I-95 Bridges

An Application for Bridge Investment Program (BIP) Funding

June 29, 2026

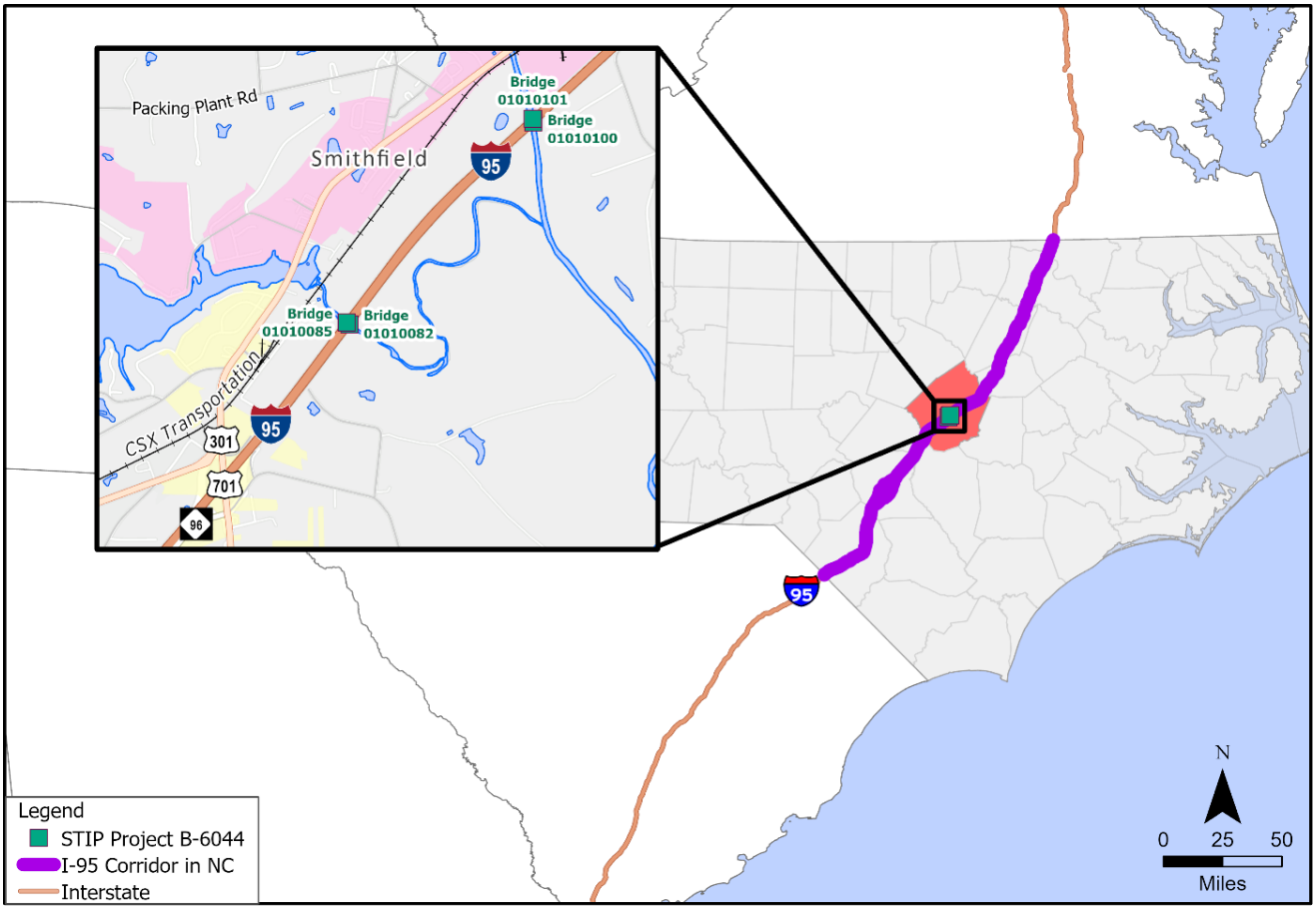
North Carolina Department of Transportation (NCDOT)

UIE: XSN8A4TT1DY5

I. Project Description

The North Carolina Department of Transportation (NCDOT) seeks $49,454,000 in USDOT Bridge Investment Program (BIP) Bridge Project funding to replace four aging I-95 bridges in Johnston County, North Carolina: two bridges over the Neuse River and two bridges over the associated Black Creek. These structures are located on one of the nation's most important travel and freight corridors. At the project location, I-95 is part of the Federal Highway Administration's National Highway System (NHS), the National Highway Freight Network (NHFN), and the Strategic Highway Network (STRAHNET). One bridge is already in poor condition and supported by temporary shoring, while the other three bridges, though currently rated in fair condition, were built in the same era and are showing continued deterioration. By replacing all four bridges through a single coordinated project, NCDOT will address a pressing state of good repair need, improve safety and reliability for interstate travel and freight movement, and reduce repeated construction disruptions on this nationally significant corridor. The project is environmentally cleared, right of way acquisition is complete, and BIP funding would allow NCDOT to advance construction from the current FY 2029 schedule to FY 2027. Figure 1 shows the location of the bridges. NCDOT has developed a website that includes references and other supplemental information: I-95 Bridges.

Figure 1. *I-95 Project study area showing bridges of concern*



The four bridges were constructed between 1955 and 1958 and are at or beyond the end of their design life. Bridge inspection reports included in the supplemental materials document widespread

deterioration, including delamination, cracking, exposed rebar, missing header and joint material, and corrosion. Bridge 00000001010085 is in poor condition, with a superstructure rating of 4, and is currently supported by temporary shoring; NCDOT classifies it as structurally deficient. The 2024 inspection report notes that the bridge remains open only because of the temporary shoring.

The other three bridges are currently rated in fair condition, but they were built at the same time using similar materials and construction standards and are following the same aging trajectory. NCDOT classifies Bridges 000000001010082, 000000001010100, and 000000001010101 as functionally obsolete. Maintenance costs have increased over the past five years, and without continued intervention, the condition of these structures will continue to decline. Replacing the four bridges now is a more durable and cost-effective solution than continuing to rely on stopgap repairs on a high-volume interstate corridor.

Location

The project is located in the Southeastern Plains Level 3 Ecoregion, within the Rolling Coastal Plain and Southeastern Floodplains and Low Terraces Level 4 Ecoregions and lies within the Neuse River Basin. Specific locational data for each bridge is shown below:

The project area is partially located within the Smithfield, North Carolina 2020 Census-designated urbanized area, while the remainder is rural. Smithfield has a poverty rate of 27.4 percent, more than double the national average of 12.5 percent and the North Carolina average of 13 percent. NCDOT has maintained a project website to keep the public informed throughout project development.

Table 1. *Location of Project Bridges*

Structure No.	Latitude	Longitude
000000001010082	35°27'58.66"N	78°22'50.40"W
000000001010085	35°27'59.60"N	78°22'50.68"W
000000001010100	35°28'39.30"N	78°22'04.48"W
000000001010101	35°28'39.72"N	78°22'04.63"W

II. National Bridge Inventory Data

Please refer to the attached Excel Template.

III. Project Budget – Grant Funds, Sources, and Use of All Project Funding

NCDOT seeks $49,454,000 million in BIP Bridge Project funding for the I-95 Bridges Project. The funding will allow NCDOT to move forward with 2026 – 2035 State Transportation Improvement Program (STIP) project B-6044. The project has completed environmental documentation and right of way (ROW) acquisition. However, due to funding concerns, the project has been delayed until 2029 for construction. BIP funding will expedite this much-needed project.

The Categorical Exclusion (CE) for the project was signed on October 18, 2022. NCDOT has completed right of way (ROW) acquisition. To date, NCDOT has spent over $436,600 in planning and ROW costs. Including federal expenditures, the total previously incurred costs are $2,043,990.

NCDOT developed cost estimates based on ROW plans on March 25, 2026. The total costs of construction were estimated to be $62,300,000. The project also includes $250,000 for the installation of a Dynamic Messaging Sign (DMS) to alert drivers of accidents or other hazards and $50,000 for the installation of a stream gauge that will monitor potential backwater flooding of Black Creek while also monitoring for potential dam failures of the dam at Holtz Lake. The total project costs are $62,600,000. The estimate includes $6,939,303 in contingency funds. The cost estimate is included in the supplemental materials.

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 is not limited to, cost and mobility improvements for each proposed project.

The process has three major competition categories, Statewide Mobility, Regional Impact, and Division Needs. These categories are based on the proposed project's type of transportation asset class. STIP Project B-6044 was selected for funding through the Statewide Mobility category in the current (2026-2035) STIP. Due to the limited nature of state funds, construction was scheduled for FY 2029. If BIP Funding is provided, State Highway Fund Bridge Replacement Program moneys are available to provide the NCDOT Match ($13,146,000). Table 1 provides a breakdown of project costs. Table 2 provides a breakdown of project costs.

B-6044 Remaining Costs ($2026):

- Dynamic Messaging System (DMS): $250,000
- Stream Gauge: $50,000
- Construction: $62,300,000

Source of Funds

Table 2. *Project Budget*

Item	BIP funds	State Funds	Total Cost
B-6044	$49,279,000	$13,146,000	$62,300,000
DMS	$150,000	$100,000	$250,000
Stream Gauge	$25,000	$25,000	$50,000
Total	**$49,454,000**	**$13,146,000**	**$62,600,000**

As NCDOT has proceeded through ROW for the project, risks are limited to the permitting and construction phases. As noted previously, NCDOT has already had substantial coordination with resource agencies, minimizing that risk. To account for risks related to construction, NCDOT includes contingency fees in all construction cost estimates. For B-6044, the overall construction contingency is 11.1% ($6,939,303).

IV. Merit Criteria

The I-95 Bridges Project advances the U.S. Department of Transportation's Bridge Investment Program goals by delivering substantial, measurable benefits across all six Merit Criteria, including State of Good Repair, Safety and Mobility, Economic Competitiveness and Opportunity, Resiliency and the Environment, Quality of Life, and Innovation.

Located along a nationally significant freight and travel corridor, the project addresses multiple structurally deficient and functionally obsolete bridges that are at or beyond their design life and currently require ongoing maintenance and temporary stabilization measures. By replacing these aging structures through a coordinated, shovel-ready project, NCDOT will improve system reliability, reduce lifecycle costs, enhance safety performance, and strengthen the resiliency of critical infrastructure in a flood-prone environment.

As demonstrated in the Benefit-Cost Analysis (BCA), the project generates quantifiable benefits:

- Reduced maintenance costs
- Reduced crash rates
- Improved water quality
- Fewer travel and supply chain disruptions
- Less economic disturbance
- More efficient and safer travel routes for freight and American families

Together, these outcomes demonstrate strong alignment with BIP priorities and underscore the project's readiness to deliver timely and lasting national and regional impacts.

Criterion #1: State of Good Repair

All of the bridges were built or reconstructed before 1960 and are at or beyond the end of their designed lifespan. All four structures are listed in the National Bridge Inventory (NBI) with elements in poor or fair condition. Below is a summary of the condition of the four bridges included in this application.

Figure 2. *I-95 Bridge No. 000000001010082 on I-95 over Black Creek*

Table 3. *Bridge No. 000000001010082 on I-95 over Black Creek (NBI#377607)*

1 – Bridge No. 000000001010082 on I-95 over Black Creek (NBI#377607)	
Notes: In 2018, the superstructure condition had fallen to 5. Extensive efforts in 2020 and 2022 improved the superstructure condition to the current rating, but these improvements are at best a Band-Aid that will not slow the deterioration of the structure long term.	**Sufficiency Rating:** 80.84
	Deck Condition: 6
	Superstructure Condition: 7
	Substructure Condition: 6
	Built: 1958

Table 4. *Bridge No. 000000001010085 on I-95 over Black Creek (NBI # 377610)*

2 - Bridge No. 000000001010085 on I-95 over Black Creek (NBI # 377610)	
Notes: Listed in Poor condition on the NBI. The bridge has temporary shoring.	**Sufficiency Rating:** 52.63 (Structurally Deficient)
	Deck Condition: 6
	Superstructure Condition: 4
	Substructure Condition: 5
	Built: 1955

Table 5. *Bridge No. 000000001010100 on I-95 over the Neuse River (NBI # 377624)*

3 – Bridge No. 000000001010100 on I-95 over the Neuse River (NBI # 377624)	
Notes: Current listed maintenance needs include a priority repair need for the deck due to missing header and joint material as well as multiple instances of cracking, delamination/spall, and damaged pilings and railings.	**Sufficiency Rating:** 65.13 (Functionally Obsolete)
	Deck Condition: 6
	Superstructure Condition: 5
	Substructure Condition: 5
	Built: 1957

Table 6. *Bridge No. 000000001010101 on I-95 over the Neuse River (NBI # 377625)*

4 - Bridge No. 000000001010101 on I-95 over the Neuse River (NBI # 377625)	
Notes: Current listed maintenance needs include exposed Rebar, corrosion, and delamination/spall.	**Sufficiency Rating:** 54.00 (Functionally Obsolete)
	Deck Condition: 5
	Superstructure Condition: 5
	Substructure Condition: 5
	Built: 1955

Structure 000000001010085 is in poor condition and the other structures are in fair condition. The deck condition of Structure 000000001010100 had fallen to a 6 in 2018. A maintenance effort of $82,000 boosted the deck condition of the deck, but this did not supply a long-term solution to the bridge condition. As shown in the table below, maintenance costs for these bridges have approached $630,000 over the last 15 years.

Table 7. *I-96 Bridge Maintenance Costs from 2010-2024*

I-95 Bridges Maintenance Costs (2010–2024)				
	B000000001010082	**B000000001010085**	**B000000001010100**	**B000000001010101**
2010	$31,351	$20,263		$60,375
2011				$832
2012		$4,191	$3,097	$11,453
2013			$6,729	$6,729
2014	$35,561	$2,781	$3,965	$6,910
2015	$1,018	$3,944	$18,110	$15,122
2016				$22,031
2017		$2,531	$2,828	$645
2018			$657	$3,791
2019		$2,792	$6,501	$2,237
2020				$16,462
2021	$14,544	$41,018	$19,042	$53,115
2022	$67,823		$3,126	$27,607
2023			$41,232	$10,524
2024			$33,000	$25,000
Total	**$150,297**	**$77,520**	**$138,287**	**$262,833**
Grand Total	**$628,937**			

Of that total, over $336,000 has been spent since 2020. Given the increases in materials costs and the aging infrastructure, these expenditures are only expected to increase in the coming years. Given the age of the structures, it is not unreasonable to anticipate that increasing maintenance would be required to avoid load restrictions in the coming years.

The BCA details the anticipated expenditure needed to maintain the I-95 structures. Given the State of North Carolina's extensive inventory of aging bridges, such regular expenditures are not feasible. NCDOT is able to program funding for part of the proposed replacement of the I-95 bridges; however, BIP funding is urgently needed to make up the gap in funding. BIP funding, along with the State contribution, will provide the long-term solution for the structure needs instead of stop-gap measures.

The project also improves the ability of the structures over the Neuse River to withstand future flood events. The new structures will reduce the number of piers in the water, which will improve the channel conductivity of debris downstream. The project will also install a flood gauge to better

inform downstream residents of potential flooding issues and the potential dam failure at Holtz Lake.

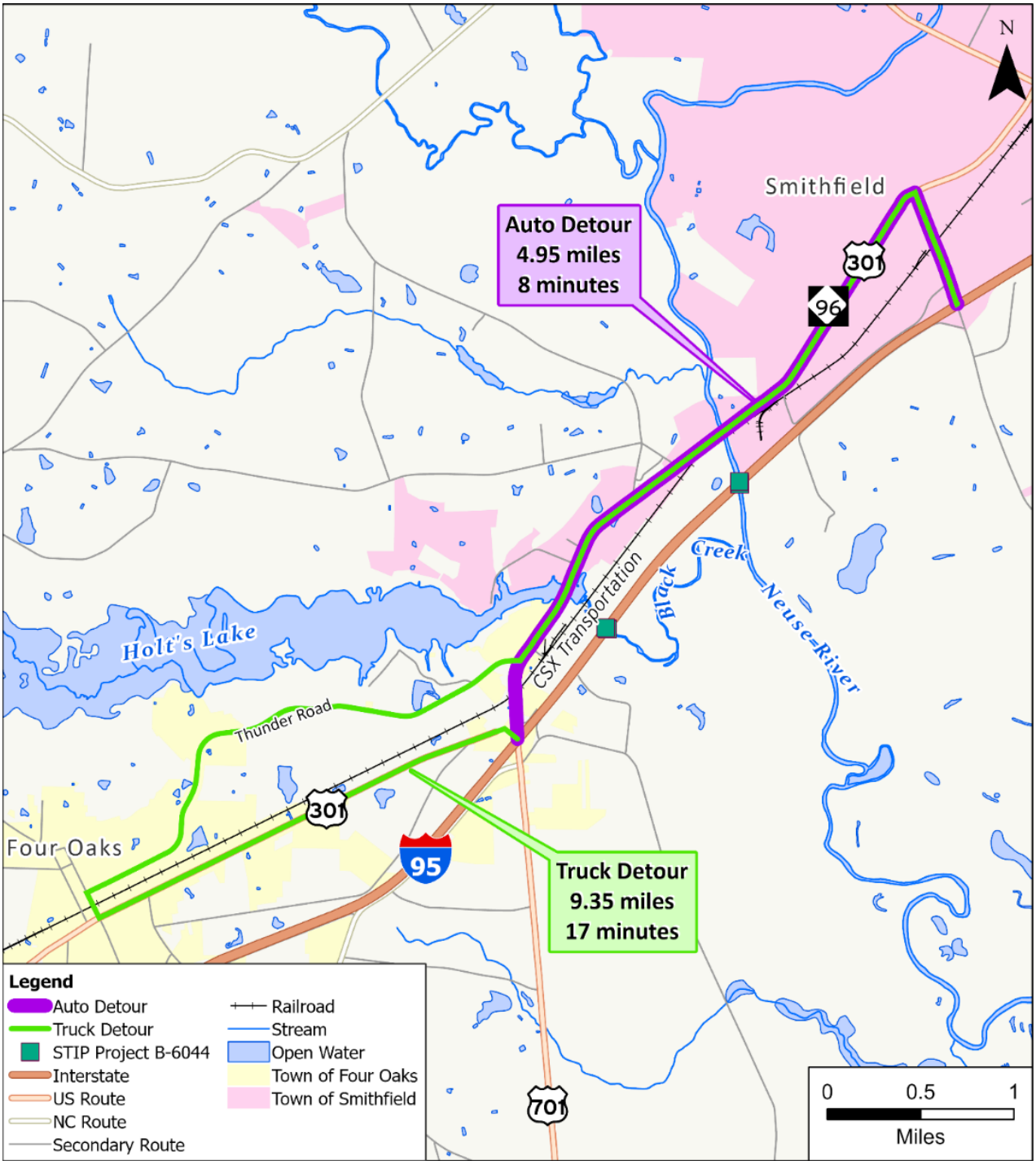
With modern construction techniques, the new structures are anticipated to require minimal maintenance for the next century. The project BCA analysis estimates annual maintenance costs for both a No-Build and a Build condition through 2062. The BCA estimates total bridge maintenance costs for the Build condition to be $166,514 from the 2033 date of construction completion through 2062, with specific dates of recommended maintenance included. The No-Build estimated maintenance costs were estimated to be $5,824,032 from 2029 through 2062, for a difference of over $5.6 million dollars. NCDOT will commit bridge maintenance funds to support the long-term state of good repair of the I-95 bridges.

Criterion #2: Safety and Mobility

Safety needs and benefits are supported by quantified historical crash and traffic data within the project limits. From December 1, 2018, through November 20, 2023, there were 105 reported crashes within the 1.7-mile project limits, including 17 crashes with non-fatal injuries and an estimated $695,700 in property damage. The number of accidents is noteworthy, considering that this is a controlled-access facility with no ramps through the project study area. Of the reported crashes, 31 were fixed object crashes and 25 were sideswipes. Another 21 were rear end, slow or stop crashes. Providing a wider shoulder would allow for increased ability to avoid these types of impacts. While crash data are highly variable, it should be noted that the months with the greatest number of crashes were March and April, and Saturday was the day of the week with the greatest number of crashes. This suggests a potential correlation with tourist travel. Updated data from May 2021 through April 2026 indicates that on average there were over 19 property damage only crashes each year, and almost 4 injury crashes each year.

Operational disruptions are also quantified: 12 crashes between November 2, 2022, and January 15, 2024, required detours with an average duration of nearly 1.5 hours. The parallel facility (US 301) is not designed to accommodate the traffic volumes that would result from extended I-95 closures. There are regular news reports of crashes on I-95 closing the facility for hours. A failure of the I-95 structures could delay traffic for days or weeks. A detour map is shown below in figure 3. It should be noted that bridge 000000001010037, which carries US 301 and NC 96 over CSX railroad, is load rated to 18 tons for single vehicles (SV) and 21 tons for tractor trailer trucks (TTS).

Figure 3. *I-95 Detour Options in the Event of Structure Failure*



The facilities lack sufficient paved shoulder width for service vehicles or stranded motorists to pull off of the travel lanes. The bridges have deck drains that discharge stormwater directly into the

sensitive Neuse River watershed. In addition, the relatively flat grade of the structures is prone to ponding during increasingly heavy rainfall events.

BIP funding will provide a new facility with 14-foot shoulders that allows drivers to safely leave the travel lane if they encounter difficulties. This wider shoulder also provides additional space for emergency and maintenance vehicles. The structure will be designed to channel stormwater off the facilities, reducing pollutants entering the vulnerable Neuse River watershed.

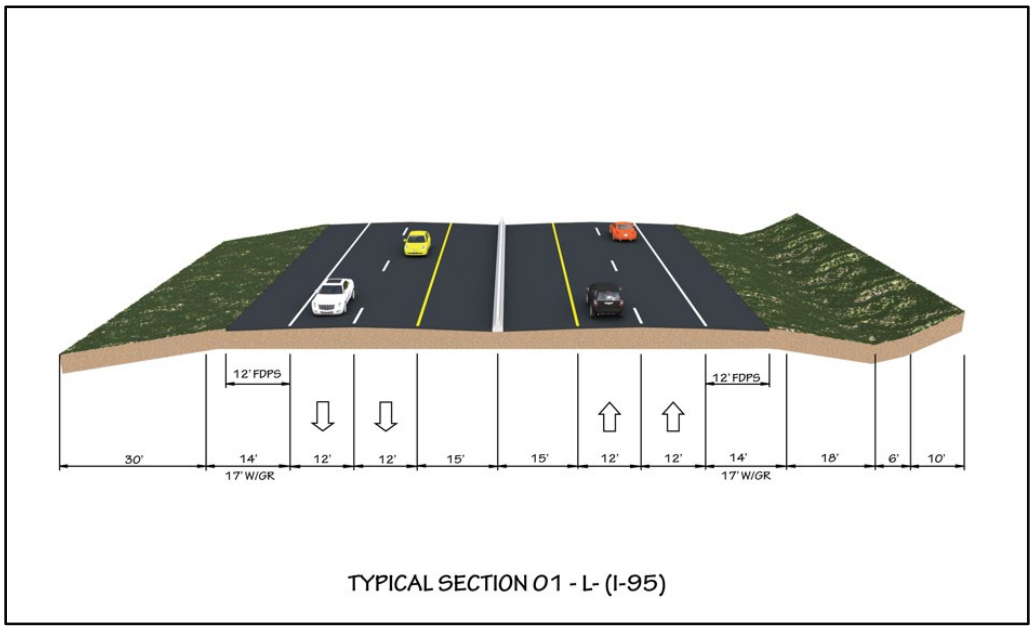
Figure 4. *Bridge Nos. 000000001010082 and 000000001010085 Over Black Creek*

Figure 5. *Bridge Nos. 000000001010100 and 000000001010101 Over Neuse River*

According to the NCDOT Average Annual Daily Travel (AADT) map, the average AADT on I-95 at the Neuse River Bridge was 50,000 vehicles per day in 2024, an increase of 22 percent over the past 10 years. The Truck Tractor Semi-Trailer (TTST) percentage of overall traffic was 12 percent, and the Dual Axel (Duals) were 4 percent. Based on the 50,000 vehicles/day at the Neuse

River crossing, there is an estimated 85,000 vehicle-miles traveled per day within the 1.7-mile project limits. Using FHWA Highway Statistics (VM-1) to compute an all-vehicle average occupancy factor (2021 total person-miles divided by vehicle-miles ≈ 1.52 persons/vehicle), the corridor carries approximately 60,225,000 person-miles traveled per day across the same 3.3-mile segment. The project corrects documented geometric deficiencies by providing 14-foot paved shoulders, improving roadside recovery space and incident response capability, and increases superelevation to 0.025 to reduce ponding risk. The BCA provides a cost estimate associated with the proposed safety improvements.

Figure 6. *Proposed Typical Section*



The improvements associated with the construction of the I-95 Bridges Project will enhance the safety of drivers on the facility by providing a wider shoulder. After a review of multiple Crash Reduction Factors (CRFs) from the NCDOT Traffic Safety Group during developing of the BCA analysis, it was found that an 18 percent reduction in crashes for the Project facility is a reasonable estimate based on CRF ID 4.15.8 for widening and the multiple substandard features being revised to meet current standards. This reduction in accidents will increase the reliability of the I-95 corridor and reduce the accident-inspired delays on the facility.

The replacement of the I-95 bridges over the Neuse River (Bridge Nos. 0000000010100100 and 0000000010100101) present an opportunity to accommodate a permanent greenway crossing beneath the bridges, separating pedestrians and trail users from vehicle traffic, unlike the current conditions. Both the Mountain to Sea Trail (MST) and East Coast Greenway (ECG) currently rely on temporary, road-based crossings of I-95 in this area, which do not include sidewalks or shared-use paths.

While the I-95 corridor is a vital part of the nation's economy, it presents a barrier to those without access to automobiles. The MST is co-located with the Buffalo Creek Greenway in Smithfield before continuing south and east on US 301, using the US 701 bridge over I-95 to Devils Racetrack Road as a temporary crossing. The ECG runs along US 301 south of Smithfield and currently continues onto Boyette Road at the interchange.

NCDOT met with the North Carolina Department of Parks and Recreation (NCDPR) and ECG representatives on July 26, 2019, to discuss temporary routes and a more permanent solution for both trails. At that meeting, attendees agreed to evaluate accommodating a greenway beneath the Neuse River bridges as part of the bridge replacement project.

Criterion #3: Economic Competitiveness and Opportunity

The project will provide definitive benefits during and after construction. Data from the American Road & Transportation Builders Association states that highway and bridge spending has a GDP multiplier of approximately 3.4. For an overall project construction cost of $62 million, that equates to a local economic impact during construction in excess of $200 million in local hotels, restaurants, suppliers, and retailers.

The I-95 corridor is designated as part of the National Highway Freight Network and the North Carolina Strategic Transportation Corridors network (Corridor T), recognized as a critical link connecting the state's Coastal Plains region to major employment centers between the South Carolina and Virginia state lines. As noted in Criteria 2, I-95 at the project location carries approximately 50,000 vehicles per day, with a truck composition of 12% truck tractor-semitrailers and 4% dual-axle vehicles. According to the NC Statewide Multimodal Freight Plan (2023), peak average annual daily truck traffic (AADTT) on I-95 reaches 7,000–8,000 trucks per day, a figure expected to grow with the opening of the CSX rail intermodal terminal at Rocky Mount, which increases both truck activity and the strategic importance of I-95 to the state's multimodal freight network.

Based on data from the Bureau of Transportation Statistics, the value of freight moving through this corridor is approximately $1,001 per ton. Assuming an average cargo weight of 42,000 to 48,000 pounds per semi-truck, the daily value of truck freight traffic on the I-95 corridor is approximately $115,616,000 to $120,240,000. Recent experience in Pennsylvania and Georgia illustrates the severe consequences when interstate bridges fail: traffic diverted onto secondary roads not designed for such volumes increases crash risk and imposes significant economic costs. Closing the 5-mile stretch that would be affected by a failure of the I-95 Neuse River bridges would cost an estimated $84.8 million per day in 2022 dollars (approximately $96.5 million per day in 2026 dollars, as calculated by the CPI Inflation Calculator.

In terms of economic impact, few facilities compare with I-95. In a recent NBER Working Paper entitled Highways and Globalization, researchers quantified the value of the 20 longest interstates in the US. As a transnational route, I-95 was found to be one of the most valuable. The route was considered “extremely valuable” as it not only connects the most cities and the most major markets to one another but also connects to ports.

I-95 is vital not only in terms of economic development, but also as a major tourism corridor. A vast number of East Coast residents have fond memories of escaping northern winters by traveling to sunny destinations along I-95, and that tradition continues to drive significant economic activity in North Carolina. According to Visit NC's annual Economic Impact of Travel on North Carolina Counties report, North Carolina welcomed nearly 40 million domestic visitors in 2024, ranking fifth in the nation behind only California, Florida, Texas, and New York. Statewide visitor spending reached a record $36.7 billion in 2024, supporting more than 230,000 jobs and generating nearly $2.7 billion in state and local tax revenue.

Johnston County, which spans I-95, benefits directly from corridor traffic, serving both destination visitors and travelers passing through on their way farther south. According to the same Visit NC report, visitors spent $314.59 million in Johnston County in 2024, up 5.2% from 2023, or about $861,890 per day at local hotels, restaurants, attractions, and stores. This activity supported more than 2,000 tourism-related jobs and generated $12.83 million in state tax revenue and $9.76 million in local tax revenue, reducing the local tax burden by an estimated $180 per household. Attractions such as the Ava Gardner Museum, Tobacco Farm Life Museum, Clemmons Educational State Forest, and Bentonville Battlefield State Historic Site draw visitors to the county, while local hotels also serve the many travelers continuing south on I-95.

The impact of a potential bridge failure and the travel times associated with it were examined as a benefit. Bridge failure rates from a 2014 Utah State study were used to determine the likelihood that one of the I-95 bridges would fail and require detouring onto parallel facilities.[1] The travel time savings between the current and detour routes were then calculated to determine the impacts. The estimated detour route was 1.6 miles longer than the current route. Based on the BCA Guidance, travel time benefits were approximately **$78.0 million.**

Criterion #4: Resiliency and the Environment

Resiliency Benefits

The Neuse River in the area of the I-95 bridges frequently floods, and debris in the stream channel is a common occurrence. The river exceeded the flood stage three times in 2024 alone. Debris flows are known to damage piers in the water, increasing in maintenance needs. By reducing the number of piers in the water for the Neuse River bridges, the project will provide a more resilient structure that is less likely to be damaged by debris through its useful existence. This is vital, because a failure of the I-95 structures, particularly over the Neuse River, would cause substantial interruption of commerce and family recreation opportunities. The structures over the Neuse River will have fewer piers in the water, allowing for more natural stream flow, reducing the area in which debris can be trapped by the structure, while requiring less maintenance, reducing the disturbance of the stream channel after construction.

North Carolina has recent experience on the difficulty in replacing a highway bridge destroyed by flooding. The I-40 bridge over the Pigeon River was destroyed by flooding associated with Tropical Storm Helene. Construction of a temporary bridge took several months, disrupting local transportation networks for people and freight. A final replacement structure will not be in place until 2028. While the I-95 bridges are in a less complex geologic area, replacing a flood damaged bridge could take over a year. Replacing the Neuse River dual bridges with a single structure with fewer piers in the river will greatly reduce future flooding risks to the facility.

In addition, the project will install a flood gauge downstream of Holtz Lake, which will provide up to the minute information on potential flooding, providing vital security to downstream residents and integrate into North Carolinas flood monitoring network. The Department has invested considerable time and funds into the Flood Inundation Mapping and Alert Network for Transportation (FIMAN-T) and BridgeWatch. These resources help NCDOT better understand the roadway conditions and better inform and communicate extreme rain and flooding events to the public and local community.

[1] https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3187&context=etd

FIMAN-T, a web-based tool, provides NCDOT officials and emergency management stakeholders with real-time and forecasted flood inundation depths along roads, bridges, and other NDCOT assets. FIMAN-T pulls from various datasets to provide visualization and metrics for roadway inundation, bridge hydraulic performance, and identification of potentially impacted NCDOT assets.

BridgeWatch is also an online application service that allows NCDOT to proactively monitor floor levels and rainfall conditions conducive to flooding at valuable bridges and culverts. These internal tools, in combination with DriveNC.gov, allow DOT staff to send customized electronic alerts via cell phones, emails, application dashboards, etc. when roadways and bridges are experiencing dangerous or critical conditions.

In combination with the improved ability to communicate flooding conditions and hazards to residents in real time, these technologies also improve NCDOT's system resilience and advanced disaster preparedness. Recently, 23 new stream gauges have been installed along the US 74 corridor. These will also be added to both the FIMAN-T and BridgeWatch tools to provide real-time flood impacts to US 74 including whether overtopping is occurring or near to occurring at the Lumber River crossing.

Environmental Benefits

The project will replace structures that cross the Neuse River and a major tributary of the Neuse, Black Creek. The Neuse River flows approximately 275 miles through eastern North Carolina to its mouth at the Pamlico Sound. The Albemarle-Pamlico estuary was designated as "an estuary of national significance" by the US Congress in 1987. At the site of the I-95 bridges, the Neuse River has been identified as Critical Habitat for Atlantic sturgeon and a Primary Nursery Area for anadromous fish, notably shad, herring, and striped bass.

Figure 7. *Neuse River at the I-95 Bridges*

Figure 8. *Black Creek Near the I-95 Bridges*

The current structures over the Neuse River Bridge consist of multiple piers at each bent, which was a common construction style in the 1950s. The current structure has deck drains, which were designed to allow stormwater to be pulled from travel lanes in this relatively flat area.

Figure 9. *Neuse River Bridges*

Because the Neuse River is classified as a "Nutrient Sensitive Water", streamside riparian zones within the study area are protected under provisions of the Neuse River Riparian Buffer Rules administered by North Carolina Division of Water Resources (NCDWR). The Neuse River Buffer

Rules establish 50-foot buffers adjacent to subject waterbodies and apply to intermittent and perennial streams in the study area, including Black Creek and Neuse River.

Stream buffers reduce suspended solids, pesticides, fertilizers and oil residues and byproducts over direct discharge. Bridge deck runoff has been extensively studied for years, but is highly location specific. The National Cooperative Highway Research Program (NCHRP) Report 474 (2002) published Assessing the Impacts of Bridge Deck Runoff Contaminants in Receiving Waters. The US Environmental Protection Agency (EPA) noted that heavy metals, polycyclic aromatic hydrocarbons (PAHs) and conventional contaminants such as phosphorus and nitrogen are also of concern.

NCDOT is also focused on reducing construction related impacts associated with the project. The Department has entered an informal Section 7(a)(2) consultation with National Marine Fisheries Service (NMFS) for the federally endangered Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). Conservation measures that result from that consultation will be strictly adhered to. NCDOT is subject to a Programmatic Biological Opinion (PBO) of MA-LAA for the northern long-eared bat (*Myotis septentrionalis*) in Highway Divisions 1-8, which encompasses this project. A separate PBO of MALAA for Divisions 2,4,5, and 7 applies to the following Federally listed aquatic species due to proximity to known populations:

- Atlantic pigtoe (*Fusconaia masoni*)
- Carolina madtom (*Noturus furiosus*)
- Dwarf wedgemussel (*Alasmidonta heterodon*)
- Neuse River waterdog (*Necturus lewisi*)
- Tar River spinymussel (*Parvaspina steinstansana*)

NCDOT will submit payments in conjunction with the aquatics PBO and fully adhere to the corresponding conservation measures for aquatic species. Payments made under the PBO are remitted to a fund for conservation. A multi-agency organization/group of species experts will determine how to expend these funds to assist in the recovery of the Carolina madtom and Neuse River waterdog.

All of these measures will serve to remove barriers on the Neuse River to Atlantic Sturgeon and anadromous fish species while aiding in the recovery of federally listed species

Criterion #5: Quality of Life

Opportunities for Public Input

NCDOT used public input to inform project development. A website was established as part of the 2021 Public Involvement Plan (PIP) for the project and has received 4,908 views to date. The website includes project visualizations, such as a typical section, contact information for the project team, opportunities for the public to ask questions and stay informed of project progress, and project funding and schedule information. Users can also access translated information in a variety of languages, from Abkhaz to Zulu, through Google Translate.

Postcards informing the public of the project website were sent in July 2022 to inform the public of the project website and request input. A small group meeting was held in May of 2022 to coordinate with planners for the East Coast Greenway to ensure that future accommodation for

that facility was provided under I-95. Robust public outreach has and will continue to inform the project.

The greenway will provide notable improvements for those who lack access to motor vehicles. Currently the nearest crossings of I-95 are highway overpasses that lack sidewalks. Data from NC Vision Zero states that sidewalks reduce crashes involving people walking along roadways by 65 to 89 percent. The Small Town and Rural Design Guide states "Physically separated facilities are most appropriate on roads with high volumes of traffic operating at high speeds." The guide notes, "A **shared use path** provides a travel area separate from motorized traffic for bicyclists, pedestrians, skaters, wheelchair users, joggers, and other users. Shared use paths can provide a low-stress experience for a variety of users using the network for transportation or recreation."

Public Benefit

Quality-of-life impacts of disruptions are quantified by the documented detour experience: 12 detour-causing crashes averaged nearly 1.5 hours in duration, with the detour route using facilities that are not designed for sustained I-95 diversion volumes. The I-95 Bridges project also benefits the public as there are no ROW relocations. It also provides the mitigation measures previously outlined to improve water quality and produce other environmental benefits by reducing potential detours and travel delays.

I-95 is a critical access route for Johnston County residents maintaining employment. Based on 2016 to 2020 ACS data, almost 43,000 residents commute out of the county each day for work, and I-95 is a key corridor for those commuting.

Also, as noted under Merit Criteria 3, the construction associated with replacing the I-95 bridges will provide a stimulus to the local economy both during and after construction. Contractor crews will use area hotels, restaurants, and gas stations. There may be some local hiring and training of area residents that can offer future employment possibilities.

Criterion #6: Innovation

The project employs an innovative bundling approach, combining the replacement of multiple I-95 bridge structures over the Neuse River and the associated Black Creek crossing into a single, coordinated construction project. This consolidated construction staging approach allows NCDOT to use shared mobilization, traffic control, equipment, work zones, and contractor sequencing across the closely spaced bridge. This will reduce staging and mobilization costs, limit repeated lane closures and traffic shifts, minimize disruption to one of the nation's most critical freight and travel corridors, and deliver greater value per federal dollar invested.

NCDOT will explore the use of recycled concrete and innovative bridge materials to reduce materials costs and potentially extend the effective lifetime of the bridge. As part of an Accelerated Innovation Deployment Demonstration (AID) grant, NCDOT recently utilized glass fiber reinforced polymer bridge deck technology on the Harkers Island Bridge. Such materials are corrosion resistant and can allow for structural health monitoring of the bridge by embedding fiber optic sensors in the bridge deck.

Many NCDOT corridors currently lack broadband connectivity, limiting the ability to deploy real-time traffic management tools. NCDOT is utilizing a RAISE grant to expand broadband along the I-95 corridor, building on previously installed infrastructure. This improved connectivity will enable installation of ITS-enabled dynamic message signs within the I-95 median right-of-way. Evidence from an ITS deployment evaluation on Utah freeways found that activating variable

message signs during incidents increased diversion rates by 18%, demonstrating measurable incident-management value for travelers when timely information is provided. This is of critical importance for interstate travelers who can have hours of delay if they lack timely alerts on road hazards.

In April 2013, Haghani et al., reported for the Maryland Department of Transportation on the effectiveness of DMS with regards to traffic flow. The study examined the effects for three types of messages:

- Type 1 – Danger Warning Messages
- Type 2 – Common Road Condition Messages
- Type 3 – Regulatory/Not Traffic-Related Messages.

Based on 2,268 cases, the study found that for Type 1 messages, driver speeds decreased by an average of 3.13 miles per hour and that decreases occurred in 17.1 percent of the cases where Type 1 messages were displayed.

Speeding is reported as common on I-95. The posted speed limit on I-95 in this area is 65 miles per hour. Of the 105 crashes reported at the bridges for this project, 12 reports listed at least one driver's speed at 70 mph or higher at the time of the crash. This number may be an underestimation. Any measures that can quantifiably reduce speed, even for some percentage of drivers, should provide definitive benefits over time, resulting in fewer and less severe crashes.

In August 2021, Savolainen et. al, evaluated the use of DMS to display safety messages in a report sponsored by the Michigan State University Department of Civil and Environmental Engineering. Crash analyses showed that while there were no significant differences with respect to total or nighttime crashes, speeding-related crashes were significantly lower downstream of DMS that showed messages related to speeding or tailgating. The crash data analysis was complemented by a series of field studies that sought to determine the immediate impacts of safety messages on fundamental aspects of driving behavior. Drivers were shown to more frequently drive at or below the speed limit when targeted move over messages were shown as compared to standard travel time messages. The study states that, *"Crashes decrease significantly based upon the frequency with which speeding and tailgating related messages are displayed. A one percent increase in the frequency of message display is associated with an average decrease of 1.5 percent in these types of crashes."*

In September 2023, the US General Accountability Office (GAO), reported on the benefits of intelligent transportation systems for traffic congestion and safety (GAO-23-105740). The study detailed that *"ITS allowed them to monitor and operate equipment remotely, which enhanced their ability to work more efficiently, including better leveraging limited staff. For example, officials at one locality told us they can remotely verify whether equipment is functioning or not, including outside of normal business hours. Furthermore, they said that this ability allows them to respond to problems more quickly and function with the limited staff they have. An official in a state with ITS deployments in rural areas told us the state's road weather information system was helpful for field maintenance staff to learn about road conditions and inform travelers of them by dynamic message signs. They were able to accomplish this from their office, rather than having to travel to distant areas of the state. Additionally, multiple places noted that the ability to operate remotely was particularly beneficial during the COVID-19 pandemic*." While these are qualitative benefits, they do show the utility of DMS deployment.

Various ITS elements – specifically gages and sensors distributed along the roadway and on structures – to be installed as part of the CORESI project, coupled with the installation of fiber optic cabling on I-95, will expand the scope, functionality, and efficacy of the state's FIMAN-T network. As noted in Criteria 4, FIMAN-T provides web-based tools to provide NCDOT officials and emergency management stakeholders with real-time and forecasted flood inundation depths along roads, bridges, and other NDCOT assets. BridgeWatch provides an online application service that allows NCDOT to proactively monitor floor levels and rainfall conditions conducive to flooding at valuable bridges and culverts. These internal tools, in combination with DriveNC.gov, allow DOT staff to send customized electronic alerts via cell phones, emails, application dashboards, etc. when roadways and bridges are experiencing dangerous or critical conditions.

V. Benefit Cost Analysis

Introduction

This technical memorandum estimates the long-term benefits associated with the I-95 Bridge Investment Program (B-6044 I-95 Bridges) Project. This evaluation discusses the relevant Performance Outcome Criteria mentioned in the Notice of Finding Opportunity. For some measures a qualitative discussion is included. The assumptions and methods used to develop the Benefit-Cost Analysis (BCA) are detailed for each topic and are supported by supplementary material where appropriate. The BCA was calculated using the official Bridge Investment Program Benefit-Cost Analysis Tool developed by FHWA.

The long-term quantifiable benefits are presented for the Project Outcome Criteria include safety, maintenance, and environmental benefits. Benefits to resiliency is included as a quantitative benefit and is a component of the economic and innovation benefits.

The final section summarizes the anticipated benefits and costs of the I-95 Bridges project and calculates the overall Benefit-Cost Ratio.

Years of Analysis

The analysis is based on the project coming online in 2030. A benefits period of 2030-2059 was used. This 30-year benefits period is consistent with the 2025 BCA Guidance for Discretionary Grant Programs (BCA Guidance) for projects involving the full reconstruction of highways or similar facilities.

Methodology

Benefits are estimated in accordance with the BCA Guidance. Where no specific approach was provided in the Guidance, NCDOT used best practices and research data as specified in the assumptions and methodology for each measure. The benefits quantified in the BCA use 2024 dollars (as advised by USDOT). Benefits for each project element are described within the benefit categories.

Analysis Assumptions

A list of assumptions for the project is provided in the BCA workbook and summarized in Tables 8 and 9. **Table 8** displays the generalized BCA input values provided by the USDOT for the relevant quantifiable benefits for this project.

Table 8. *Input values from BCA Guidance*[2]

Input	Value
General Assumptions	
Analysis Period (Years)- Projects Involving Full Reconstruction of Highways	30
Discount Rate	7%
Dollar Year	2024
Auto Occupancy (Passenger Vehicles, All Travel)	1.52
Auto Occupancy (Trucks)	1.00
Business Value of Travel Time (Hourly)	$34.60
Personal Value of Travel Time (Hourly)	$20.10
All Purposes Value of Travel Time (Hourly)	$21.80
Truck Driver Value (Hourly)	$37.20
Safety – Crash Data Assumptions	
O – No Injury	$5,500
C – Possible Injury	$122,400
B – Non-incapacitating	$256,300
A – Incapacitating	$1,302,300
K – Killed	$13700,000
U – Injured (Severity Unknown)	$238,500
# of Accidents Reported (Unknown if Injured)	$162,600
Property Damage Only Crashes	$9,700

Note: Dollar values are in 2024 dollars

Table 9 lists project-specific assumptions. Most of these project-specific assumptions come from NCDOT and the National Bridge Institute (NBI).

Table 9. *BCA Calculation Inputs – Project-Specific*

Input	Value	Source
General		
Annual Average Daily Traffic Volumes (AADT)	Varies by Bridge	NBI
Calculated ADDT Growth Rate	3.36%	
Crashes (categorized by type) from 12/1/2018 to 11/30/2023	Varies by Crash Type	NCDOT Traffic Engineering Accident Analysis System Strip Analysis Report
Crash Reduction Factor (CRF) ID 4.15.8 (Increase shoulder widths)	0.82	NCDOT Traffic Safety Group

[2] Values from https://www.transportation.gov/sites/dot.gov/files/2023-12/Benefit%20Cost%20Analysis%20Guidance%202024%20Update.pdf

Benefits

Based on the provided BCA analysis, the following benefits and costs were quantified for the I-95 Bridges project.

Criterion #1: State of Good Repair

Currently, the structures within the Project study area are contributing to an aging, deteriorating facility with frequent and expensive maintenance costs. The Project will provide improved facilities that will have less frequent and less costly maintenance. This includes pavement preservation, bridge maintenance, and general maintenance. This results in a net profit of approximately **$5.8 million**. These bridges are also being designed to have an asset life of 100 years, which brings residual benefits to the project totaling approximately **$3.1 million**.

Altogether, state of good repair benefits will total **$8.8 million (numbers don't add up exactly due to rounding.**

Criterion #2: Safety and Mobility

An in-depth crash strip analysis report was completed for the Project based on the 5-year period from December 1, 2018, to November 30, 2023. For the 1.7 miles of the project area, the total vehicle exposure was 130.30 (MVMT). The total crash rate was 80.54 per 100 million vehicle miles. The non-fatal crash rate was 13.04 per 100 million vehicle miles, the night crash rate was 19.18 per 100 million vehicle miles, and the wet crash rate was 10.74 per 100 million vehicle miles.

The crash analysis assessed all 105 crashes that occurred during this time, including a breakdown by crash type – fatal, non-fatal injuries and property damage only crashes (types A, B, and C). These breakdowns were converted to the KABCO Injury Classification Scale. Property Damage Only (O) crashes accounted for the majority, over 80 percent, of all crashes. Benefit values were estimated by using a combination of monetized values per injury level.

The improvements associated with the construction of the Project will enhance the safety of drivers on the facility by providing a wider shoulder. After a review of multiple Crash Reduction Factors (CRFs) from the NCDOT Traffic Safety Group (refer to **Table 10**), it was found that an 18 percent reduction in crashes for the Project facility is a reasonable estimate based on CRF ID 4.15.8 for widening and the multiple substandard features being revised to meet current standards. Based on the BCA guidance, there was no net gain in safety due to the potential for work zone crashes during construction.

Table 10. *Project Crash Reduction Factor*

ID	Countermeasure Description	CMF	Expected Crash Reduction	Application
4.15.8	Increase shoulder widths; applies to rural multi-lane highways with speed limits of 45 to 70 mph	0.82	18%	CRF applied to Build scenario

Criterion #3: Economic Competitiveness and Opportunity

I-95 is a critical north-south corridor for passenger and freight movement in North Carolina and

the east coast. In a recent NBER Working Paper entitled Highways and Globalization, researchers quantified the value of the 20 longest interstates in the US[3]. As a transnational route, I-95 was found to be one of the most valuable. The route was considered "extremely valuable" as it not only connects the most cities and the most major markets to one another, but also connects to major ports on the eastern seaboard. NBER research also found that the cost of removing I-95 from the Interstate Highway System (IHS) was estimated at $10.3-16.4 million per mile in 2012 dollars. Therefore, if the I-95 bridges for this project were to be closed due to structural issues, a detour along US 301 would likely be utilized. This would close five miles of I-95 in Johnston County. Using a cost of $13.3 million per mile as the mid-point estimate, the cost of closing this five-mile stretch of I-95 is estimated at $66.5 million in 2012 dollars, which equates to $84.8 million in 2022 dollars.[2]

Several businesses in Johnston County rely on I-95 for efficient transportation of agricultural products, manufactured goods, and raw materials. Of the eight counties I-95 traverses in North Carolina, Johnston County has the second greatest number of business establishments with 1,900 in 2013. The county also had the greatest number of manufacturing establishments of the eight counties with 121 establishments and an estimated 6,200 employment in 2011[4]. In December 2025, Johnston County still had the second largest number of establishments (5,924).

The impact of a potential bridge failure and the travel times associated with it were examined as a benefit. Bridge failure rates from a 2014 Utah State study were used to determine the likelihood that one of the I-95 bridges would fail and require detouring onto parallel facilities.[5] The travel time savings between the current and detour routes were then calculated to determine the impacts. The estimated detour route was 1.6 miles longer than the current route. Based on the BCA Guidance, travel time benefits were approximately **$78.0 million.**

Criterion #4: Resiliency and the Environment

The Project will provide increased ability to adapt to major weather events such as flooding. While the bridges are above the current and projected floodplain through the end of the benefits period, the No-Build alternative will not include removal of deck drains and channeling stormwater from the bridge to offsite retention areas where infiltration allows for the removal of contaminants. Thes measures under the Build Alternative will reduce water runoff and pollution entering Black Creek and the Neuse River. These benefits were largely qualitative and balance any potential emissions increases.

Stormwater runoff is especially important issue for the Neuse River, as it is habitat for anadromous fish such as the federally endangered Atlantic Sturgeon and federally threatened Neuse River waterdog, one of the rarest Salamanders in the southeast United States.[6] In addition, the new bridge design will reduce the number of piers in Black Creek in the Neuse River, thus improving the riverbed habitat.

In addition, when installed and originally maintained, the two bridges over Black Creek were coated with lead paint primer. The Project will remove the lead paint primer, thus reducing

[3] https://www.nber.org/papers/w27938
[4] https://connect.ncdot.gov/projects/Driving95/I-95%20Economic%20Assessment.pdf
[5] https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=3187&context=etd
[6] https://www.fws.gov/species/neuse-river-waterdog-necturus-lewisi

potential lead contamination in the waterway.

Criterion #5: Quality of Life

Benefits for Equity and Quality of Life include such qualitative measures as increased access to goods, services and employment. To the extent these benefits were quantifiable as travel time savings, they are included in the Criteria 2 discussion and not repeated here to avoid double counting. However, the Merit Criteria narrative describes potential qualitative impacts to residents due to safer, more reliable travel post construction for residents and American families traveling to recreational destinations.

Criterion #6: Innovation

The benefits related to Criterion 6 are qualitative. These include areas such as adding overhead variable message signs, evaluating innovative bridge material, and the use of recycled concrete.

Summary

The analysis resulted in an overall **2.13 BCR** across the four bridges, and a **$39.8 million net present value**. (refer to **Table 11**). This meets BIP criteria that the benefits of the project outweigh the costs. NCDOT has concluded that these benefits reasonably justify the costs of the project.

Table 11 *Total Project Benefit-Cost Analysis * Rounded values*

Bridge ID	Total Discounted Costs	Total Benefits	Benefit-Cost Ratio
0000000010100100	$9,961,347	$20,891,574	2.09*
0000000010100101	$9,928,347	$22,362,583	2.25*
0000000010100082	$9,953,347	$20,358,202	2.04*
0000000010100085	$9,928,347	$21,457,870	2.16*
Total	**$39,771,390**	**$85,070,230**	**2.13***

VI. Project Readiness and Environmental Risk

a) Technical Feasibility and Technical Competency

The B-6044 project has followed FHWA's established procedures and guidance for the implementation of a highway project. The project was initially listed in the 2020-2029 STIP as the replacement of the bridges over Black Creek. The project was expanded in the updated June 2021 2020-2029 STIP to include the bridges over the Neuse River, which is the current project.

NCDOT followed its normal procedures for the project. It was determined that the project did not need to follow the Department's Section 404 Merger Process, but extensive coordination has taken place prior to development of the environmental document (CE), which was signed in October 2022. NCDOT has completed ROW acquisition and is moving forward with final designs. The construction cost estimate was finalized in March 2026 and includes an 11.4 percent contingency cost, which based on project experience has proven sufficient in the past. Geotechnical investigations for the structure have been completed, and no new substantive issues were encountered.

In terms of scope, schedule, and budget risk mitigation issues, NCDOT has the technical competency to undertake this important project. The Department is responsible for approximately 13,700 bridges in the state. In 2024, NCDOT is providing $47 million in state funds for bridge maintenance, $333 million for bridge replacements, and $86.5 million for bridge preservation. In addition, NCDOT has successfully secured and is delivering on federal grant funding for bridge replacements, including a 2018 RAISE Grant to replace 77 bridges in 17 rural counties, a 2022 RAISE Grant to replace 28 bridges in Western North Carolina, and a 2022 MPDG Grant to replace the Alligator River Bridge.

b) Project Schedule

The I-95 Bridges project has passed through the following milestones:

- Programming in the STIP – 2018
- Start of NEPA – August 2021
- Completion of NEPA (Signed CE) – October 2022
- Permit Drawing Package Submitted – April 2023
- Start of ROW Acquisition – August 2023 (completed November 2023)

The I-95 Bridges Project after BIP funding is secured:

- Finalize Permit – February 2027
- Submit Final Design – FY 2027
- Begin Construction – FY 2027
- Complete Construction – FY 2031

ROW acquisition was finalized in November 2023. All real property and ROW acquisition necessary for the project was completed in a timely manner in accordance with 49 CFR 24, 23 CFR 710, and other applicable legal requirements.

c) Required Approvals

The environmental document (federal CE) was completed in October 2022. ROW acquisition is complete. NCDOT has coordinated with resource agencies with regards to permit requirements. Although the Neuse River is considered a navigable water in this location, a Coast Guard permit is not required. The department has also resolved issues associated with federally endangered species. Due to the presence of anadromous fish species in the Neuse River, relevant construction moratoria have been documented and will be followed.

NCDOT has involved the public throughout the project development process. This includes coordination with tribal and other interested parties and establishing a Title VI-compliant project website to inform the public and obtain input.

Section VII. DOT Priority Considerations

The I-95 bridge replacements meet multiple goals of the highway program. Please see the Merit Criteria section for additional information.

Support for the American Family

Replacing obsolete bridges on a high-volume facility like I-95, where the project bridges carry 50,000 vehicles per day, improves geometric design, eliminates the potential for future weight restrictions, and reduces crash risk and congestion delays. At the household level, improved infrastructure performance has a direct economic impact: national analyses indicate that sustained investment in transportation systems can save American families nearly $700 per year by reducing vehicle operating costs, travel delays, and supply-chain inefficiencies. The I-95 Bridges Project will provide safer trips, more reliable commute times, and lower transportation-related expenses for millions of families who depend on the corridor for daily travel and goods movement. It will ease the travel experience for many families who cannot afford air fare to reach tourist destinations along the Atlantic Coast, from Disney World and Universal Studios to Myrtle Beach, Washington, and points north.

Conclusion

Funding for replacement of the I-95 bridges will meet BIP goals for improving the safety, efficiency, and reliability of people and freight traveling over the bridges. Not only will the number of bridges in poor or at risk of falling into poor condition be reduced, the total person miles traveled over bridges in poor condition will also be reduced.

The included Excel Spreadsheet and Merit Criteria discussion provide context for the proposed improvements. The project budget and BCA submittals detail the cost effectiveness of the proposal. NCDOT looks forward to your review and approval for funding this important project.