I-40 - Clearing Oversize Vehicles for Effective Routing (I-40 COVER)

An application for Bridge Investment Program (BIP) Planning Grant Funding

October 1, 2024

North Carolina Department of Transportation (NCDOT)

UEI: XSN8A4TT1DY5

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I. Basic Project Information

The North Carolina Department of Transportation (NCDOT) urgently requests $890,000 in Bridge Investment Program planning funds to address a critical issue: low bridges over I-40 in western North Carolina are forcing Oversize/Overweight (OSOW) permitted vehicles onto roadways that are not designed to accommodate them, creating costly diversions. These diversions cause substantial OSOW vehicle travel time delays, increased fuel consumption, and create air quality and safety issues, especially when vehicles are diverted onto secondary roads. Often, these routes rely on two-lane facilities, some of which travel through Historically Disadvantaged Communities (HDCs) or Areas of Persistent Poverty (APP). Navigating OSOW permitted vehicles in these areas presents unique challenges, especially with driveway access, bicycles, pedestrians and community facilities nearby. Additionally, travelers may not be aware of the large stopping distances these vehicles require, even when traveling at low speeds. Even when OSOW permitted vehicles have escort vehicles, there are significant risks in driving through these communities. NCDOT is committed to providing a match of $235,000 to achieve the goals of this planning study.

NCDOT has begun the process of improving and replacing aging structures over I-40 as funds are available. Current and proposed structures that are targeted for improvement are shown in Table 2. This study would conduct a bundled evaluation that would determine the most cost-effective way to remove barriers to OSOW commerce while addressing these needs along I-40. The proposed planning study would evaluate bridges over I-40 west of Winston-Salem, NC, that are potential barriers to OSOW permitted vehicles traveling east-west. All of the structures are under 15.5 feet in height, which force many OSOW vehicles to divert from I-40 to areas described above. All of these structures were built between 1955 and 1958, dating back to the original construction of I-40. Based on National Bridge Inventory data, the bridges are in Fair or Poor condition, and need substantial renovation or replacement based on their age and condition. Some of these bridges are currently included in the North Carolina State Transportation Improvement Program (STIP), but many lack funds for right of way (ROW) and construction.

I-40 is a critical economic engine for the entire United States. In Highways and Globalization, (National Bureau of Economic Research, 2020) Jaworski et. al., estimated that removing I-40 would reduce domestic trade by over 27 billion dollars and international trade by over 3 billion dollars. This made the I-40 system the third most valuable roadway network in the interstate highway system (behind I-5 and I-10) in the United States.

The proposed planning study will provide several critical pieces to assist NCDOT in developing a plan to allow OSOW permitted vehicles to be routed through I-40 as quickly as possible with the maximum benefit to the traveling public. The study will include:

- An in-depth crash and safety analysis for each overpass and interchange, including ramps as applicable.
- A replacement/improvement strategy for each structure.
- Detailed cost estimates for needed improvements/replacements.
- An evaluation of environmental constraints.
- A sequencing schedule for a subsequent Large Bridge Grant construction project.

There are other bridges over I-40 in the project area that are greater than 15.5 feet in height but are less than 17 feet in height. These structures would require diversions of some OSOW permitted

vehicles that are greater than 15.5 feet in height, even if all the project bridges were raised by a future construction project. However, as data from the most recently available 16-month period shows, if a future construction project were to raise the project bridges to greater than 15.5 feet in height, it would allow over 94 percent of OSOW vehicles traveling east-west across North Carolina to have the option of traveling on I-40.

Table 1

Cumulative Percentage of East-West OSOW Vehicles with Required Vertical Clearance

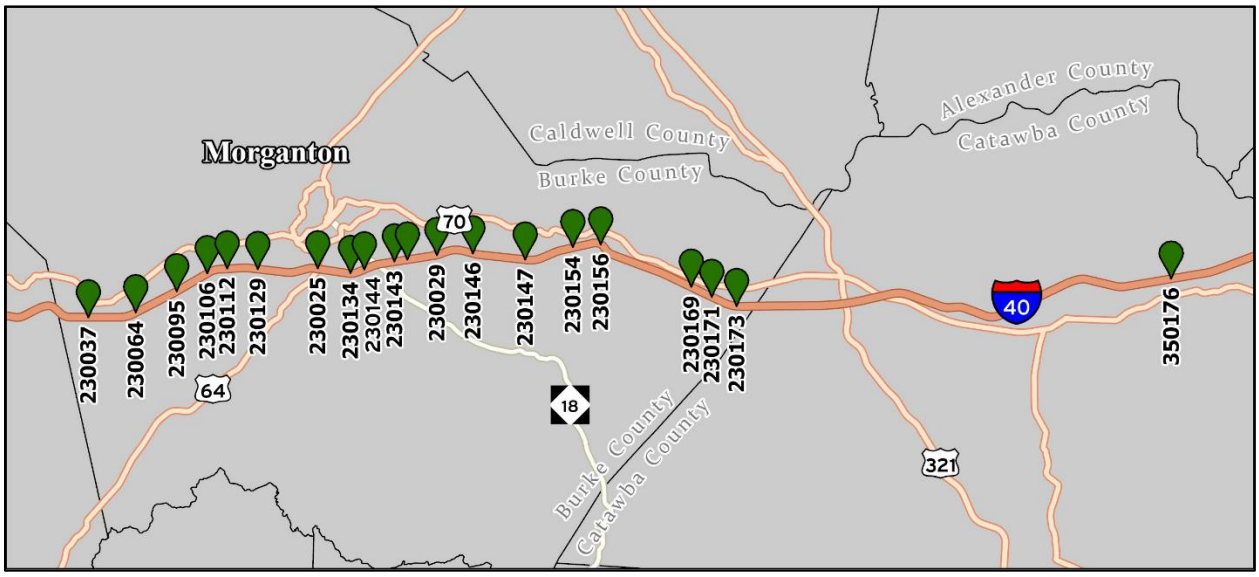
Vehicle Clearance Required	Count	Cumulative Percentage
Less than 15 feet	1052	72.30
Less than 15.5 feet	1373	94.36
Less than 16 feet	1454	99.93
Greater than or equal to 16 feet	1455	100.00

Project Location

The proposed structures are located in the foothills of the Appalachian Mountains. The area is centered around a point that is 35.731257 degrees latitude and -81.604006 longitude. Interstate 40 provides the key east-west route through the area, connecting the Piedmont of North Carolina with Tennessee and the Midwest. A map of the bridges proposed for evaluation is shown in Figure 1.

Figure 1

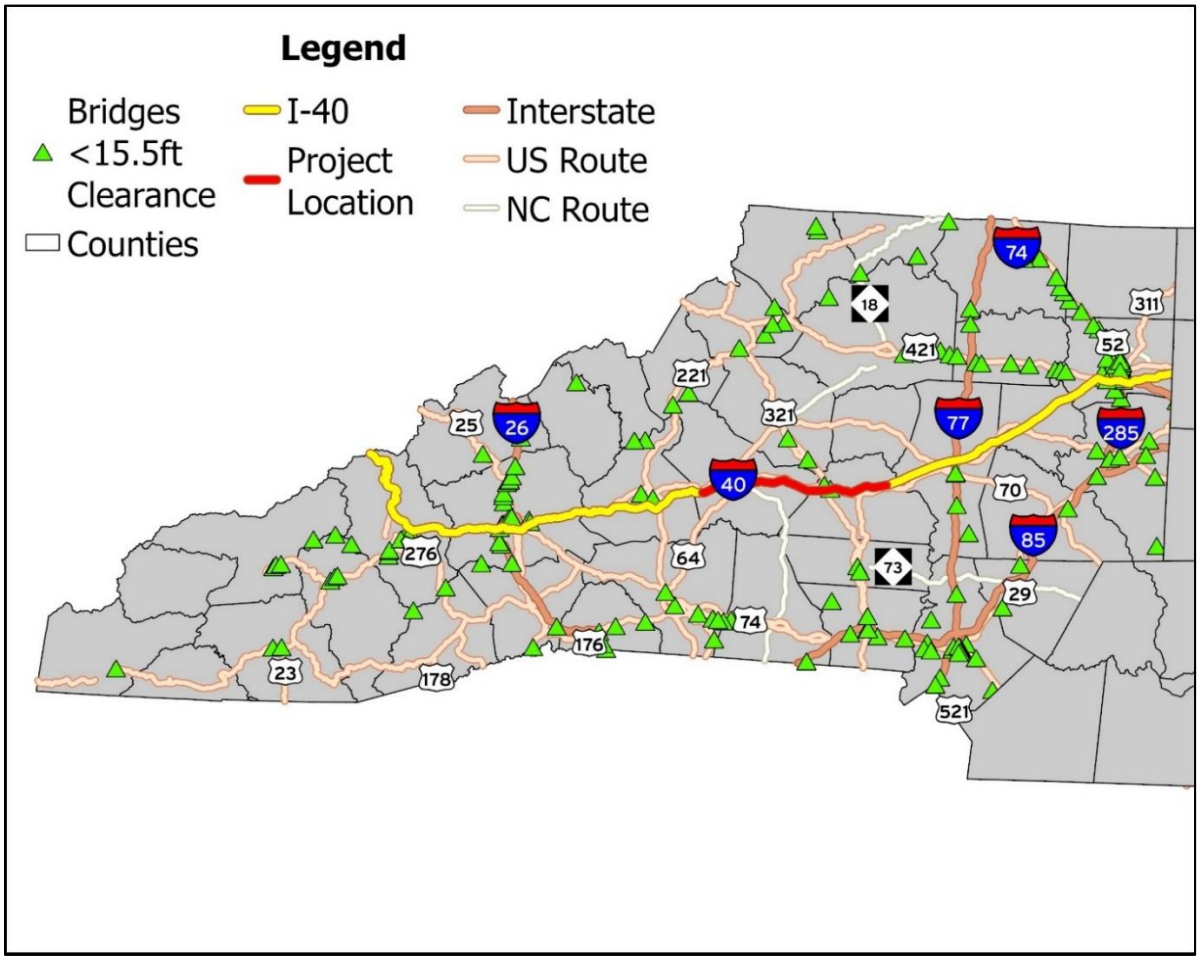
Project Study Area Showing Bridges of Concern



Low bridges are a significant issue throughout western North Carolina. As shown in Figure 2 below, there are numerous low bridges on many important routes, including I-26, throughout the state. The presence of low bridges causes many OSOW permitted vehicles to divert to rural routes. This proposed planning study will create a safe corridor for OSOW permitted vehicles and other high-profile loads.

Figure 2

Non-I-40 Bridges Less than 15.5 feet in Height in North Carolina



NCDOT will coordinate with the freight industry and local stakeholders to obtain valuable input on local and regional needs. Based on the information noted above, NCDOT will develop a staging plan for clearing I-40 for OSOW permitted vehicles under 15.5 feet. This information will be used by NCDOT in prioritization for the proposed improvements. The results of this study will be the basis for a future USDOT Large Bridge Project, as the overall anticipated replacement costs for all the project structures exceed $100 million (as provided in the project documentation).

II. National Bridge Inventory Data

The National Bridge Inventory (NBI) Database includes condition ratings for deck condition, superstructure condition, and substructure condition on a scale of 1 to 10. Condition ratings of 1-4 are considered "Poor," those rated 5 or 6 are considered "Fair," and those 7 or higher are considered "Good." Table 2 shows current NBI data for bridges that NCDOT has improved (indicated by *) and those that will be targeted for this planning study.

Table 2

Condition of Project Bridges

Bridge No.	Exit No.	Road Name	Route No.	Deck Condition	Super-structure Condition	Sub-structure Condition	Vertical Clearance (ft)[1]
Burke County Bridges							
37	94	Dysartsville	SR 1129	7	7	7	16.9
64	96	Kathy	SR 1138	7	5	5	15.0
95	98	Causby	SR 1147	9	9	7	16.9*
106	n/a	Conley	SR 1168	6	5	6	14.3
112	100	Jamestown	SR 1142	6	5	5	14.7
129	n/a	Hopewell	SR 1102	6	5	5	14.7
25	103	Burkemont	US 64	6	5	5	14.9
134	104	Enola	SR 1922	6	8	7	17.9*
137	n/a	Old NC 18	SR 1924	6	6	6	15.2
143	n/a	East Parker	SR 1708	6	5	5	15.1
144	106	Bethel	SR 1704	6	5	5	14.9
29	107	Drexel	NC 114	6	5	5	14.5
146	n/a	Jacumin	SR 1843	5	5	5	15.5[1]
147	n/a	Carolina	SR 1734	5	5	5	14.4
154	113	Malcolm	SR 1001	4	5	5	14.6
156	n/a	Coldwater	SR 1755	6	7	7	21.0*
166	n/a	Pedestrian Bridge	n/a	6	6	7	14.4
169	n/a	Berry	SR 1765	6	6	6	14.5
171	118	Old NC 10	SR 1761	5	6	6	14.7
173	119	Henry River	SR 1002	5	4	4	14.8
Catawba County Bridges							
Catawba 176	n/a	N. Lookout St / Bunkerhill School	SR 1716	5	6	6	15.3

[1]The NCDOT OSOW database used for permitting OSOW vehicles reports bridge 146 as 15.50 feet MVC over I-40 WB.

III. Project Budget and Schedule

The proposed budget for the planning study is shown in Table 3. Table 4 shows the estimated structure replacement costs that will be updated for a subsequent Large Bridge Project BIP grant application. One innovative aspect of this planning grant is that part of NCDOT's match will come from OSOW permit fees, not from taxpayer dollars. As per § 20-119.1. "Use of excess overweight and oversize fees. Funds generated by overweight and oversize permit fees in excess of the cost of administering the program, as determined pursuant to G.S. 20-119(e), shall be used for highway and bridge maintenance required as a result of damages caused from overweight or oversize loads (2005-276, s. 28.5.)."

Table 3

Planning Grant Budget

Budget Item	Anticipated Costs	Funding Source
Information Gathering	$10,000	NCDOT OSOW Funds
Crash Analysis	$30,000	NCDOT OSOW Funds
Public Involvement	$40,000	NCDOT OSOW Funds
Design Development	$890,000	Grant Funds
Quantity Development	$50,000	NCDOT State Highway funds
Report Development	$65,000	NCDOT State Highway funds
Administration/Expenses	$40,000	NCDOT State Highway funds
Total	**$1,125,000**	

Table 4

Estimated Replacement Costs for Project Bridges

Structure No.	Bridge No.	Exit No.	Vertical Clearance	Replacement Cost
110037	37	94	16.9	$12,601,058
110064	64	96	15.0	$7,519,658
110095	95	98	16.9	$6,863,974
110106	106	n/a	14.3	$7,245,722
110112	112	100	14.7	$9,125,870
110129	129	n/a	14.7	$8,747,213
110025	25	103	14.9	$13,090,061
110134	134	104	17.9	$16,261,503
110137	137	n/a	15.2	$9,478,403

Structure No.	Bridge No.	Exit No.	Vertical Clearance	Replacement Cost
110143	143	n/a	15.1	$6,411,486
110144	144	106	14.9	$6,312,696
110029	29	107	14.5	$8,231,129
110146	146	n/a	15.5	$6,140,011
110147	147	n/a	14.4	$6,318,982
110154	154	113	14.6	$8,231,129
110156	156	n/a	21.0	$7,566,826
110166	166	n/a	14.4	n/a
110169	169	n/a	14.5	$6,531,010
110171	171	118	14.7	$7,935,107
110173	173	119	14.8	$13,319,702
170176	Catawba #176	n/a	15.3	$8,162,261
Total:				**$176,093,801**

Figure 3

Project Schedule from Obligation of Grant Funds

Month	1	2	3	4	5	6	7	8	9	10	11	12
Information Gathering												
Crash Analysis												
Public Involvement												
Design Development												
Quantity Development												
ROW Cost Development												
Final Planning Study Report												

It is anticipated that ROW costs will take approximately three months to develop. The planning study will be finalized within one year of obligation of funds. Upon completion of the planning study, it is anticipated that the project bridges will complete NEPA review as a Categorical Exclusion. It should be noted that NCDOT has already completed some NEPA documentation as noted above. The improvements/replacements are not in areas with extensive stream or wetland issues, and minimal relocations are anticipated. A thorough review of affected resources will be developed in the planning study to verify the needed environmental document. This stage of the project is anticipated to last for 18 months after completion of the planning study.

Following completion of preliminary designs and NEPA, NCDOT will pursue construction funds for the projects. If it is possible to pursue BIP or other federal funding options, right-of-way acquisition of the project could begin within 12 months of obligation of federal funds. Where NCDOT has already acquired ROW, construction would begin upon obligation of funds. It is anticipated that the duration of construction would be six years.

IV. Merit Criteria

Criterion 1. State of Good Repair

NCDOT is responsible for maintaining the second largest state-owned roadway system. According to 2021TRIPNET.org's evaluation of North Carolina's roadway network, nine percent (1,714) of North Carolina's bridges were in poor condition and 52 percent (9,606) were in fair condition. Most of these fair or poor structures are near the end of their useful life. NCDOT is organized into 14 Highway Divisions with this project being located primarily within NCDOT's Division 13, which has the largest number of bridges in the state. The Division, therefore, bears a disproportionate burden in terms of maintaining their bridges in good condition. Without supplemental funding, addressing needed bridge improvements and replacements will take decades.

Prioritizing the sequencing of bridge replacements is a substantial challenge for the state and for Division 13. When examining the replacements that will provide the greatest economic return, it is logical to focus on the state's interstate network.

This planning project will determine the path forward to improve the State of Good Repair for I-40. As shown by Table 2, all the bridges were constructed in the 1950s. As shown above, NCDOT has made some improvements based on available funds. The remaining bridges are currently listed in the National Bridge Inventory as being in either Fair or Poor condition. The most recent NCDOT Bridge Inspection Reports are included in the supplemental materials. All of the structures have priority maintenance needs which may include:

Exposed Rebar	Cracking
Rust/Efflorescence	Distortion
Delamination/Spall	Potholes/Patched Areas
Connection	Corrosion
Loss of Bearing Area	Settlement
Bulging, Splitting, or Tearing	

NCDOT is working diligently to maintain their bridge network and to replace aging structures throughout the state as funding is available. As indicated above, NCDOT is already working to replace several low bridges on I-40. These include:

- Burke County (Bridge 230095) is currently under construction.
- Burke County (Bridge 230171) is scheduled to begin construction in 2026.
- Iredell County (Bridge 970090) is in final design and scheduled to let in August 2026
- Iredell County (Bridge 970118) is scheduled for construction in 2025.

However, due to the number of low bridges, timely replacement of these structures is unlikely to be implemented in the foreseeable future without additional funding sources. A planning study to prioritize the repair and replacement of these structures to accommodate OSOW traffic is the first step to ensuring that the state is strategically addressing this issue and reducing negative impacts to secondary roads subject to diversions. Currently, NCDOT has committed extensive funding to maintaining the project structures. In addition to vehicular structures, there is one largely abandoned pedestrian bridge that is not on the National Bridge Inventory on I-40 in Burke County. This bridge will not be included in the planning study, but NCDOT will develop a separate recommendation with respect to this structure. Without additional funding for the I-40 COVER bridges, maintenance costs will continue to climb in the years ahead.

Of the bridges included in this application, planning studies are underway, but construction funds are not available for:

- 230147 (Project I-5008)
- 230029 (Project I-5875)
- 230112 (Project I-5874)
- 230025 (Project I-5009)

It should also be noted that diverting OSOW permitted vehicles to secondary roads increases wear and tear on those facilities. This leads to increased pavement damage and more frequent repaving for those facilities.

This project will allow an in-depth review of the current condition of all of the listed bridges and develop a plan to move forward to prioritize replacements that will most rapidly eliminate offsite OSOW diversions while constructing new structures that will require minimal maintenance through an anticipated 100-year lifespan.

Criterion 2. Safety and Mobility

Safety is the number one priority of NCDOT and USDOT. The structures in this application were all built in the 1950s and do not meet current design standards. As part of this application, NCDOT examined crashes occurring on project overpasses and interchanges.

Crash data for the most recent 10-year period (7/1/2014 to 6/30/2024) was pulled for this section of I-40 and revealed 16 reported crashes related to an over height vehicle striking one of the bridges identified in this planning grant application. All reported crashes above were property damage only, except for one crash, which was a C Type injury. Table 5 shows the crash bridge strikes on I-40 bridges over the past 10 years.

Table 5

Reported Over Height Vehicle Crashes on Bridges over I-40 in the I-40 COVER Area

Structure No.	Crashes
230095	1
230106	2
230129	2
230144	1

Structure No.	Crashes
230147	1
230169	5
230171	2
230173	2

Crashes were also totaled for the roads passing over I-40 and the associated ramps to determine potential safety issues. Crash data for the most recent 10-year period (7/1/2014 to 6/30/2024) are Shown in Table 6. Typically, the study limits were 500 ft beyond each end of the bridge and extended if this limit fell within a curve. Limits were extended to 500 ft beyond ramp intersections for y-lines with ramps.

Table 6

Crash Data for Roads Passing Over I-40 with Ramp Crashes (if applicable)

Structure No.	AADT (2021)	Existing Ramps?	Total Reported Crashes Reported over 10 years
230025	25,600	Yes	339
230029	4,900	Yes	40
230064	2,300	Yes	13
230095	1,600	Yes	10
230106	2,300	No	2
230112	10,300	Yes	92
230129	1,800	No	6
230137	2,200	No	9
230143	1,900	No	2
230144	3,300	No	10
230146	600	No	9
230147	3,600	Yes	8
230154	8,300	Yes	41
230169	700	No	0
230173	5,700	Yes	72
350176	2,500	No	25

One outcome of the proposed planning grant would be an in-depth traffic analysis that will be used in prioritizing structure improvement/replacement recommendations.

There have been over height collisions on the project overpasses. Such collisions are hazards not only to the impacted vehicle, but to all of the traveling public. According to "*Response Planning, Assessment, and Rapid Restoration of Services of Bridges in Extreme Events: Background and Summary*," National Academy of Sciences, 2024, the considerations shown in Table 7 for structure closures or lane restrictions apply following an over height collision with an overpass.

Table 7

Considerations for Lane Closures or Restrictions after a Bridge Crash

Restricting Traffic on the Bridge	Restricting Traffic under the Bridge
Extent of damage to supporting girder(s)	Vehicles or payloads blocking lanes or impeding traffic flow
Location of damaged girders with respect to traffic lanes	Debris on the road from vehicles/payloads/ or the bridge itself
Structural redundancy (number of girders)	Damage to road surface under the bridge
Ability to strengthen/stabilize structure	Potential for additional debris to fall from the structure onto traffic
Ability to safely shift traffic lanes considering lane widths, speed limit, and traffic direction	Instability of the bridge or compromised structural integrity of the bridge
Availability of detour routes	Potential of future over height collisions to cause collapse of the damaged structure
Importance of traffic route	Structure having the appearance of being unsafe so as to distract the traveling public
	Displaced bridge members that intrude on vertical and/horizontal clearance requirements

Figure 4

Crashes and Damage from Over Height Vehicles on I-40 in Burke County

Crash at Bridge 110106 Closing I-40

Crash at Bridge 110144 Closing I-40

Crash Damage on Bridge 110106 – 11/23/24. Spalling.

Crash Damage on Bridge 110106 – 11/23/21. Spalling with Exposed Rebar.

Crash damage on Bridge 110129 – 2021. Beam Out of Plumb.

Crash damage on Bridge 110129 – 2021. Beam Out of Plumb.

Crash damage on Bridge 110169 – 2023. The north side of the diaphragm is ripped loose.

Crash damage on Bridge 110169 – 2023. Only 3 out of 10 bolts remained on the south side of Diaphragm 3.

Figure 5

Oversize Load with Secondary Push Trucks

Oversize/overweight truck operations traveling on I-40 currently must utilize various detours off I-40 to avoid striking the low bridges. A detour introduces safety concerns for many reasons outlined in this application, as well as the safety of law enforcement officers who often have to close roads temporarily and electric companies who move power lines, as shown in Figure 5, above.

This planning study will provide recommendations for a future construction project that will substantially improve the mobility of OSOW permitted vehicles by allowing them to remain on the most appropriate facility for their use. As shown in Figures 6 and 7, these low bridges require vehicles to travel circuitous paths on their east or west routes.

Figure 6

OSOW Routes for Eastbound Vehicles

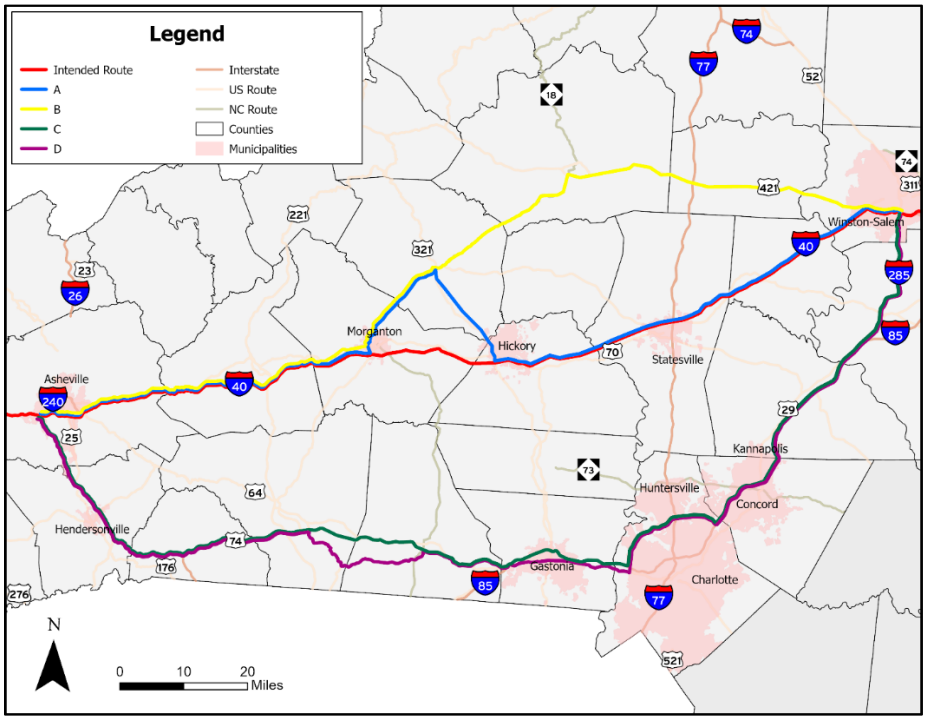
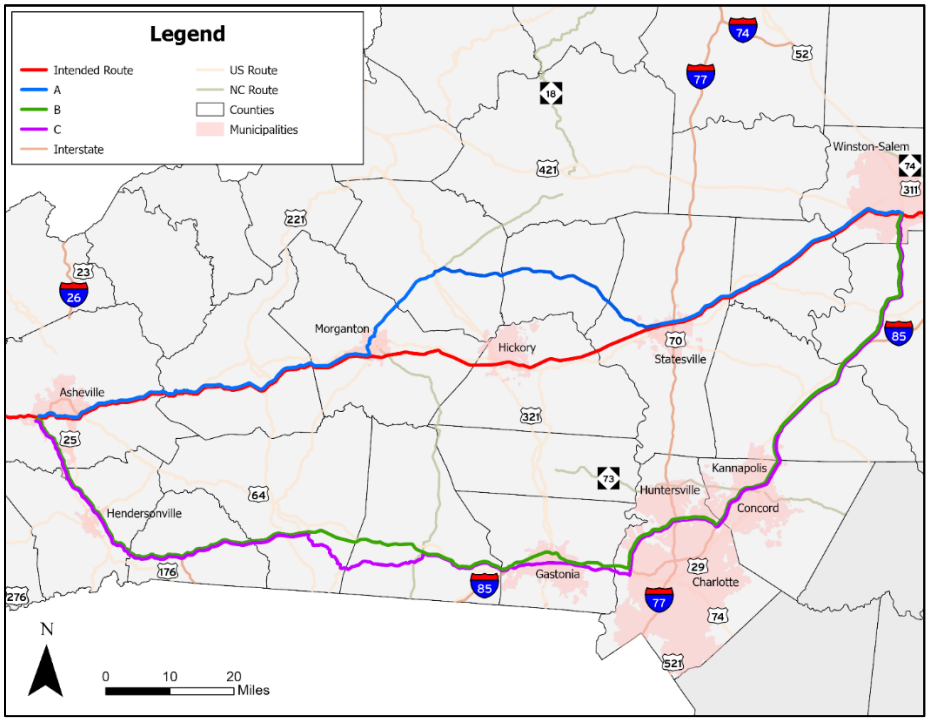


Figure 7

OSOW Routes for Westbound Vehicles



Removing these low bridges will drastically improve travel times and reduce fuel usage for OSOW permitted vehicles. The detour routes include other interstates, 4-lane median divided facilities, and 4-lane- and 2-lane non-access-controlled facilities. Many of these routes go through smaller communities and can disrupt local traffic, impacting schools, driveway access, bicycle and pedestrian travel.

As part of the planning study, NCDOT will evaluate appropriate bicycle/pedestrian facilities and will include a review of county and municipal bicycle pedestrian plans, as well as coordination with local planners and stakeholders.

Criterion 3. Economic Competitiveness and Opportunity

There is an old adage that "time is money." Nowhere is that statement more applicable than in the field of interstate commerce. The interstate system has played a vital role in the expansion of the nation's economy. According to research conducted by the FHWA, "From 1950 to 1989, approximately one-quarter of the nation's productivity increase is attributable to increased investment in the highway system." By improving transportation between regions, the interstate highway system has helped to expand the national market for goods as firms can supply their products to much larger geographical areas at lower costs. A 2013 National Bureau of Economic Research (NBER) publication found that each dollar of current federal highway grants received by a state raises that state's annual economic output by at least $2.

Diverting OSOW permitted vehicles off I-40 leads to substantially greater travel times and fuel consumption for these very large vehicles. In 2023 the American Transportation Research Institute (ATRI) estimated that the average tractor-trailer achieved 6.7 miles per gallon of fuel. Table 8 shows the extra miles and time traveled on the detour routes shown above. The direct route (I-40) covers 207 miles. Travel times were estimated using StreetLight data and Google Maps. Fuel consumption conservatively estimated based on 10 miles per gallon for regular tractor trailers and 3 mpg for heavy haul trailers and does not include gas consumption for escort vehicles and is rounded to the nearest mile. Fuel consumption estimates also do not consider the stop and start nature of traffic through communities.

Table 8

Miles and Additional Travel Times for Diverted OSOW Permitted Vehicles

Route (E/W)	Additional Travel Miles*	Additional Travel Time	Additional Fuel Consumption (range)
I-40 (No Diversions)	0	0	0
East Route A	14	35 minutes	2 gallons
East Route B	5	30 minutes	1 gallon
East Route C	44	40 minutes	6 gallons
East Route D	51	55 minutes	8 gallons
West Route A	9	35 minutes	1 gallon
West Route B	44	55 minutes	6 gallons

Route (E/W)	Additional Travel Miles*	Additional Travel Time	Additional Fuel Consumption (range)
West Route C	51	50 minutes	8 gallons

* Rounded to the nearest mile

In addition to fuel consumption, extra miles traveled adds to the cost of transport. Other elements that figure into transport costs include extra repair and maintenance, tire wear, driver wages and benefits, and permit costs. Increased costs generally find their way to consumers.

It is also critical to maintain I-40. In a recent (2023) NBER Working Paper entitled Highways and Globalization, research found that removing the Interstate Highway System (IHS) reduces the country's real GDP by $421 to $578 billion in 2012 dollars. The cost of removing I-40 from the IHS was estimated at $39.7 to $50.1 billion (2023 dollars). The total reduction attributed to domestic trade costs was estimated at $19.9 billion, and an additional $25.0 billion attributed to international trade cost. In terms of economic impact, few facilities compare with I-40. Only I-80 was found to have more economic value.

OSOW permitted vehicles carry economically significant cargo, from mobile homes to turbines to pre-cast infrastructure components. A list of east-west OSOW permitted loads for the most recent 16-month period is shown in Table 9.

Table 9

OSOW Permitting Load Type Distribution

Load Type	Count	Percent of Total
Manufactured Housing	652	45%
Storage & General	412	28%
Equipment & Machinery	311	21%
Power & Energy	67	5%
Building & Shelter	7	<1%
Military	3	<1%

Criterion 4. Climate Change, Sustainability, Resiliency, and the Environment

As noted above, diverting OSOW permitted vehicles off I-40 leads to substantially greater travel times and fuel consumption for the trucks and any required escort vehicles. Given the national importance of I-40 cargos, continued safe operations on I-40 is a critically needed improvement. In addition to increased fuel usage, it is also important to consider where these emissions take place. Many of the diverted routes pass through low-speed areas with no control of access, which tends to lead to substantial stop and start traffic. These conditions increase fuel consumption and emissions. And, as detailed in Criterion 5, many of these communities are disadvantaged.

Removal of barriers to OSOW cargos has other benefits. It increases the resiliency of the network for these loads. By keeping OSOW permitted vehicles on interstate routes, which are also designated as priority zero emission vehicle (ZEV) corridors, it will facilitate transition of these loads to ZEV use as the technology advances.

The ability to transport power and energy-related loads without detours on I-40 is critical during emergencies such as hurricanes and other severe weather events, which are common in North Carolina. These shipments constitute 4.60 percent of OSOW loads and the percentage increases during emergency situations. Timely delivery of equipment like cooling towers and generators are vital for restoring power and supporting emergency services. Current detours due to low bridges hinder prompt responses, potentially prolonging recovery efforts. By accommodating these loads on I-40, the project aims to enhance emergency logistics efficiency and strengthen community resilience during natural disasters.

Figure 8

Wind Turbine Transport in North Carolina

Bringing in newer and more modern electrical equipment efficiently also improves the resiliency of the national transportation network. By increasing efficiency and reducing transport costs, it increases the ability to upgrade local electric grids. This increases the ease of installing ZEV charging stations.

Criterion 5. Equity and Quality of Life

The I-40 COVER Project improves equity and quality of life in multiple areas. First there is the improvements in Burke and Catawba Counties in North Carolina. As shown in Table 10, bridges in the project area pass through multiple census tracts that qualify as Areas of Persistent Poverty (APPs) or Historically Disadvantaged Communities (HDCs). These populations will directly benefit from the construction of a future project due to increased safety and potential employment opportunities and indirectly from workers using area restaurants, hotels, and other services. In terms of direct impacts, the project greatly exceeds Justice40 Criteria.

Table 10

APP and/or HDC Population along I-40 COVER Corridor

Census Tract	APP/HDC Status	Population	% APP/HDC
37035011000	APP/HDC	2,140	100%
37035010900	APP/HDC	3,219	100%
37035011101	HDC	3,885	100%
37035011102	No	7,671	0%
37023021202	HDC	4,928	100%
37023021100	HDC	6,000	100%
37023021000	No	5,070	0%
37023020900	HDC	6,901	100%
37023021201	APP/HDC	3,724	100%
37023020802	HDC	3,553	100%
37023021400	APP/HDC	4,997	100%
37023020302	HDC	7,403	100%
37023020301	HDC	4,962	100%
Total		**64,453**	**80% (51,712 total)**

Eliminating diversions off I-40 will be provide definitive equity benefits. Currently the low bridges on I-40 require taller vehicles to divert to other facilities. As stated previously, several diversion routes include two-lane facilities. The tables below show several of these facilities and details the miles of the two-lane facility miles and overall roadway miles that lack control of access that are in APPs and/or HDCs.

Table 11

Miles Diverted OSOW Permitted Vehicles Travel on Two-Lane Facilities

Route (E/W)	Total 2-lane Miles	Miles Only APP	Miles Only HDC	Miles APP and HDC	Percentage APP and or HDC
West A / East A	9.49	1.88	0	6.81	91.6%
East B	30.45	0	14.99	0	71.7%
West C / East D	21.12	9.29	0	4.60	65.8%

Table 12

Miles Diverted OSOW Permitted Vehicles Travel on Facilities Without Control of Access

Route (E/W)	Total Access Control Miles	Miles Only APP	Miles Only HDC	Miles APP and HDC	Percentage APP/HDC
West A	39.71	3.30	14.20	12.81	76.3%
East A	38.6	0	4.37	20.21	63.7%
East B	47.19	0	17.91	12.81	65.1%
West B East C	17.09	7.09	0.33	2.35	57.2%
West C / East D	31.03	16.62	0.20	7.32	77.8%

The presence of OSOW permitted vehicles can cause significant difficulties when diversions take them to smaller facilities. One example of this is census tract 37023020100 in Burke County. This rural tract is on US 64 north of the Town of Morganton and has a population of just over 4,000 people. In this area, US 64 is a two-lane facility with limited passing zones and no paved shoulders. This can complicate the ability of vehicles to share the facility when driving in the opposite direction from the OSOW permitted vehicle. Based on a CEJST screening, the area is in the top 87th percentile in terms of low income and its disadvantages include agricultural land loss, heart disease, unemployment, percentage of those lacking a high school education, and transportation barriers. The lack of a dense roadway network offers limited redundant routes. In a region with few transportation options, any issues with an OSOW permitted vehicle could paralyze the entire area.

Other communities face different challenges from OSOW permitted vehicles. Census tract 37045951100 in Rutherford County is located in downtown Forest City, North Carolina and includes Alternate US 221, which is a three-lane facility with a central turn lane and no control of access. This disadvantaged census tract is in the top 94th percentile in terms of low income, and residents' disadvantages include high rates of diabetes, heart disease, low life expectancy, high energy costs, low median income, poverty, and those lacking in a high school education. In addition, tract residents are in the top 89th percentile in terms of asthma. Many houses are located on this part of Alternate US 221, along with businesses and restaurants. OSOW permitted vehicles are major intrusions and can contribute to difficulties, especially for those residents with asthma or those with limited access to motor vehicles.

The presence of manufactured housing among OSOW permitted vehicles (almost 45 percent) is significant. According to the 2021 American Housing Survey by the US Census Bureau, the median household income for manufactured housing owners was $35,000, significantly lower than the national average of $70,784. Eliminating detours will reduce travel times and costs for these loads, benefiting economically disadvantaged residents by improving access to affordable housing options and alleviating financial burdens associated with longer, more costly routes.

Figure 8

Manufactured House Oversized Load

According to the North Carolina Housing Finance Agency, in North Carolina there are approximately 470,000 occupied manufactured homes, of which 91 percent are inhabited by low-income households. The average monthly housing costs of manufactured housing is $655 per month, while the average monthly housing costs for all other types of homes is $1,232. For many people, manufactured homes are the only affordable housing option available. Any option that even marginally reduces the cost of such housing will be a disproportional benefit to people in financial need.

Equity During Project Development and Construction

NCDOT has established a Disadvantaged Business Enterprise (DBE) program to address ongoing discrimination and the continuing effects of past discrimination in transportation markets nationwide. This program will be used in all aspects of project letting.

In accordance with 49 CFR Part 26 and the Special Provisions, NCDOT has established goals for participation of DBEs in USDOT-assisted contracts, as well as state-assisted contracts. The Triennial Goals are set as follows:

- 2020 – 2022 Triennial DBE Goal for Federal Transit Administration - 1.9%
- 2021 – 2023 Triennial DBE Goal for Federal Aviation Administration - 8.9%
- 2021 – 2023 Triennial Combined Goal for NCDOT Division of Aviation (state funded projects) - 10.7%
- 2022 – 2024 Triennial DBE Goal for FHWA - 13.0%
- 2019 – 2021 Triennial Combined Goal for NCDOT (state funded projects) - 12.3% (revising soon)

On July 19, 2024, NCDOT reported that for a third straight year, the Department awarded a record amount of funding to small businesses. “NCDOT awarded nearly $65.4 million to small business enterprises (SBEs) through contracts under $1 million in the 2024 fiscal year, generating a 35

percent increase over the previous record of about $48.4 million in 2023 and double the target of $28 million."

NCDOT is committed to improving the depth of the transportation talent pool. Through the NCDOT Office of Civil Rights (OCR), the Department offers an On-the-Job Training (OJT) program. As of 2021, the OJT program included:

- 103 participating contractors
- 33 contractors with an assigned trainee goal
- 5 contractors without an assigned trainee goal
- 111 trainees enrolled

The Department operates Accelerated Boot Camps (ABCs), which are accelerated, two-week versions of the Highway Construction Trades Academy (HCTA), in NCDOT's 14 Divisions as well as full, six-week versions of the program. HCTAs and ABCs are customized to the local area and are designed to train participants and connect the talent pipeline to new employment. Currently, typical subjects may include:

- Construction math
- OSHA 10, CPR/First Aid
- Flagger certifications
- Introduction to Earthmoving and Heavy Equipment Training
- Introduction to Commercial Driver's License (CDL)

Participants in OJT or HCTAs can receive Advanced Highway Skills Training (AdT) in current/developing needs areas. This includes bridgework, disaster recovery, EV charging station installation, and CDL for women. The Department is actively examining expansion of these programs to include additional subjects, including broadband installation and maintenance.

NCDOT is also working with its Historically Black Colleges and Universities (HBCUs) and the state's MSI (UNC Pembroke, established by the Lumbee Tribe of North Carolina) to build the transportation labor force. Some examples include:

- NC A&T State University's Center of Excellence for Connected and Autonomous Vehicle Technology
- Fayetteville State University's SAP Next-Gen Lab for transportation geospatial research
- Elizabeth City State University's four-year Unmanned Aircraft Systems (UAS) degree program

NCDOT's OCR will explore the possibility of providing HCTA, ACTs, and/or AdTs in the Division during construction. The Department will encourage the use of DBE firms as part of the letting/administration process.

Criterion 6. Innovation

NCDOT continues to explore innovative ways to address the needs of the traveling public. The bundling approach proposed in this grant is a novel approach to determine the most efficient way to clear the I-40 corridor for OSOW permitted vehicles. As noted previously, part of NCDOT's funding will come not from state or federal taxes, but from the funds collected from OSOW permits. This innovative approach minimizes taxpayer funding of the planning study.

NCDOT is looking at innovative construction methods including retaining substructure components for project bridges where possible to reduce costs. The Department also evaluates the

use of recycled concrete to reduce waste and greenhouse gas emissions. In determining the proper construction approach, NCDOT will explore innovative construction approaches such as design-build.

V. Administration Priorities and Departmental Strategic Goals

As noted throughout this application, the I-40 COVER project will support all of the administration priorities and departmental strategic goals listed in the NOFO.

As stated in Criterion 2. The project will improve safety by evaluating the project bridges using a detailed crash analysis to determine potential geometric condition concerns, as well as reduce the potential for over-height vehicles crashing into the structures. The project will lead to a construction project that will return OSOW vehicles to the proper facility for their use, improving the safety of current diversion routes. NCDOT has strong work zone practices in place to ensure the safety of the traveling public during maintenance and construction activities.

As stated in Criterion 4, the project will address climate change, environmental justice, and resiliency. The project will improve existing structures, avoiding or minimizing environmentally impactful new location construction. By allowing OSOW permitted vehicles to remain on I-40, miles traveled and fuel consumption for these energy-intensive vehicles will be reduced. The project will reduce OSOW permitted vehicles requirements to travel on non-access controlled facilities, many of which are in environmental justice communities. The project will improve the efficiency of the I-40 system in transporting critical components needed to upgrade our existing power grid and support emergency response actions.

As stated in Criterion 5, NCDOT has conducted a thorough equity evaluation of the project corridor and current OSOW detour routes. The proposed project schedule for the planning study includes multiple additional public involvement points to ensure the voice of the community and other stakeholders are heard and accommodated to the extent practicable. There are multiple ways the project will fight climate change through reduction of greenhouse gas emissions for thousands of OSOW permitted vehicles each year. The workforce development component of the subsequent construction project is fully detailed.

As stated in Criterion 5, workforce development is a key consideration for NCDOT. On July 19, 2024, NCDOT reported that for a third straight year, the Department awarded a record amount of funding to small businesses. "NCDOT awarded nearly $65.4 million to small business enterprises (SBEs) through contracts under $1 million in the 2024 fiscal year, generating a 35 percent increase over the previous record of about $48.4 million in 2023 and double the target of $28 million." Due to the disadvantaged nature of this portion of the I-40 corridor, the subsequent construction project is a prime candidate for Highway Construction Trade Academy (HCTA) implementation.

VI. DOT Priority Selection Considerations

NCDOT lacks the funding to fully address the needs of the I-40 corridor in a timely fashion. As detailed in the application, of NCDOT's 14 Divisions, Division 13, which contains Burke County, has the largest number of bridges. Many of these structures are facing the end of their designed lifespan. NCDOT is working to maintain these structures, but without additional funding it will not be possible to develop the information needed to develop a definitive plan for not only addressing current deficiencies, but to free the I-40 corridor for greater use by OSOW permitted vehicles.

This project will complete the planning process that will enable NCDOT to pursue Large Bridge Project funding to clear the I-40 corridor for over 95 percent of all OSOW permitted vehicles, based on 2023 and 2024 data. As noted in the application, the anticipated replacement costs for all the project bridges exceeds $170 million dollars. Thes improvements will upgrade or replace multiple bridges in poor or fair condition.

VII. Conclusion

NCDOT appreciates USDOT's consideration of our request for $890,000 in Bridge Investment Program planning funds to address the critical challenges caused by low bridges over I-40: the need to replace the aging structures and the diversions caused to OSOW permitted vehicles onto roadways that are not designed to accommodate them, creating costly diversions. NCDOT is committed to providing a match of $235,000 to achieve the goals of this planning study.

As noted above, diversions of OSOW permitted vehicles cause travel time delays, increased fuel consumption, and create air quality and safety issues, especially when vehicles are diverted onto secondary roads. Often, these routes pass through disadvantaged communities.

NCDOT has begun the process of improving and replacing aging structures over I-40 as funds are available. This study would conduct a bundled evaluation that would determine the most cost-effective way to remove barriers to OSOW commerce while addressing these needs along I-40. The proposed planning study would evaluate bridges over I-40 west of Winston-Salem, NC, that are potential barriers to OSOW permitted vehicles traveling east-west. All of the structures are under 15.5 feet in height, which force many OSOW vehicles to divert from I-40 to areas described above. All of these structures were built between 1955 and 1958, dating back to the original construction of I-40. Based on NBI data, the bridges are in Fair or Poor condition, and need substantial renovation or replacement based on their age and condition. Some of these bridges are currently included in the North Carolina State Transportation Improvement Program (STIP), but many lack funds for right of way (ROW) and construction.

I-40 is a critical economic engine for the entire United States. In Highways and Globalization, (National Bureau of Economic Research, 2020) Jaworski et. al., estimated that removing I-40 would reduce domestic trade by over 27 billion dollars and international trade by over 3 billion dollars. This made the I-40 system the third most valuable roadway network in the interstate highway system (behind I-5 and I-10) in the United States.

The proposed planning study will provide several critical pieces to assist NCDOT in developing a plan to allow OSOW permitted vehicles to be routed through I-40 as quickly as possible with the maximum benefit to the traveling public. NCDOT requests your strong consideration of this application.