



STERLING

Strengthening Transportation Evacuation
Resilient Lifeline by Improving the Network's Grid

U.S. 64 OVER ALLIGATOR RIVER BRIDGE REPLACEMENT



MAY 2022



BASIC PROJECT INFORMATION

What is the Project Name?	US 64 over the Alligator River STERLING (Strengthening Transportation Evacuation Resilient Lifeline by Improving the Network's Grid) Project
Who is the Project Sponsor?	NCDOT
Was an application for USDOT discretionary grant funding for this project submitted previously?	(If Yes, please include project title and applicable grant programs) No
A project will be evaluated for eligibility for consideration for all three programs, unless the applicant wishes to opt-out of being evaluated for one or more of the grant programs.	<input type="checkbox"/> Opt-out of Mega? <input type="checkbox"/> Opt-out of INFRA? <input checked="" type="checkbox"/> Opt-out of Rural?

PROJECT COSTS

MPDG Request Amount	Exact amount in year-of-expenditure dollars: \$173,100,000
Estimated Other Federal funding (excl. MPDG)	Estimate in year-of-expenditure dollars: \$52,400,000
Estimated Other Federal funding (excl. MPDG) further detail	Other Federal funding from Federal Formula dollars: \$52,400,000 Other Federal funding being requested from other USDOT grant opportunities?: \$0 From What Program(s)?: N/A
Estimated non- Federal funding	Estimate in year-of-expenditure dollars: \$64,000,000 (State)
Future Eligible Project Cost (Sum of previous three rows)	Estimate in year-of-expenditure dollars: \$289,500,000
Previously incurred project costs (if applicable)	Estimate in year-of-expenditure dollars: \$5,100,000 (Authorized -State)
Total Project Cost (Sum of 'previously incurred' and 'future eligible')	Estimate in year-of-expenditure dollars: \$294,600,000



BASIC PROJECT INFORMATION

INFRA: Amount of Future Eligible Costs by Project Type

- 1) A highway freight project on the National Highway Freight Network: \$0
- 2) A highway or bridge project on the National Highway System: \$173,100,000
- 3) A freight intermodal, freight rail, or freight project within the boundaries of a public or private freight rail, water (including ports), or intermodal facility and that is a surface transportation infrastructure project necessary to facilitate direct intermodal interchange, transfer, or access into or out of the facility: \$0
- 4) A highway-railway grade crossing or grade separation project: \$0
- 5) A wildlife crossing project: \$0
- 6) A surface transportation project within the boundaries or functionally connected to an international border crossing that improves a facility owned by fed/state/local government and increases throughput efficiency: \$0
- 7) A project for a marine highway corridor that is functionally connected to the NHFN and is likely to reduce road mobile source emissions: \$0
- 8) A highway, bridge, or freight project on the National Multimodal Freight Network: \$0



BASIC PROJECT INFORMATION

Mega: Amount of Future Eligible Costs by Project Type	1) A highway or bridge project on the National Multimodal Freight Network: \$0 2) A highway or bridge project on the National Highway Freight Network: \$0 3) A highway or bridge project on the National Highway System: \$173,100,000 4) A freight intermodal (including public ports) or freight rail project that provides public benefit: \$0 5) A railway highway grade separation or elimination project: \$0 6) An intercity passenger rail project: \$0 7) A public transportation project that is eligible under assistance under Chapter 53 of title 49 and is a part of any of the project types described above: \$0 8) A grouping, combination, or program of interrelated, connected, or dependent projects of any of the projects described above: \$0
Rural: Amount of Future Eligible Costs by Project Type	N/A

PROJECT LOCATION

State(s) in which project is located	North Carolina
INFRA: Small or Large project	Large
Urbanized Area in which project is located, if applicable	None - the project connects the urban centers of Plymouth, NC to Manteo, NC. Plymouth is approximately 45 miles to the west of the project site and Manteo is 23 miles to the east.
Population of Urbanized Area (According to 2010 Census)	N/A
Is the project located (entirely or partially) in Area of Persistent Poverty or Historically Disadvantaged Community?	Yes, Census Tracts 37117970500 and 37065021200 are HDC only, Census Tracts 37117960100, 37187950100, 37187950200, 37117970100, 37117970200, 37117970600, 37065020800, 37065020900, 37065021000, 37065020300, 37065020400, and 37065020600 are listed as both APP and HDC
Is the project located (entirely or partially) in Federal or USDOT designated areas?	Yes. Opportunity Zones Census Tracts 37117960100, 37187950200, 37117970200, 37065020900, 37065021000, and 37065020400
Is the project currently programmed in the:	Yes.
• TIP	STIP Project No. HB-0001, Replace Tyrrell County Bridge Number 7 over the Alligator River;
• STIP	
• MPO Long Range Transportation Plan	Tyrrell County Comprehensive Transportation Plan (2012)
• State Long Range Transportation Plan	Dare County Comprehensive Transportation Plan (2015)
• State Freight Plan	

Contact: Greg Burns, PE
Eastern Deputy Chief Engineer

Email: gburns@ncdot.gov

Telephone: (919) 707-2512

Supplemental materials are available online at: <https://connect.ncdot.gov/resources/MPDG2022-Alligator/Pages/default.aspx>

UEI Number: XSN*A4TT1DY5



I PROJECT DESCRIPTION

II PROJECT LOCATION

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1. Safety
2. State of Good Repair
3. Economic Impacts+, Freight Movement, and Job Creation
4. Climate Change, Resiliency, and the Environment
5. Equity, Multimodal Options, Quality of Life
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I. PROJECT DESCRIPTION

The US 64 over the Alligator River STERLING (Strengthening Transportation Evacuation Resilient Lifeline by Improving the Network’s Grid) Project seeks Multimodal Project Discretionary Grant (MPDG) funds to allow the North Carolina Department of Transportation (NCDOT) to maintain critical connections to the Outer Banks by replacing the currently deficient Alligator River Bridge connecting Tyrrell and Dare Counties.

The replacement of the Alligator River Bridge is currently listed as State Transportation Improvement Program (STIP) No. HB-0001, but will be referred to as the Alligator River Bridge Replacement through this application.

The STERLING Project includes the Alligator River Bridge Replacement and will also provide much needed broadband access to thousands of North Carolina residents along US 64 from its intersection with I-95 to NC 12 on the Outer Banks. These improvements will not only benefit residents now, it will also

prepare northeastern North Carolina for automated/connected vehicles, improve hurricane evacuation times, and provide critical information to drivers, improving safety along the US 64 corridor.

The Benefit/Cost Ratio of the project is 1.50 with a total benefit of \$483,350,763 and a Net Present Value (NPV) of \$256,011,394 (\$2020).

1.1 TRANSPORTATION CHALLENGES AND SOLUTIONS

Roadway and Bridge Challenges

US 64 in eastern North Carolina is a vital transportation corridor critical for statewide mobility and regional connectivity. The facility is one of NCDOT’s Strategic Transportation Corridors (STCs). It is the only designated expressway in the area and is a primary east-west route to northeastern North Carolina between I-95, US 17 and the Outer Banks. It is also a critical connection for residents of Tyrrell and Dare Counties and is used to access jobs, medical facilities, and other goods and services. One of only two US routes



Figure 1 : STERLING Project Area



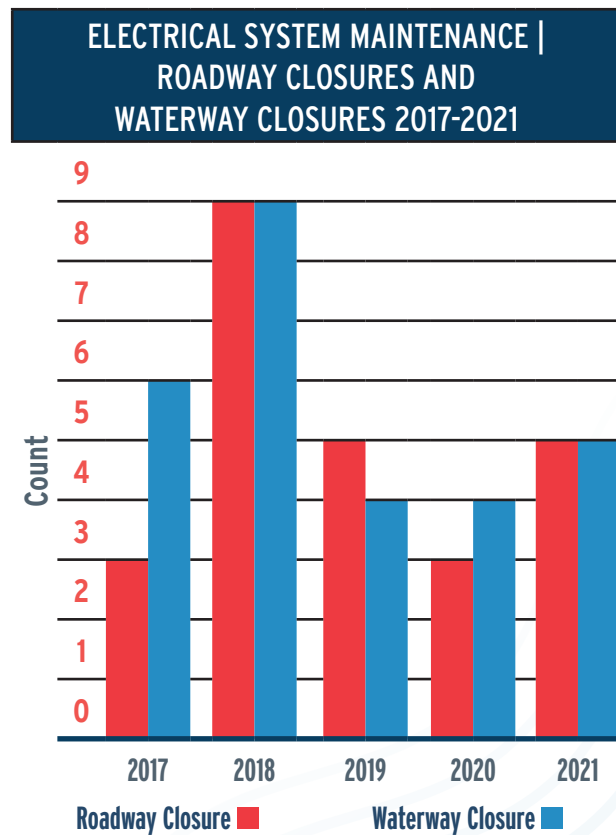
to the Outer Banks, the US 64 highway carries traffic that is heavily used by tourists during specific seasons of the year and is a designated hurricane evacuation route.

On July 18, 2020, the Washington (NC) Daily News reported Tyrrell County’s worst traffic jam. The location of the jam was the US 64 highway as a result of a crash on the alternate US 158 route to the Outer Banks using the Wright Memorial Bridge. The Wright Bridge closing during peak vacationing season, coupled with the five-to-seven bridge openings of the movable span at the US 64 Alligator River bridge during the event, led to an 18-mile backup of nearly 2,000 cars to use the Alligator Bridge. The event is indicative of the importance of the route and the bridge.

The state of North Carolina understands the importance of maximizing the safety of residents and tourists visiting the Outer Banks, especially during tropical system events. In 2005, the North Carolina General Statute 136-102.7 set a “goal” of 18 hours for the evacuation travel clearance time for the Outer Banks based on a 24-hour warning and watch timeframe. In 2019, NCDOT developed the “Proposed US 64 Corridor Improvements Hurricane Evacuation Reevaluation” report, which is included in the project supplemental materials. The report indicated that, despite an increase of the goal to 30 hours due to better hurricane forecasting, the US 64 clearance time for the 2040 no-build alternative was 34.2 hours. While the proposed Alligator River Bridge Replacement does not increase lane capacity, it does eliminate the potential issue of the movable bridge conflict and potential maintenance issue through the use of a modern two-lane, high-level,

fixed-span bridge over the Intracoastal Waterway (ICW) .

The above discussion highlights challenges with the current facility during normal operations. However, as the facility has aged, it often fails to achieve normal operations. As shown in the figure below, multiple roadway and waterway closures for electrical system maintenance have been reported each year since 2017.



While the average delay for electrical closures is approximately 2 hours, delays of up to 36 hours have been reported. These closures have a substantial impact on the traveling community. When the bridge is unavailable, a detour of over 90 miles is required, as shown in the map on Figure 2.

Roadway and Bridge Solutions

The proposed bridge replacement features a high rise, fixed span (non-movable)

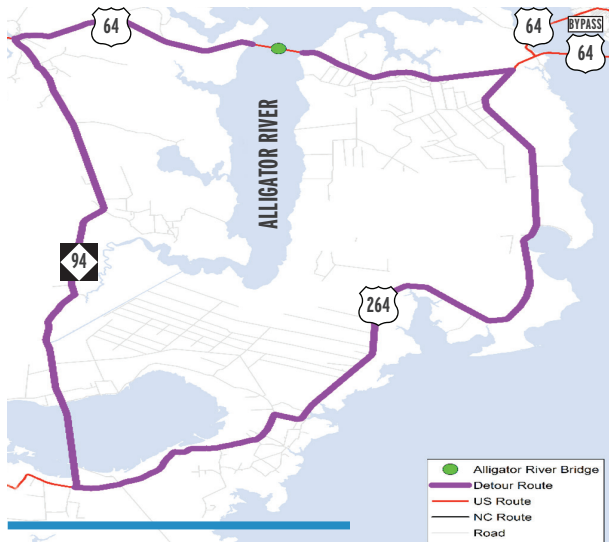


Figure 2: Alligator River Detour Route

of Engineers Wilmington District. Based on the preliminary design, the bridge typical section will carry two 12-foot lanes with eight-foot shoulders for a clear width of 40 feet. The railing height will be increased to four feet, six inches and is suitable for bicycle traffic on the paved shoulders. The bridge will consist of 134 spans of lengths varying from 80 feet to 170 feet over the dedicated channel with a total length of 3.32 miles. The navigation channel is currently located toward the western terminus of the bridge, approximately 6,600 feet from the end bent. Precast, prestressed concrete beams with a cast-in-place concrete deck will comprise the superstructure.

arrangement. Based on coordination with the US Coast Guard, the new bridge is proposed to include a horizontal clearance of 140 feet and a vertical clearance of 65 feet for the navigational channel of the river, as delineated by the US Army Corps

All precast piles and cast-in-place concrete in the substructure will utilize carbon fiber reinforcement to eliminate rebar corrosion. The table below highlights the difference

BRIDGE FEATURE	EXISTING BRIDGE	PROPOSED BRIDGE
Intersection Type	“At Grade” with signal control	“Grade Separated” with continuous flow - no stopped conditions
Bridge Type	Machinery driven movable span	High rise fixed span
Main Span Materials	Fracture critical, steel through girder system with filled grid deck	Redundant precast, prestressed concrete girders with precast deck panels with composite concrete deck
Vertical Clearance to Navigation Channel	14 feet in closed position; Unlimited in open position	65 feet to fixed span
Horizontal Clearance for Navigation	Two 100-foot clear channels	One 140-foot clear channel
Bridge Protection from Vessel Collision	Wooden fenders at pivot and rest piers only	AASHTO designed waterline footings for vessel criteria
Clear Roadway Width	26 feet: two 12-foot lanes with 1-foot shoulders	40 feet: two 12-foot lanes with eight-foot safe shoulders with bicycle access
Railing	Substandard “corral” rail with a 2 feet, 10 inch height from deck	Crash tested vehicular/bicycle safe four feet, six inch height; the proposed railing complies with the Manual for Assessing Safety Hardware (MASH).
Corrosion Resistance	No significant criteria known	Concrete additives, low water to cement ratios, epoxy rebar in superstructure, carbon fiber bars in substructure



between the existing facility and the STERLING Project design.

The entire bridge replacement, including some realignment of US 64, will be constructed on a new location approximately 4.6 miles in length and slightly north of the existing alignment (See Figure 3). The preferred alternative selected was a result of the investigation of six alternatives and is considered the Least Environmentally Damaging Practicable Alternative. The alignment shift allows for continued use of the existing bridge during construction. In addition, the offset precludes interference of the swing span operation, permitting waterway traffic to be unimpeded. The distance from the existing bridge, however, will prevent construction access to the new bridge from the existing bridge.

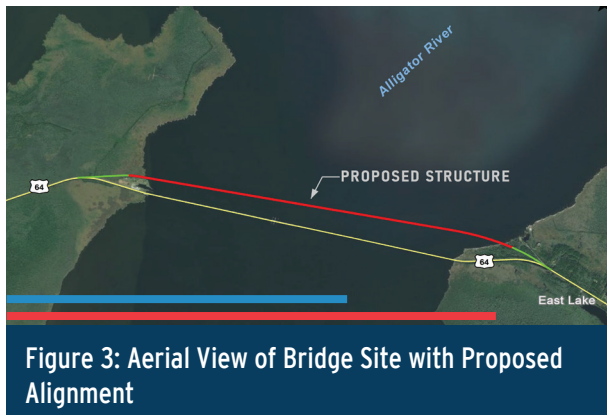


Figure 3: Aerial View of Bridge Site with Proposed Alignment

Technology Challenges

Historically, there have been many challenges facing those in northeastern North Carolina. This includes barriers to educational opportunities. Based on EJSscreen data (provided in the supplemental information), fewer than 10 percent of area residents have a college degree and over 10 percent lack a high school diploma. These factors limit occupational opportunities for many residents.

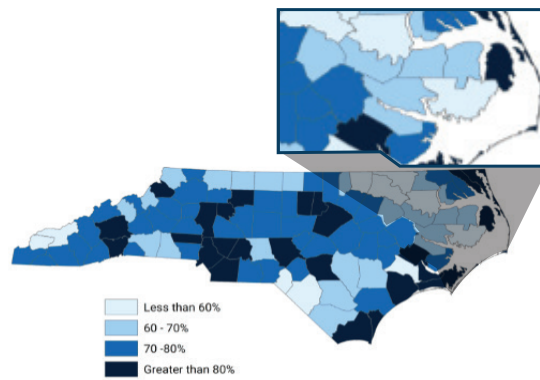
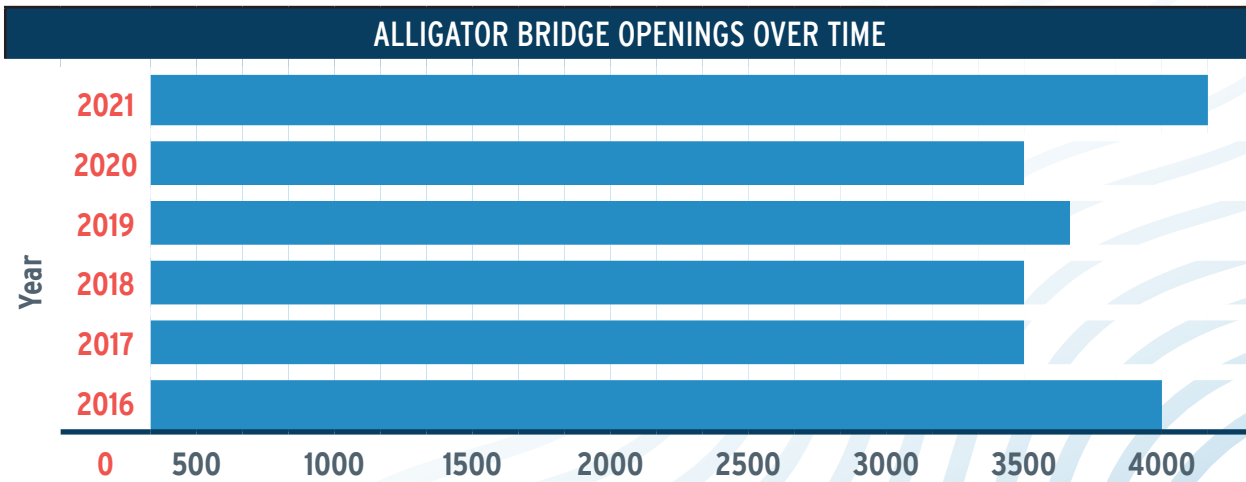


Figure 4: Percent of households with Broadband Access by County

In addition, EJSscreen data noted that for most of the corridor, projected losses of agricultural land, buildings, and population are almost all in the top 80th percentile





for US residents. These factors further amplify the need to increase information access. It is likely that farming will become even more challenging than is currently the case while both droughts and tropical systems will be more frequent. In the absence of change, the loss of agricultural jobs will increase population loss as area residents face diminishing opportunities.

Most of the US 64 corridor lacks ITS access. This limits the ability of the system to provide the needed information required for automated connected vehicles and limits information to area drivers with regards to potential hazards.

Technology Solutions

The STERLING Project provides the needed broadband infrastructure to increase access to information, training, and employment opportunities that are vital as these communities deal with population decline and the effects of climate change. Based on data from the Brookings Institute, "Increasing access and usage of broadband infrastructure in rural areas (and the amenities, digital skills, online education, and job search opportunities that come with it) lead to higher property values, increased job and population growth, higher rates of new business formation, and lower unemployment rates." A more competitive labor force will serve to increase employment opportunities, potentially reducing the projected population loss and maintaining these communities.

Broadband will also allow upgraded ITS infrastructure to warn drivers about hazards, from fires to floods and hurricanes. It will allow for high wind warnings and improve the efficiency of hurricane evacuations.

Funding Challenges

North Carolina DOT funds capital improvement projects through a data driven process based on the Strategic Transportation Investments (STI) Law, passed in 2013 by the NC Legislature. The STI Law establishes a prioritization framework and funding constraints for the State Transportation Improvement Program (STIP). Per the STI Law, state highway trust funds and federal aid monies are split into three categories; 40% Statewide Mobility, 30% Regional Impact, and 30% Division Needs to address needs-based improvements across all six modes of transportation (highway, aviation, bike-pedestrian, ferry, rail, and public transportation). The Statewide Mobility category is intended to address significant congestion and bottleneck locations on major corridors (like Interstates and National Highway System routes), whereas the Regional Impact category is envisioned to improve the connectivity within smaller regions of the state. The Division Needs category is specifically focused on addressing localized needs and concerns.

It would be difficult to fund this project through the traditional STI funding mechanism. The Bridge project is eligible for funding at the Statewide Mobility funding category and would compete for funding with all other projects at that funding tier across the State. This is a highly competitive funding bracket - where historically only the top 20 percent of projects are funded and this project would likely not receive funding at this level. The remainder of the projects cascade down to be considered at the Regional Impact and (possibly the Division Needs) funding categories. Even if funded at the Regional Impact level, at an estimated replacement cost of approximately \$268 million, this project would consume approximately



half of the entire funding apportioned for the next 10 years and would take up an even larger portion of the Division Needs allocation. Under the STI law, there is funding for alternate criteria projects, which is how bridge replacement projects are typically funded in the STIP. Generally speaking, approximately \$150 million per year is appropriated towards bridge replacements across the state. These funding limits make advancing the STERLING Project for construction impractical without additional federal funds, given current structure replacement needs of the state.

Funding issues also plague North Carolina as it works to upgrade the transportation network to meet the changing information needs of automated/connected vehicles and other renovations that freight carriers and the traveling public will rely on in the years ahead.

Funding Solution

The ability to use MPDG funds to offset some of the substantial costs of STERLING will expedite replacement of the Alligator River Bridge and offer a substantial reduction of future operations and maintenance costs for NCDOT. Without these funds, another stop-gap renovation of the aging structure will be required in two-to-three years.

1.2 PROJECT HISTORY

The existing bridge, Tyrrell County Bridge #7 (Lindsay C. Warren Bridge), was constructed in 1960 as a 2.83 mile long, movable swing span bridge over the Alligator River and ICW. The ICW is a 3,000-mile inland waterway running from New Jersey to Texas through natural waterways and artificial canals. The ICW provides a navigable route for waterway commerce without many of the hazards

of travel on the open sea. Nearly two million tons of cargo pass through North Carolina's portion of the ICW a year. The Alligator River Bridge swing span provides a 14-foot vertical clearance in the closed position and unlimited clearance in the open position to navigation. The bridge was considered to be a state-of-the-art structure when it opened to traffic.

Accommodating both roadway and waterway traffic requires many openings of the structure each day. As shown in the figure above, between 3,000 and 4,000 openings of the bridge have taken place each year since 2016.

The existing bridge consists of 342 approach spans, each approximately 50 feet in length, and a 261-foot swing span providing two 100-foot horizontal clear channel spans for navigation when open. The typical section of the bridge carries two 12-foot lanes and one-foot shoulder with a clear width of 26 feet. The approach spans consist of a cast-in-place concrete slab on precast, prestressed concrete girders. The barrier rails are cast-in-place "corral" style with a two-foot height above a 10-inch curb section. The swing span consists of two steel through plate girders with a floor beam and stringer system. The deck is a four-inch thick concrete-filled steel grating. Due to the lack of redundancy in this superstructure type, the span is considered fracture critical - fracturing of the through girders could result in immediate collapse. The substructure of the bridge consists of precast concrete piles and cast-in-place concrete bent caps. The pivot pier and rest piers are protected against minor vessel course deviations by a wooden fender system. The machinery used for the bridge was generally site-specific. Repairs have required specially made parts which leads



to long closures of the bridge to highway traffic.

Replacement of this facility is critical due to its deteriorated state and safety concerns. In 1999, NCDOT initiated a feasibility study to replace the project bridge. The bridge is now classified as structurally deficient. The term indicates a structure is in overall poor condition and/or has an unsatisfactory load carrying capacity, but does not mean the structure is unsafe. The sufficiency rating of the bridge in the 2020 inspection report is 31.71 out of 100. In November of 2019, a \$17,000,000 major rehabilitation project allowed for the continued use of the bridge for an estimated seven-year duration before the next major rehabilitation. The bridge rehabilitation included an extensive pile jacketing operation, deck resurfacing and machinery repair to allow the bridge to remain open.

1.4 PROJECT'S PLACE IN THE GRAND SCHEME OF OTHER INFRASTRUCTURE INVESTMENTS

While the STERLING Project is the largest project in the vicinity of the Alligator River, other projects, including Mann's Harbor, Albemarle Sound and Pirate's Cove projects are currently under development.



Figure 5: Rehabilitation of Bridge Included Pile Jacketing

1.3 PREVIOUSLY INCURRED COSTS

NCDOT reports that previously incurred costs for the STERLING Project are approximately \$1,832,730. These costs pertain to preliminary engineering and environmental analyses.



II. PROJECT LOCATION

The STERLING Project is located on US 64, the main route between the Outer Banks of North Carolina and the I-95 Corridor and includes broadband improvements as well as the replacement of the Alligator River bridge. US 64 is a part of the National Highway System. Located in the northeast portion of North Carolina, the bridge connects the urban centers of Plymouth, NC and Manteo, NC. Plymouth is approximately 45 miles west of the project site and Manteo is 23 miles to the east. The bridge is a commuter route to employment from the historically disadvantaged community (HDC) of Tyrrell County, Census Tract 9601. Tract 9601 is also listed as an Area of Persistent Poverty (APP). Both census tracts in the project study area are listed as Opportunity Zones. On the east side of the facility is Dare County Census Tract 9705.01, which is not listed as either an APP or HDC.

Tyrrell County is listed by the US Census as 0 percent urban, while Dare County is listed as 7.1 percent urban based on population. Goods and services, as well as most of the vacationers traveling to the Outer Banks, traverse this critical route. US 64 is one of two routes serving the Outer Banks and provides a key hurricane evacuation byway.

The bridge crosses the ICW, a key economic driver for the Atlantic and Gulf Coast. The ICW is part of the National Multimodal Freight Network. Local North Carolina commercial users of the ICW include Nucor Steel, a Fortune 500 Company and MiTek, a Berkshire Hathaway company. Nucor Steel, Cofield Plant is one of three steel mills producing steel plates for uses including railroad tank cars, bridge plate girders and armored personnel carriers. Located north of

the Project site on 900 acres along the Chowan River, Nucor receives scrap metal via barge pushed by tugs from the Port of Wilmington located south of the Project site via the ICW. MiTek is in Edenton, NC northwest of the Project along the Albemarle Sound at the mouth of the Chowan River. The company manufactures truss plates and other metal fabrications for the building industry. Like Nucor, MiTek relies on barges from Wilmington for raw materials.

The proposed broadband improvements for the STERLING Project serves to meet USDOT's Justice40 goals. As shown in the enclosed supplemental information, of the 23 census tracts on US 64 between I-95 and NC 12, 12 are listed as HDCs and 11 are listed as APPs. In terms of total population, of the 94,035 residents along the US 64 corridor, 47,430 (50.4 percent) live in census tracts that are listed as HDC and APP and 55.7 percent (52,405) live in HDC census tracts.



III. PROJECT PARTIES

The official application of this request for funding through the MPDG Program, NCDOT, will be coordinating with the US Department of Transportation (USDOT) and The Federal Highway Administration (FHWA) to ensure that all federal and state guidelines and requirements are met, that the STERLING Project remains consistent with state and regional planning and transportation objectives.

NCDOT is responsible for HB-0001 project financing. NCDOT Division 1 is responsible for construction management and oversight, which includes overseeing the STERLING Project’s Construction Engineering and Inspection (CEI) firm.

As part of the preliminary engineering work for the project, NCDOT has prepared a Navigation Impact Report and Vessel Impact Study. These items are in conjunction with the permitting

improvement provisions found in the 2014 Memorandum of Understanding between the U.S. Coast Guard, the Federal Highway Administration, the Federal Transit Administration and the Federal Railroad Administration requiring applicants with Department of Transportation-funded projects to prepare a navigation impact report in order to analyze the navigational impacts of the bridge design alternatives. The navigation report was prepared in accordance with the appropriate federal regulations and United States Coast Guard requirements for the purpose of obtaining Coast Guard concurrence with the proposed horizontal and vertical clearances for the project.

Additional letters of support for the STERLING Project from area communities, businesses and organizations are also on file.



Figure 6: Outer Banks Evacuation Routes (In Red)



IV. GRANT FUNDS, SOURCES, AND USE OF ALL PROJECT FUNDS

The STERLING project compliments current state law regarding NCDOT's capital program and will provide positive financial benefits. The Strategic Transportation Investment Act of 2013 requires all capital projects to go through a data-driven prioritization process. Current anticipated costs are \$69,100,000 in state funds, \$52,400,000 in other federal funds (Bridge Formula Program) and \$173,100,000 in MPDG funds.

As detailed in the cost summary below, the state share for the replacement of the Alligator River Bridge is 20 percent, while the Federal share is 80 percent. For the proposed broadband improvements, the proposed cost share is 40 percent state funds and 60 percent Federal funds.

A functional cost estimate was completed in June of 2021 and updated in May of 2022. The highway construction estimate of \$262,000,000 included a combined contingency cost for structures, and roadway of \$34,244,000 - a contingency

cost of approximately 15% of the construction cost. Utility costs and right-of-way costs were not included in the functional estimate but have since been completed separately. NCDOT utility and right-of-way costs were estimated in May of 2021 to be approximately \$500,000 each. The engineering cost for the project has been contracted at \$5,100,100 and approximately \$1,896,543 has been spent to date. Due to the large size of the project and the relative minor cost of the design, right-of-way and utilities, NCDOT will pay for these costs in their entirety without requesting Federal funds. The projected costs are shown in the Cost Table below.

STERLING PROJECT PROPOSED FUNDING				
Item	State Funds	Other Federal Funds	MPDG Funds	Total Funds
Alligator River Bridge Design	\$5,100,000	\$0	\$0	\$5,100,000
Right-of-Way	\$500,000	\$0	\$0	\$500,000
Utilities	\$500,000	\$0	\$0	\$500,000
Highway Construction	\$52,400,000	\$52,400,000	\$157,200,000	\$262,000,000
Broadband/ITS Construction	\$10,600,000	\$0	\$15,900,000	\$26,500,000
Total	\$69,100,000	\$52,400,000	\$173,100,000	\$294,600,000



V. PROJECT OUTCOME CRITERIA

As the following discussion will demonstrate, the STERLING Project aligns with USDOT’s Project Outcome Criteria. The information included is based on the technical memoranda and the Benefit Cost Analysis (BCA) material included in the supplemental information, with references as appropriate.

CRITERION 1 - SAFETY

The existing Alligator River Bridge has known safety issues, as documented in a 2022 highway crash analysis, summarized below. As many of those traveling over this section of US 64 are tourists, motorists may not anticipate bridge closings. This contributes to the overall accident rate of the facility. Of the crashes analyzed, 10 took place between the eastbound bridge stop arm and the westbound bridge stop arm, with two crashes into the bridge tender house and one on the draw bridge itself.

After a review of multiple Crash Modification Factors (CMFs) from the CMF Clearinghouse, it was determined that a 3 percent reduction in crashes for the STERLING Project

is a reasonable estimate based on CMF ID 8336 for the bridge replacement and improvement of the multiple sub-standard features being revised to meet current standards. The increased shoulder width and rail height also serve as a safety benefit to bicyclists. In addition to improvements at the Alligator River Bridge, the STERLING Project also provides increased safety through the installation of broadband and associated ITS infrastructure. Total Safety Benefits are \$214,500,000 with a Net Present Value (NPV) of \$55,000,000.

CRITERION 2 - STATE OF GOOD REPAIR

The STERLING Project modernizes a critical piece of infrastructure that is currently at the end of its useful design life. The Alligator River Bridge is specifically mentioned in the June 2021 North Carolina Transportation Asset Management Plan (TAMP), which is included in the supplemental materials. It is noted that repairs to the facility were required after damage suffered due to Hurricane Matthew, which damaged the fender walkway, and Hurricane Isabel, which damaged the motors on the bridge. The plan recommends replacing the current facility with a fixed span structure. Without MPDG funds, another expensive renovation of the existing facility will be

ALLIGATOR RIVER BRIDGE HIGH LEVEL CRASH SUMMARY		
Crash Type	Number of Crashes	Percent of Total
Total Crash	46	100.00
Fatal Crash	1	2.17
Non-Fatal Injury Crash	14	30.43
Total Injury Crash	15	32.61
Property Damage Only Crashes	31	67.39
Night Crashes	10	21.74
Wet Crashes	8	17.39

required within the next two-to-three years.

The proposed fixed span bridge will not require the maintenance intensive swing-span system required by the current facility to accommodate boat traffic. Even in a harsh coastal climate, it is anticipated that the new facility will require minimal maintenance over the next 100 years.

NCDOT developed a Vessel Collision Risk Assessment Report for the Replacement of the Alligator River Bridge in January 2022 (enclosed in the supplemental materials). Using the Method II analysis procedures from the 2020 AASHTO LRFD Bridge Design Specifications, an analysis was conducted to determine the design vessel impact forces for the proposed substructure units of the replacement bridge in the event of a vessel collision. The following three vessel collisions scenarios were evaluated:

- Case 1: A full vessel impact under normal waterway conditions to achieve a minimum return period of 10,000 years (critical bridge)
- Case 2: A drifting empty barge impact under 100-year storm event conditions
- Case 3: A minimum design impact of an empty hopper barge drifting at the yearly mean current speed

The estimated design impact loads based on the above evaluation shall be used in the final design of the replacement bridge.

To avoid corrosion in the critical elements of the new bridge, the precast piles and substructure concrete will be reinforced with Carbon Fiber Reinforced Polymer (CFRP) prestressing strand and rebar. Alligator River is located in a highly corrosive area which has significantly affected the life of the existing structure. In 2016, NCDOT, in conjunction with tNorth



Figure 7: Alligator River Maintenance



Carolina State University, has documented the benefits of CFRP prestressing strands as an effective and sustainable strand material. The significant improvement to conventional strands is the replacement of a steel strand with a non-corroding composite material. The same benefit is achieved with replacing steel rebar with CFRP reinforcing. NCDOT used CFRP on a pilot project in nearby Carteret County and has monitored and positively assessed the strands and reinforcing through its annual National Bridge Inspection Standards Program.

In addition, the design includes many features to withstand highly corrosive conditions, including: concrete additives, increased rebar cover, reduced girder stresses, precast deck panels, low water cement ratios and all epoxy coated steel in deck. The replacement of the Alligator River Bridge will create \$71,200,000 in savings with a NPV of \$24,700,000.

CRITERION 3 - ECONOMIC IMPACTS, FREIGHT MOVEMENT, AND JOB CREATION

The STERLING Project will reduce wait times for travelers on US 64. The bridge closes on average 10 times per day with an average closing duration of 8 minutes. Overall, bridge closings accounted for 18,461 minutes of delay in 2019 and 14,773 minutes of delay in 2020. These delays waste fuel, increase emissions, and impede the reliable flow of traffic. Travel time savings benefits were estimated using total travel time saved by autos and trucks at a value of \$17.80 per hour for passenger vehicles, \$32.00 per hour for trucks. This travel time savings offers a savings of \$78,000,000 with a NPV of 20,200,000.

The STERLING project will help increase the dependability of transportation options for workers living in Tyrrell County who work in Dare County. Currently, travelers

have to account for boat passage in their daily commutes; additionally, they are at risk when issues with the bridge opening/closing mechanism cause unanticipated delays. When the current facility breaks down, traffic is diverted via NC 94 to US 264 back to US 64, increasing the distance traveled from 28 miles to over 90 miles. Based on NCDOT statistics included in the supplemental information, each day of diversion costs approximately \$182,366 dollars for trucks and cars.

Because there are only two routes to access the Outer Banks, substantial congestion and delay is possible even when the Alligator River Bridge is functioning normally. On July 18, 2020, eastbound lanes of US 64 were blocked in what the Washington Daily News called, "The worst traffic jam ever in Tyrrell County...The eastbound lanes of U.S. 64 were blocked, with vehicles bumper to bumper, as thousands of tourists and others sought to get to the Outer Banks. The likely causes of the blockage were:

1. A heavy volume of beach-bound traffic on the season's hottest weekend – the thermometer hit 94 in mid-afternoon
2. The bottleneck of a 28-mile stretch of two-lane highway between Columbia and Manns Harbor, where the "slow man rules"
3. The Alligator River drawbridge astride the busy Atlantic Intracoastal Waterway.

But perhaps the biggest contributor was a five-vehicle collision on the Wright Memorial Bridge over Currituck Sound about 11 a.m. Saturday that closed the eastbound lanes for three hours and backed up traffic for 10 miles, as The Virginian-Pilot reported. The stoppage prompted many Outer Banks visitors from Tidewater Virginia and points north to try to reach the sand and surf via the nearest



alternative route – U.S. 64 through Columbia.” The newspaper reported that the Alligator River bridge opened to boat times during the six-hour traffic jam, with closures ranging from six to 12 minutes. The newspaper estimated that as many as 2,000 vehicles were trapped in the congestion as any given moment.

Although the replacement of the Alligator River bridge will not add capacity to the system, it will provide increased reliability and will eliminate closures for boat passage, providing much greater reliability to stakeholders using US 64.

The STERLING Project will include fiber optic cable and ITS improvements along the US 64 corridor. Fiber optic cable and ITS benefits were estimated to provide savings and reliability benefits worth \$72.6 million, with a NPV in 2020 dollars of \$18 million. In addition to these benefits, it is anticipated that the increase in broadband accessibility will lead to some increase in property values in along the US 64. According to Applied Economics (2019), “Results show that single-family homes with access to a 25 Mbps broadband connection have a price that is about \$5,977, or 3%, more than similar homes in neighborhoods with 1 Mbps. The rural premium is lower at \$5,099.

The current design minimizes impacts to a marina/convenience store located at the northwest corner of the project and minimizes impacts to the Palmetto-Peartree Preserve (PPP). The PPP is a 10,000-acre facility that serves as an endangered species mitigation bank for the Red Cockaded Woodpecker (RCW) and provides habitat for red wolves, black bears, bobcats and more than 100 migratory bird species. Development of PPP was funded by NCDOT. The STERLING Project minimizes impacts to the Alligator River National Wildlife Refuge along the

project’s southern boundary. The refuge was established in 1984, to protect rare pocosin wetlands and associated wildlife.

The project will improve wildlife habitat connectivity between the north and south areas of the roadway. Wildlife crossing structures and directional barrier fences will be provided to accommodate smaller wildlife. Large wildlife crossings were created by extending the bridge end spans to allow passage adjacent to the riverbank areas and providing directional fencing. Provisions will help to eliminate vehicular animal strikes and increase the permeability of the roadway for the wide diversity of wildlife in the area.

CRITERION 4 - CLIMATE CHANGE, RESILIENCY, AND THE ENVIRONMENT

Because the STERLING Project removes delays associated with bridge closings without adding capacity to the current system, the project will achieve substantial emissions reductions over the life of the facility. Removing requirements for boat passage will allow for substantive reductions in greenhouse gas (GHG) emissions. NCDOT reviewed closing data from 2019 and 2020 to examine emissions for the current structure as well as the savings anticipated by replacing the bridge. The review included average numbers of bridge closings, number of cars delayed, and average delay caused by the closure. The review targeted the median month for bridge closures and openings. Reduction of emissions has a savings of \$7,400,000 with a NPV of \$2,600,000.

Residents of the North Carolina Outer Banks are well aware of the impacts of rising sea levels and climate change. For example, the Town of Nags Head partnered with North Carolina Sea Grant to work with community members to better



understand the town's vulnerabilities to coastal hazards, including sea level rise. Dr. Jessica Whitehead, formerly with North Carolina Sea Grant, led a team to implement the Vulnerability Consequences and Adaptation Planning Scenario (VCAPS) tool in an open public planning process. VCAPS is intended to engage community members and seek their input on potential coastal hazards, such as sea level rise.

Based on information and outcomes from the VCAPS process, the town established a Coastal Resiliency and Sea Level Rise Committee in 2016. This committee reviewed the VCAPS diagrams and worked to consolidate and prioritize over 160 possible adaptation actions suggested by the public into a report.

The adaptation actions related to sea level rise and other coastal hazards were broken into four main categories: ocean management, estuarine shoreline management, stormwater management and water (ground/surface) management. These adaptation actions developed through community involvement formed the foundation for policy in the town's comprehensive plan.

An EJS SCREENING Beta tool evaluation was conducted to review potential issues. The Tyrrell County Census Tract 37177960100 was listed as qualifying as disadvantaged; the Dare County Census Tract 37055970501 was not. Both counties were listed in the highest 98th percentile or greater for expected building loss rate and expected population loss rate. Both counties had more than 90 percent of the population that lacked a higher education degree. Tyrrell County was listed in the highest 95th percentile for energy burden and exceeded the top 70th percentile for occurrences of asthma, diabetes and heart disease. Improving the connection between Tyrrell and Dare Counties will

improve not only access to employment, goods, and services, it also improves active transportation options.

To limit the impacts of climate change and its disproportionate effects on historically disadvantaged communities, North Carolina Governor, Roy Cooper, signed Executive Order (EO) 80 North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy, on October 29, 2018. EO 80 called for cabinet agencies to develop State Climate Risk Assessment and Resiliency Plans that support communities and sectors of the economy most vulnerable to the effects of climate change and to enhance the State's ability to protect human life and health, property, natural and built infrastructure, cultural resources and other public and private assets of value to North Carolinians. In response to EO 80, the North Carolina Department of Environmental Quality (DEQ) enlisted subject matter experts to provide the current state of climate science and change, documented in the North Carolina Climate Science Report (NCCSR), September 2020. State agencies developing the 2020 Resilience Plan referenced the key findings and executive summary from the NCCSR to understand the historical and projected climate trends and how they will impact state assets, programs and services. The report is included in the project supplemental materials.

The NCCSR examined the potential impacts of climate change on the three ecoregions of North Carolina: mountains, Piedmont, and the coastal plain in which this project is located. The report states that in the coastal plain, the number of very warm nights (above 75 degrees) are anticipated to increase. It is likely that annual precipitation and heavy



precipitation days (greater than 3 inches) will increase. The report also notes that models suggest that while overall annual precipitation will increase, it is also likely that droughts will also be more intense and frequent. Finally, the report notes a likely increase in severe thunderstorms. The report also projects that the intensity of the strongest hurricanes is likely to increase with warming and could resort in stronger hurricanes impacting North Carolina and that heavy precipitation accompanying hurricanes is very likely to increase, increasing freshwater flood potential.

As part of the current project, NCDOT developed a sea level rise study that examines various sea level rise scenarios. The evaluation is included in the supplemental materials.

During construction, NCDOT is evaluating potential use of materials from the demolition of the existing Alligator River Bridge to serve as artificial reefs within the Albemarle Sound.

The proposed design replaces metal rebar with Carbon Fiber Reinforced Polymer (CFRP) prestressing strand technology in prestressed concrete piles and caps. This project will accelerate the adoption of innovative technologies by NCDOT and promote state-of-the-art technologies and new business practices. This will result in improved quality and provide longer-lasting structures with improved reliability and service life in North Carolina's corrosive coastal environments.

CRITERION 5 - EQUITY, MULTIMODAL OPTIONS, QUALITY OF LIFE

The STERLING Project will benefit the federally-recognized HDC community in Tyrrell, improving access and reliability for residents who work in the Outer Banks. The upgraded facility will also improve

access to medical services, food and other goods and services. The Tyrrell and Dare County Census Tracts in which the project is located are North Carolina Opportunity Zones. The Zones will benefit from not only the implementation of the STERLING Project, but also grant funding will supply a much-needed economic stimulus during construction of the new facility. The project avoids relocations to area residents and by keeping the existing facility open during construction, will prevent any economic displacement.

The STERLING Project will provide eight-foot paved shoulders with 54-inch bike railings to accommodate bicyclists. As bicycles have a higher center of gravity than pedestrians, the increased rail height will increase safety and rider comfort.

As discussed previously, a complete EJSCREEN review was conducted along the US 64 corridor to evaluate the potential challenges associated with the corridor. With more than 50 percent of the US 64 population in APP and HDC census tracts, the project will provide much needed equity in informational access to this traditionally underserved area.

The STERLING Project enjoys the backing of nearby communities. Letters of support for the bridge replacement have been received from Dare and Tyrrell Counties, as well as the Towns of Kill Devil Hills, Duck, Southern Shores, Kitty Haw and Nags Head.

On August 15, 2021, NCDOT added a web page to the NCDOT projects page for the Lindsay C. Warren Bridge Replacement project (NCDOT: Lindsay C. Warren Bridge Replacement) on US 64 over the Alligator River. The website provides project highlights, maps, documents, news releases, property owner resources and contact information.



Replacement of the existing facility with a fixed span bridge will eliminate potential emergency vehicle access conflicts with bridge openings. Dare County has requested that the bridge “landing points” be designed to accommodate emergency vehicle access onto the bridge during peak travel times, as traffic congestion can make it difficult for emergency vehicles to get onto the bridge to respond to emergencies.

CRITERION 6 - INNOVATION AREAS: TECHNOLOGY, PROJECT DELIVERY, AND FINANCING

The STERLING Project has a multi-faceted approach within the corridor that employs the following six Dimensions of Innovation:

1. Advancement of Automated, Connected, and Electric Vehicle Program
2. Detection and Mitigation of Safety Risks through Active Traffic Management
3. Continued Broadband Deployment
4. Leveraging and Expanding the Regional Integrated Mobility Management System
5. Detection and Mitigation of Work Zone Safety Risks Through Quick Clearance Strategies
6. Leveraging and Building Upon the Statewide ITS Resilience Program

DIMENSION #1 - ADVANCEMENT OF AUTOMATED, CONNECTED, AND ELECTRIC VEHICLE PROGRAMS

The STERLING Project will provide ITS upgrades that will enable future Automated/Connected vehicle use of the US 64 corridor. Near-term deployments will utilize vehicle to infrastructure (V2I) and robust systems for vehicle control,

traffic optimization and platooning (V2X) technologies that are integrated with the NCDOT Advanced Traffic Management System (ATMS) and Cloud Services to enable direct push of safety data and traveler information to in-vehicle systems.

Near-term deployments to be assessed for implementation within the study include work zone alerts, incident alerts, hurricane evacuation data, high wind warnings, congestion ahead alerts, and alternate route recommendations that coincide, with response plans generated through the regional integrated mobility management system.

DIMENSION #2 - DETECTION AND MITIGATION OF SAFETY RISKS THROUGH ACTIVE TRAFFIC MANAGEMENT (ATM)

The safety, mobility, and environmental benefits of Active Traffic Management (ATM) have been proven through numerous studies by FHWA. The STERLING Project will provide an extensive ATM program for the project corridor. This will include enhanced situational awareness and incident detection technologies as well as enhanced traveler information technologies.

DIMENSION #3 - CONTINUED BROADBAND DEPLOYMENT

To ensure the foundational infrastructure is sufficiently robust to support advanced technologies, the Department proposes the use of this grant to build a broadband-ready fiber network on US 64 from the I-95 interchange to NC 12 in the Outer Banks. This network will be constructed in a manner that enables expansion of public-private partnership for broadband connectivity. Extending the limits of the existing broadband fiber network will be a cost-effective value-add for the deployment of technologies along



this 140-mile stretch. This tie-in to the existing public-private broadband network opens up connectivity to the developing statewide network. Additionally, the connectivity to the neighboring states will facilitate agency coordination and support a regional Traveler Information Plan.

DIMENSION #4 - LEVERAGING AND EXPANDING THE REGIONAL INTEGRATED MOBILITY MANAGEMENT SYSTEM

The STERLING Project will provide a coordinated system that will allow travelers access to information on alternate routes, and data on NCDOT construction activities along US 64.

DIMENSION #5 - DETECTION AND MITIGATION OF WORK ZONE SAFETY RISKS VIA QUICK CLEARANCE STRATEGIES:

Approximately 20 percent of all traffic incidents are secondary in nature, meaning that they are the result of a previous incident. Being able to quickly detect incidents along freeways and clear the incidents provides drastic reductions in secondary incidents and fatalities. Secondary incidents occur at even higher rates in work zones due to the presence of temporary barrier along either side of the roads. NCDOT has established an effective, performance-based tow contract program that has been proven to reduce secondary incidents and fatalities within multiple deployments across the state. The STERLING Project would seek to implement a performance-based tow program within the limits of US 64 through the project area. This program would seek to detect and mitigate work zone safety risks through quick clearance of the roadway. The project will evaluate the integration of tow requests and notifications from motorists with disabled vehicles through the integrated

mobility-as-a-service platform mentioned previously.

DIMENSION #6 - LEVERAGING AND BUILDING UPON THE STATEWIDE ITS RESILIENCE PROGRAM

NCDOT has invested in a Statewide ITS Resilience Program that seeks to implement best practices in ITS and broadband infrastructure resilience. The program employs an integrated work order management, asset management, and network management framework to actively monitor, assess, and improve traffic operations system uptime and availability. The STERLING Project would propose to extend the performance-based resilience program to provide the following elements:

- Extension of the existing resilience program to this project for increased reliability and availability of technologies during the project lifecycle.
- Establishes an effective assessment program for proactive evaluation of all technology infrastructure supporting traffic operations along the corridor.
- Establishes an effective technology repair program based on service-level agreements for immediate repair of critical network and ITS infrastructure including fiber optic cable for enhanced regional broadband and traffic operations uptime.

INNOVATIVE CONTRACTING

The STERLING Project seeks to utilize the following innovative practices in contracting:

- Use of a public-private partnership model for the broadband elements of the project. NCDOT leverages the public-private partnership model to allow a private sector partner

to commercialize portions of the broadband fiber infrastructure and in-return receives a share of revenue from the commercialization. The revenue received by NCDOT is then utilized to fund long-term operations and maintenance of ITS infrastructure along the facility.

- Use of performance-based contracting that establishes service-level-agreements that are tied to operational uptime and reliability for the traffic operations program. NCDOT has successfully implemented a similar contract through the NC Broadband project and is currently seeking to establish a similar program for all other urban areas in the state through the Statewide ITS Resilience Program.
- NCDOT will consider the use of collaborative contracting integrated with traditional design bid build to mirror project delivery benefits achieved in CM/GC and Progressive Design Build. Considering current volatile market conditions, contractor collaboration during design and appropriate risk identification and sharing are key to successful project delivery. Past used competitive hard-bid contracting models involve the owner planning and designing a project without input from the contractor industry. The scale of the STERLING Project with the required in-water work offers an intensified risk and reward for the selected construction firm. Prior collaboration provides for a more complete understanding of the project and helps to avoid claim and change orders during delivery.



VI. BENEFIT COST ANALYSIS

A benefit-cost analysis (BCA) compares the full cost of a project to the estimated benefits. The full cost includes preliminary engineering of the project, right-of-way, utilities, construction, ITS and broadband, environmental mitigation, administrative costs, and utilities. The costs of operating the project (both for the build and no build scenarios) for the duration of the analysis period are also included. The benefits are estimated for the Build scenario. The project yields a positive benefit-to-cost ratio of 1.50 and a Total Net Benefit of \$483 million, a NPV of \$256,011,394. The project's benefits are reasonably expected to justify the financial expenditure.

PROJECT	CAPITAL COST	PROJECT COST (NPV)	TOTAL NET BENEFIT	TOTAL NET BENEFIT (NPV)	BENEFIT-COST RATIO
2022 BCA SUMMARY- AlligatorRiver Bridge Crossing	\$294,600,000	\$171,189,908	\$483,350,763	\$256,011,394	1.50



VII. PROJECT READINESS AND ENVIRONMENTAL RISK

TECHNICAL FEASIBILITY

As detailed below, replacement of the Alligator River bridge has been under consideration since 1999. The replacement of the bridge was included in the 2012-2022 STIP projects R-2544/R-2545, as part of a four-lane widening in Tyrrell and Dare Counties from Columbia to East Lake. After substantial review, that project is currently unfunded. Current efforts center around replacing the bridge with no additional traffic capacity improvements to US 64 proposed. This project is included in the 2020-2029 STIP as project HB-0001. A number of studies and project-related preliminary work have occurred, including:

- January 1999: Feasibility study initiated to replace the Alligator River Bridge
- 2002: Draft feasibility study prepared for bridge replacement
- August 2002: Project work postponed until revised hurricane evacuation model completed
- 2005: Hurricane evaluation model completed
- 2005: North Carolina General Statute 136-102.7 - Setting a goal of 18 hours for evacuation of the Outer Banks once a hurricane warning has been issued
- 2007: Proposed US 64 Corridor Improvement Hurricane Evacuation technical memorandum completed
- April 2015: County of Dare resolution for emergency ferry service for crossing Alligator River at bridge site due to bridge outage
- February 2017: Alligator Bridge Maintenance Repair Contract (B-5936) executed for \$17,000,000

- April 2018: Final Environmental Impact Statement (FEIS) - US 64 Improvements Project (R-2544/R-2545) submitted
- September 2018: Traffic Noise Report submitted (R-2544/R-2545)
- April 2019: Proposed US 64 Corridor Improvement Hurricane Evacuation Reevaluation technical memorandum completed
- August 2021: CE Type III (HB-0001) document completed
- August 2021: NCDOT public website for the project goes live
- September 2021: Navigation Report completed
- January 2022: 25% Roadway plans completed
- March 2022: Vessel Collision Risk Assessment Report completed
- April 2022: Bridge preliminary general drawings prepared

North Carolina's Strategic Transportation Investments Act (STI) of 2013 requires that capital projects compete through a data-driven project prioritization process that considers, but not limited to, cost and mobility improvements for each project. The process has three major competition categories based on the type of transportation asset class referred to as Statewide, Regional and Division. STI does allow for bridge replacement projects to compete outside the forementioned categories referred to as the alternate criteria; however, NCDOT has approximately 13,000 bridges that could compete for \$150 million annually. This \$268.1 million 3-mile coastal bridge far exceeds the annual allotment of the alternate criteria. The replacement of this 62-year-old bridge was only funded for planning in the 2020-2029 STIP with no construction funding options going forward for this critical coastal connector. The STERLING Project also adds



resiliency by providing a reliable hurricane evacuation route; 140-miles of broadband to provide safety improvement through cameras, sensors and ITS devices from I-95 to the Outer Banks; and providing future electrical infrastructure connection on the bridge for redundancy in an area prone to high winds and hurricanes. This will increase the cost by \$26.5 million. NCDOT is requesting a grant of \$173.1 million to replace this bridge and the installation of broadband. Without the grant, the existing swing bridge with a sufficiency rating of 31 out of 100 will not be replaced. It will continue to cause disruptions in mobility for both vehicular and navigation traffic daily. Keeping the existing bridge in place will continue to be a maintenance strain for NCDOT and will not provide constant reliability for citizens from Tyrrell County commuting to work or during hurricane evacuations.

As detailed below, substantial design work has taken place for the Alligator Bridge Replacement and NCDOT has a complete understanding of what is required to deliver this important project. The design provides for a realignment in the area of the existing bridge to allow for continued use of the existing bridge during construction of the project. Due to the replacement of the movable span with a fixed span bridge, a significant change in roadway profile is required from the current 14 feet of vertical clearance over the navigation channel to the 65-foot clearance required to maintain ICW navigation. The existing bridge is bounded at the southwest by the State of North Carolina Alligator River Game Lands and the southeast by the Alligator River National Wildlife Refuge. In addition, the Waterfront Access Marine Industry (WAMI) Fund constructed a small facility, which supports commercial fishing. It will remain within the NCDOT right-of-way at the

southwest corner of the bridge. The new bridge will be located north of the existing alignment and the west approach will avoid the Alligator River business and WAMI site. Minor impacts are anticipated to the Palmetto-Peartree Preserve land owned by The Conservation Fund. The east end of the bridge will impact approximately six privately owned parcels but will not require any relocations.

Based on the current design, the new alignment will transition from the existing roadway approximately 3,000 feet from the beginning of the old bridge to approximately 3,500 feet from the end of the old bridge. The centerline of the existing alignment varies in offset from the new alignment: approximately 750 feet at the west bank; approximately 1,025 feet at the swing span; and 1350 feet at the east end bent. The offset distance was to avoid impacts at the begin and end of bridge to land tracts. The distance between the alignments will permit the necessary construction access to build the new structure via barge while not impacting operation of the swing span. Work from the barge outfitted with cranes will primarily include pile driving of 30-inch precast piles, placement of waterline footing, column and cap forms and concrete and setting of precast girders.

Based on the current design, interior bents will consist of trestle type caps in the approaches, and traditional multicolumn bents on waterline pile caps in higher structure elevations and higher vessel load impact areas. Accounting for a nominal barge draft of approximately four feet, normal water elevation will allow barges to access Bent 5 to Bent 123 based upon the Structure Preliminary General Drawing ground profiles and a normal water surface elevation of 0.14. Bent 4 and Bents 124 thru 130 will require



other methods involving water access. It is anticipated work bridges will be utilized for approximately 80 feet from the west bank and 675 feet from the east bank of the river. The work bridges will be used to install the foundations and concrete, like the barge usage. Foundations are expected to consist of 30-inch square prestressed, precast piles. Consideration will be given, however, to allowing an alternate design using drilled shafts. Depending on the contractor, a top-down method may be employed. Two recent bridges of considerable length in eastern North Carolina, were constructed using gantry systems to avoid the use of work bridges and barge work.

The superstructure will consist of a cast-in-place deck slab placed on precast, prestressed concrete girders. To minimize cost of the bridge, an efficient use of span and substructure units was determined. The skew of the main channel, pile cap requirements and clear channel width determined a main span length of 170 feet. The span length exceeds the normal NCDOT Modified bulb tee spans and led to the decision to use the 96-inch deep, Florida I-Beam (FIB) section. Used frequently in North Carolina in the recent past for long span arrangements, the long section will be easily transported by barge to the project site from precasters with waterway access. The large beams will require larger crane capacities to lift the heavy sections but avoids the use of post-tensioned segments of shorter lengths to achieve the long spans. Other areas of the bridge will also use the FIB sections in reduced depths of 54-inch and 72-inch sections - appropriate for the corresponding span lengths. The bridge drainage will be discharged into the open river through the use of six-inch pipe drains along the barriers. The first four spans from each end of the bridge will

not be discharged from the bridge but will carry water to the ends of the bridge and be treated as typical roadway drainage. The length of the bridge allows for a maximum of three percent profile grades in the channel area and zero percent grades for large sections. Tie-in grades at the ends of the bridges were set to match the existing roadway grades.

REQUIRED APPROVALS

The Alligator River Bridge Replacement is following the National Environmental Policy Act (NEPA) process. The Categorical Exclusion (CE) was signed on August 31, 2021. This project is utilizing the Section 404/NEPA Merger Process in accordance with the Memorandum of Understanding signed by NCDOT, FHWA, US Army Corps of Engineers (USACE) and NC Division of Water Resources, which will ensure that the project is permissible. The project has advanced through a review of preliminary hydraulic design (CP4B).

NCDOT has corroborated extensively with the agencies to ensure the safest method of bridge construction is to be used considering the sensitive environmental nature of the area. The area has been classified as coastal Anadromous Fish Spawning Area (AFSA). Prior to permitting, turbidity, acoustic vibrations and water temperature monitoring will be considered.

Public meetings will be scheduled prior to authorization to acquire right-of-way funds. However, substantial coordination with local officials has taken place, as is noted in the letters of support the project has received from area communities.



US-64 STERLING TENTATIVE PROJECT SCHEDULE	
1999	Feasibility study initiated
2020	HB-0001 placed in 2021-2029 STIP
August 2021	CE signed
September 2021	Navigation Report completed
January 2022	25% roadway plans completed
March 2022	Vessel Collision Risk Assessment Report completed
April 2022	Bridge preliminary general drawings prepared
May 2022 - September 2023	Final design, permitting, right-of-way
May 2022 - September 2023	Broadband/ITS Investigation and Design
November 2023	Construction advertisement
January 2026 - July 2027	Broadband/ITS Construction
January 2024 - July 2027	Bridge Construction

an independent review of the proposed design takes place and that opportunities for innovation and risk mitigation can be built into the project prior to right-of-way and construction.

PROJECT RISKS AND MITIGATION STRATEGIES

As noted in Section IV, NCDOT accounts for the risk of increasing cost by incorporating contingency factors in their cost estimate. NCDOT is currently conducting a Value Engineering study in May 2022. A constructability review is scheduled for June 2022 to ensure that



VIII. PROJECT REQUIREMENTS

Statutory Project Requirements

STERLING ELIGIBILITY SUMMARY	
Benefits	The STERLING project offers many benefits in terms of safety and technology improvements, greater reliability, and reduced maintenance needs for critical highway infrastructure, increased active transportation access. It also provides a facility that is able to meet the needs of the future vehicle and freight technologies.
Cost Effective	The STERLING Project has a positive benefit-to-cost ratio of 1.50 (see Section 6). Please refer to the BCA technical memorandum in the supplemental materials for more information.
Contributes to Section 150 Goals	<p>The STERLING Project will substantially contribute to Section 150 goals. In addition to the monetary values of these contributions shown in the BCA, please refer to the following sections of the document for each goal:</p> <ul style="list-style-type: none"> • Safety, see Criterion 1 • Infrastructure Condition, - Criterion 2 • Congestion Reduction, - Criterion 3 • System Reliability, - Criteria 3 and 6 • Freight Movement and Economic Vitality, - Criteria 3 and 6 • Environmental Sustainability, - Criterion 4 • Reduced Project Delivery Delays, - Criterion 6 and Section 7
Based on Preliminary Engineering	As noted in Sections 6 and 7, preliminary engineering for the STERLING Project have been completed and was used in the development of the environmental document in August 2021. As shown in the current schedule, final design is anticipated to be complete by September 2023.
Stable Funding Sources Available for Construction/Maintenance	As noted in Section 4, NCDOT has committed \$69,100,000 in state funds to complete the design and assist in construction of the STERLING Project and has identified \$52,400,000 in additional federal funds (Bridge Formula Program). These dedicated funds, along with this grant, will allow for full development of the STERLING Project. NCDOT has a statewide maintenance plan in place for highway infrastructure, which mentions the Alligator River Bridge. As shown in Section 3, all parties associated with the project have clearly defined operations and maintenance responsibilities. As detailed in Criterion 6, revenue from P3 partnerships will fund long-term maintenance of Broadband and ITS infrastructure
Need for Federal Funds	As noted in Section 1.1 and Section 4, the current North Carolina STI law established a prioritization framework and funding constraints for the State Transportation Improvement Program (STIP). On average, approximately \$150 million per year is appropriated towards bridge replacements across the state. These funding limits make advancing the STERLING Project for construction impractical without additional federal funding, given the overall structure replacement needs of the state.
Project Begins Within 18 months of Obligation of Funds	As noted in Section 7, the STERLING Project has already completed a rigorous environmental and technical review. The environmental document was signed in August 2021, and 25 percent roadway plans were completed in January 2022. Based on the current schedule, final design, right-of-way acquisition, and permitting will be completed by September 2023 and project letting is anticipated in November 2023.