a single pile (minutes)	180						
Duration of Sound Production within 24-h period (seconds)	21600						
10 Log (duration of sound production)	43.34						
Transmission loss coefficient	20						
Distance of sound pressure level (L_{rms}) measurement (meters)	10						

NOTE: The User Spreadsheet tool provides a means to estimates distances associated with the Technical Guidance's PTS onset thresholds. Mitigation and monitoring requirements associated with a Marine Mammal Protection Act (MMPA) authorization or an Endangered Species Act (ESA) consultation or permit are independent management decisions made in the context of the proposed activity and comprehensive effects analysis, and are beyond the scope of the Technical Guidance and the User Spreadsheet tool.

RESULTANT ISOPLETHS							
	Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds	
	SEL_{cum} Threshold	199	198	173	201	219	
	PTS Isoleth to threshold (meters)	653.0	106.1	875.5	449.5	61.3	



APPENDIX G

USFWS STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

STANDARD MANATEE CONDITIONS FOR IN-WATER ACTIVITIES

During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable.

All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). We recommend the following to minimize potential impacts to manatees in areas of their potential presence:

- All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at “no wake/idle” speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.
- If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.
- Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½ " X 11" reading language similar to the following: “CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSTRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT”. A second temporary sign measuring 8½ " X 11" should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: “CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION”.
- Collisions with, injury to, or sightings of manatees should be immediately reported to the Service’s Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

