

September 15, 2022

Southern Shores – Trinitie Trail Pipe Culvert Replacement Conceptual Study

Project Understanding

Based on information (previous reports and email correspondence) provided by the Client, the aluminum pipe arch culvert over Canvas Back Canal on Trinitie Trail in Southern Shores, NC has experienced significant settlement on the sides of the culvert leading to an uneven roadway surface and ponding water during rain events on the roadway above.

Following a field visit to the project site and in coordination with the Town of Southern Shores, Kimley-Horn has developed conceptual level structure and roadway plans for three (3) different alternatives to replace the existing pipe arch culvert. The alternatives that have been evaluated include a cast-in-place reinforced concrete flat slab bridge, a cored slab bridge, and a prefabricated buried arch structure. For each of the 3 alternatives, it is assumed that Trinitie Trail will be shut down to all vehicular traffic for the duration of construction. In addition to the schematic level plans, Kimley-Horn has also provided a memo describing the environmental constraints and necessary permits required to construct a new structure at this site, as well as a memo citing the utilities that are potentially in conflict with the proposed structure.

Kimley-Horn has prepared a conceptual level Opinion of Probable Construction Costs (OPCC) for each of the three (3) alternatives that are provided below with brief descriptions and list of assumptions for each alternative. Due to the volatile nature of construction materials and pricing, Kimley-Horn has no control over the cost of labor, materials, equipment, or the Contractor's means and methods of determining prices. Nor does Kimley-Horn have control over competitive bidding or market conditions. All opinions of probable construction costs are based on the information known to Kimley-Horn at the time provided and represent only Kimley-Horn's judgement as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from their Opinion of Probable Construction Costs.

Due to the conceptual level of analysis performed as a part of this task and in conjunction with the ever-volatile price and availability of construction materials and personnel, each of the below estimates also contain a contingency multiplier up to **40%**.

Alternative #1: Flat Slab Bridge

The flat slab bridge alternative will require permanent sheet pile wall with reinforced concrete coping on top to be driven directly outside the limits of the existing structure. These walls will extend the full length of the existing structure and tie to existing bulkheads both to the east and west of Trinitie Trail. Cast-in-place concrete end bent caps and turned back wingwalls will be used to support the surrounding soil at the begin and end bridge. Due to the nature of this type of construction, it is anticipated that the canal will be closed for a longer duration since the above water work will be more substantial than any of the other alternatives.

Opinion of probable flat slab bridge construction cost:

- Structures = \$675,000
- Roadway = \$295,000
- Potential Utility Relocation = \$50,000

Alternative #1 Anticipated Total Project Construction Cost = \$1,020,000

Alternative #2: Cored Slab Bridge

The cored slab bridge alternative will also require permanent sheet pile wall with reinforced concrete coping on top to be driven directly outside the limits of the existing structure. Similarly, these walls will extend the full length of the existing structure and tie to existing bulkheads both to the east and west of Trinitie Trail. Cast-in-place end bent caps and earth retaining wingwalls will be formed, poured, and stripped at begin and end bridge. It is anticipated that the end bent caps will need to be supported on deep foundations based on past performance of the existing structure. Construction of the precast cored slab superstructure will require crane operation and rigging coordination to pick and set each of the precast units. Note, it is anticipated that a shorter term shut down of the canal will be necessary to construct the cored slab bridge than would be necessary for the other alternatives.

Opinion of probable cored slab bridge construction cost:

- Structures = \$660,000
- Roadway = \$295,000
- Potential Utility Relocation = \$50,000

Alternative #2 Anticipated Total Project Construction Cost = \$1,005,000

Alternative #3: Precast Arch

The precast arch alternative will also require permanent sheet pile wall to be driven directly outside the limits of the existing structure. These walls will extend from the precast arch to the existing bulkheads both to the east and west of Trinitie Trail. Cast-in-place pedestal footings, pedestals, and earth retaining wingwalls and headwalls will be formed, poured, and stripped at begin and end bridge. It is anticipated that the pedestal and wingwall footings will need to be supported on deep foundations based on past performance of the existing structure. Construction of the precast arch will require crane operation and rigging coordination to pick and set each of the precast units. Note, it is anticipated that a shorter term shut down of the canal will be necessary to construct the precast arch than would be necessary for the flat slab bridge alternative.

Opinion of probable precast arch construction cost:

- Structures = \$1,020,000
- Roadway = \$300,000
- Potential Utility Relocation = \$50,000

Alternative #3 Anticipated Total Project Construction Cost = \$1,370,000



REPLACEMENT OF TRINITIE TRAIL CULVERT

AUGUST 23, 2022

ENVIRONMENTAL CONSTRAINTS

An environmental database evaluation was conducted for the proposed Replacement of Trinitie Trail Culvert project located in Southern Shores, Dare County, North Carolina. The project is located within the Pasquotank River Basin (US Geological Survey [USGS] 8-digit Hydrologic Unit Code (HUC): 03010205). The database evaluation conducted by Kimley-Horn revealed the following environmental constraints along the shoreline and stream banks adjacent to the existing aluminum pipe arch culvert (approximately 200 feet upstream and downstream of the culvert):

WATER RESOURCES

A review of recent NC Statewide Orthoimagery (2020), the NC Division of Water Resources (NCDWR) NC Surface Water Classification database/mapper, the 1:24,000 USGS Topographic Map, the US Fish and Wildlife Service (USFWS) National Wetlands Inventory, and the most recent Natural Resources Conservation Service (NRCS) Soil Survey for Dare County revealed one potentially jurisdictional feature within the project. Jean Guite Creek (Stream Index Number: 30-1-17; NCDWR Surface Water Classification: SC) is a stream likely to be considered subject to Clean Water Act protections enforced by the US Army Corps of Engineers (USACE) and the NC Division of Water Resources (NCDWR). No other potentially jurisdictional features were identified.

No Outstanding Resource Waters (ORW), High Quality Waters (HQW), water supply watersheds (WS-I or WS-II), Primary Nursey Areas (PNA), Permanent Secondary Nursery Areas, anadromous fish spawning areas, or Special Secondary Nursery Areas are located within the project.

In accordance with Section 303(d) of the Clean Water Act, states are required to develop a list of water bodies not meeting federal water quality standards or that have impaired uses. No streams within the project are listed on the North Carolina 2022 Final 303(d) List of Impaired Waters.

Jean Guite Creek is not designated by the USACE as a Navigable Water under Section 10 of the Rivers and Harbors Act. However, based on aerial imagery and recent site photographs, it appears that Jean Guite Creek is likely not a navigable water utilized by motorized watercraft. However, if the culvert is utilized by motorized watercrafts, then the project will likely be subject to Section 9 of the Rivers and Harbors Act. Coordination with the US Coast Guard is recommended to determine if Jean Guite Creek is considered navigable and subject to Section 9 of the Rivers and Harbors Act.

BUFFER RULES

Due to the location of the project within the Pasquotank River Basin, streamside riparian areas within the project are not subject to any state-regulated riparian buffer protection rules administered by the NCDWR.

COASTAL RESOURCES

As detailed in NC's Coastal Area Management Act (CAMA) administered by the NC Division of Coastal Management (NCDCM), Dare County is identified as one of the 20 coastal counties that are adjacent to, adjoining, intersected by, or bounded by the Atlantic Ocean or any coastal sound. There are two tiers within this boundary. The first tier is comprised of Areas of Environmental Concern (AECs) designated by the state. The second tier includes land uses with the potential to affect coastal waters, even though they are not defined as AECs. An AEC is an area of natural importance, and its classification protects the area from uncontrolled development.

According to the NC Division of Marine Fisheries (NCDMF) Descriptive Boundaries for Coastal-Joint-Inland Waters Map (June 1, 2013), Jean Guite Creek is designated as an inland fishing water (not an estuarine water) and is, therefore, likely to be considered a Public Trust AEC by the NCDCM. If Jean Guite Creek is classified as a Public Trust Water, the lands within 30 feet of the normal high water level of Jean Guite Creek are considered Coastal Shoreline AECs. No Coastal Wetland, Ocean Hazard, Public Water Supplies, or Natural and Cultural Resource AECs appear to be located within the project. However, due to the proximity of Jean Guite Creek to other estuarine waters and the Atlantic Ocean, consultation with the NCDCM is advised to determine the AEC's present within the project.

FLOODPLAINS

The FEMA Digital Flood Insurance Rate Map (DFIRM) panel 3720986700K (effective June 19, 2020) indicates there are 1% Annual Chance Flood Hazard areas (100-year floodplain) and 0.2% Annual Flood Hazard areas (500-year floodplain) along Jean Guite Creek within the project.

FEDERALLY PROTECTED SPECIES

As of August 23, 2022, the US Fish and Wildlife (USFWS) Information for Planning and Conservation (IPaC) website lists thirteen federally listed species protected under the Endangered Species Act (ESA) as known to occur within the project vicinity, including northern long-eared bat (NLEB), West Indian manatee, eastern black rail, piping plover, red knot, red-cockaded woodpecker (RCW), American alligator (SAT), green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, and seabeach amaranth. Bald eagle is also known to occur in Dare County and is protected under the Bald and Golden Eagle Protection Act (BGPA). A review of the NC Natural Heritage Program (NCNHP) element occurrence database records (updated July 2022) indicates that there are no known occurrences of any federally protected species within the project. However, the NCNHP database indicates one historical occurrence of shortnose sturgeon and one current occurrence of Atlantic sturgeon, West Indian manatee, loggerhead sea turtle, green sea turtle, and leatherback sea turtle within 1.0 mile of the project.

ESSENTIAL FISH HABITAT

The National Marine Fisheries Service (NMFS) has identified Jean Guite Creek as an Essential Fish Habitat for two fish species: bluefin tuna during the spawning, eggs, and larvae life stages and snapper grouper for all life stages.

CONSTRUCTION MORATORIUM

Based on a review of the NCDMF Interactive mapping, Jean Guite Creek is not designated as a Primary or Secondary Nursery Area. However, Bridge No. 17 on South Dogwood Trail (TIP# B-5417), located downstream of the current project, was subject to a PNA moratorium that extended from February 15 to September 30. Due to these conflicting determinations, coordination with NCDCM is recommended to determine if the project is subject to any construction moratorium.

CULTURAL AND HISTORICAL RESOURCES

A desktop assessment of the project using the North Carolina State Historic Preservation Office (NCSHPO) HPOWEB GIS Web Service database was performed on July 26, 2022. This review was undertaken in order to identify any known National Register (NR), Study List (SL), and/or Determined to be Eligible (DOE) for listing resources within the project. No NR, SL, or DOE resources were identified within the project.

ANTICIPATED PERMITTING

Due to potential impacts to Jean Guite Creek resulting from the culvert replacement project, it is anticipated that the project will qualify for authorization under a Section 404 Nationwide Permit (NWP) 3 or 18 or a Reginal General Permit (RGP) 198000291 from the USACE and an associated Section 401 Water Quality Certification (WQC) from the NCDWR. Project impacts that exceed the thresholds of a NWP or cannot meet the general and regional conditions of NWP or RGP will require an Individual Section 404 Permit. The final determination of permit applicability lies with the USACE.

If Jean Guite Creek is designated as a navigable water and, as a result, subject to Section 9 of the Rivers and Harbors Act upon coordination with the US Coast Guard, it is anticipated that a US Coast Guard Bridge Permit will be required for the proposed replacement of the large culvert. Should the new structure over Jean Guite Creek lower the vertical clearance within the navigable waters the US Coast Guard may require a navigation study to be conducted to study the use of the waterbody by watercraft over a 12-month period.

In addition, due to the location of the project in one of the 20 CAMA counties in North Carolina and the presence of AECs within the project, it is anticipated that the proposed project will likely require a CAMA General Permit. However, a CAMA Major Permit may be required if the NCDCM determines the project does not qualify for a CAMA General Permit. The final determination of permit applicability lies with the NCDCM.

MEMORANDUM

To: Town of Southern Shores
From: Nate Harvey, P.E.
Kimley-Horn and Associates, Inc.
Date: September 15, 2022
Subject: Trinitie Road Pipe Arch Replacement – Preliminary Utility Coordination

PRELIMINARY UTILITY COORDINATION FINDINGS

Kimley-Horn performed a site visit on 7/18/22, including representatives from the Town of Southern Shores and Dare County Water. We made visual observations and discussed previous relocation work with Dare County Water.

According to Dare County Water, the 6" water line was relocated when the culvert was last replaced. Its current alignment is to the east of the eastern end of the culvert where it was installed under the creek via directional drill.

Based on visual observations of adjacent telecommunications pedestals and electrical power transformers; and the minimal amount of cover between the culvert and the roadway pavement surface, it is most probable that the existing telecommunications and electrical power utilities were relocated when the culvert was last replaced, either to the west side of the west end of the culvert, or beneath the culvert.

Based on this site visit, replacement of the existing culvert with a bridge or new culvert is not anticipated to necessitate water utility relocations, provided the construction stays between the endpoints of the existing culvert. It is, however, possible that the pipe arch replacement will necessitate some level of electrical or telecommunications relocations.

Additional coordination with utility owners is recommended upon selection of the Town's preferred replacement for the existing culvert to determine whether or not conflicts exist and if relocations is necessary.

Please contact us with any questions or comments at 919-678-4083 or Nate.Harvey@kimley-horn.com