



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



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

June 15, 2026

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 freight vehicles onto roadways that are not designed to accommodate them, creating unsafe and costly diversions. NCDOT will develop a bundled planning study for replacing or improving bridges over I-40 west of Winston-Salem, NC with clearances under 15.5 feet to allow OSOW permitted vehicles to be routed east-west through I-40 as quickly as possible with the maximum benefit to the traveling public. Current and proposed structures that are targeted for improvement are shown in Table 2, with NC County Bridge numbers shown for ease of display. The study will include:

- A bridge-by-bridge deficiency and clearance assessment with an in-depth crash and safety analysis for each overpass and interchange.
- A prioritization and sequencing framework for future replacement/improvement projects.
- Planning level cost assessments for each structure.
- An evaluation of environmental and permitting constraints.
- A recommended pathway for a future bundled Large Bridge Grant construction project.

NCDOT is committed to providing a match of \$235,000 to achieve the goals of this planning study. NCDOT has developed a [project website for supplemental information and letters of support](#).

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.

Diversions caused by low bridges result in 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 rural communities. Navigating OSOW permitted vehicles in these areas presents unique challenges, especially with driveway access, non-vehicular travelers, 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 has begun the process of improving and replacing aging structures over I-40 as funds are available. All of the structures in the study are under 15.5 feet in height, which forces many OSOW vehicles to divert from I-40 to areas described above. 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.

Based on Table 1, raising these bridges to at least 15.5 feet would give over 94 percent of east-west OSOW vehicles across North Carolina the option of traveling on I-40, a substantial expansion

of routing flexibility along the corridor. While some OSOW vehicles exceeding 15.5 feet would still require diversions due to other bridges in the project area that fall short of 17 feet, the planning study will evaluate where these clearance improvements are feasible to maximize that benefit.

Table 1

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

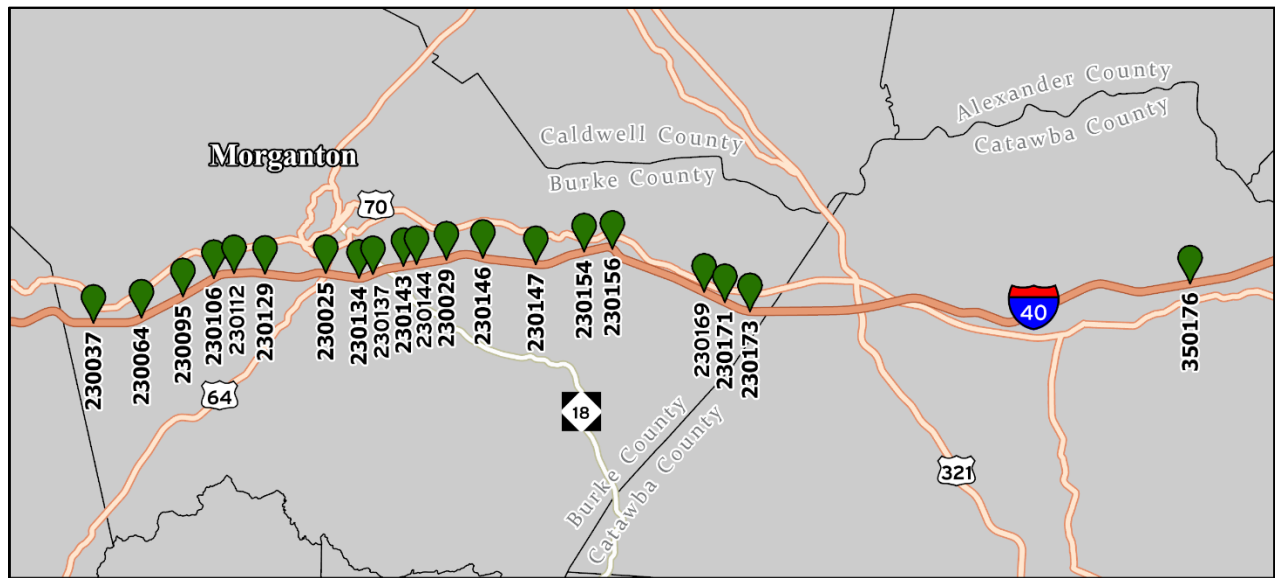
Vehicle Clearance Required	Count	Cumulative Percentage
Less than 15 feet	1052	72.30
Less than 15.5 feet	1373	94.36
Less than 16 feet	1454	99.93
Greater than or equal to 16 feet	1455	100.00

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 North Carolina with Tennessee and the Midwest. A map of the bridges proposed for evaluation is shown in Figure 1. For ease of display, the NC bridge numbers are shown rather than the NBI numbers.

Figure 1

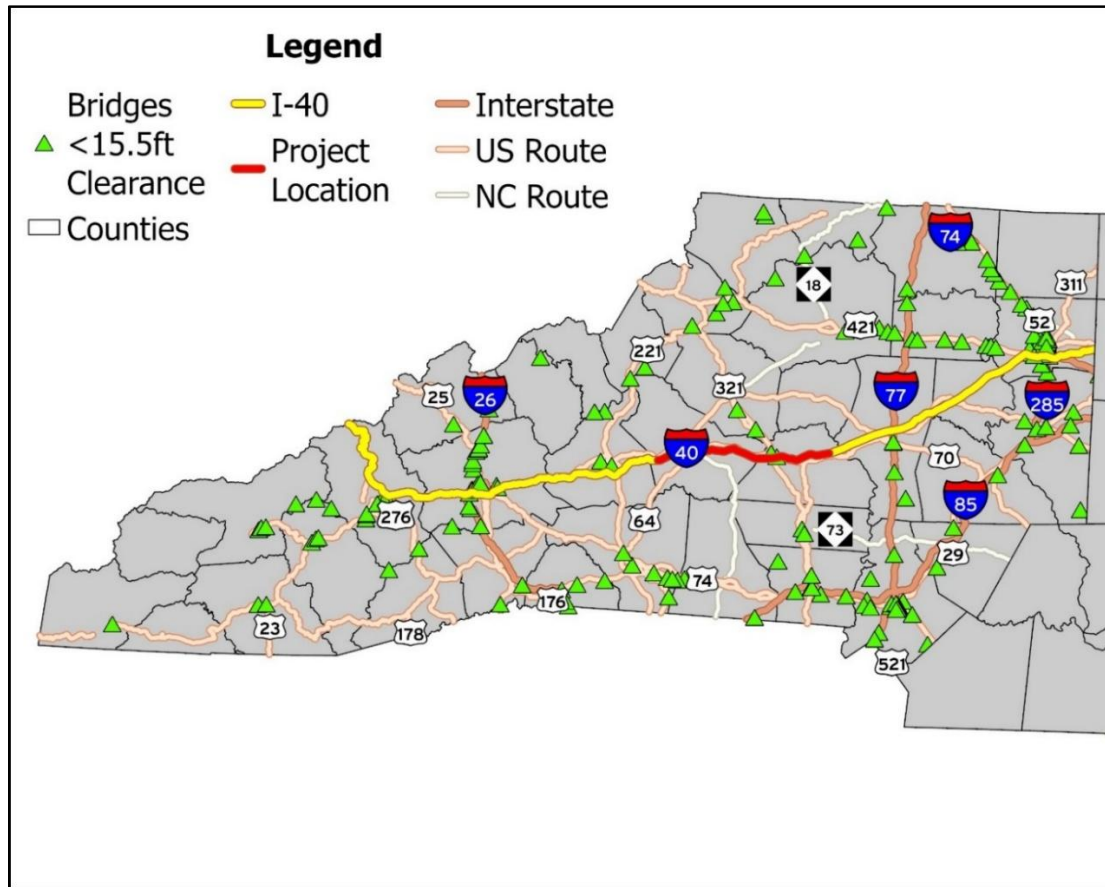
Project Study Area Showing Bridges of Concern



Low bridges are a significant issue throughout western North Carolina. As shown in Figure 2 below, there are numerous low bridges on other major facilities. This limits the vehicles 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



Based on the information noted above, NCDOT will develop a strategy report for replacing or improving I-40 bridges with clearances under 15.5 feet. NCDOT will coordinate with the freight industry and local stakeholders to obtain valuable input on local and regional needs. The evaluation will take into account the ability of OSOW vehicles to avoid bridges at interchanges where taking ramps will avoid the under-height structures, as well as the crash history of the current structure alignments. The evaluation will also include bundling strategies 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). Bundling will allow for far more efficient project staging on site, as in some areas a single staging site could be used for multiple replacements. Finally, the evaluation will include recommendations on the potential use of innovative materials or financing vehicles, such as design-build.

Together, these efforts will position NCDOT to advance a strategic, corridor-level investment that improves the safety, efficiency, and reliability of both freight and passenger travel along I-40. By identifying and prioritizing bridge improvements and replacements, the proposed planning study directly supports the goals of the Bridge Investment Program by reducing the number of bridges in poor condition or at risk of deterioration, while also addressing structures that do not meet current geometric or operational requirements. In doing so, the study will lay the groundwork for

future investments that enhance system performance, reduce OSOW-related constraints, and strengthen the long-term condition and resiliency of this nationally significant freight corridor.

II. National Bridge Inventory Data

The National Bridge Inventory (NBI) database provides condition ratings for bridge decks, superstructures, and substructures on a scale from 1 to 10. Ratings of 1 to 4 are classified as “Poor,” 5 to 6 as “Fair,” and 7 or higher as “Good.”

Because the most recent NBI data does not yet reflect NCDOT’s latest biannual inspections, Table 2 includes both NBI data and updated inspection results for the project bridges. These data show that while NCDOT continues to invest in maintenance, overall bridge conditions remain a concern. Since the last NBI update, four bridges have improved, while seven have declined in condition, including five that are now rated as poor. This trend highlights the ongoing challenge of maintaining aging infrastructure along this critical freight corridor.

Bridges marked with an asterisk (*) in Table 2 have been recently improved, although some are still narrow bridges that need overall replacement. Bridges marked with a # are currently listed in the NCDOT STIP for replacement. The remaining structures will be the focus of the proposed planning study. Additional inspection data are provided in the Supplemental Materials. The Causby bridge was replaced following an explosion of [a truck carrying gasoline on July 24, 1998](#). The explosion destroyed the bridge and caused detours of I-40. Non-stop work by NCDOT and support staff opened I-40 to vehicular traffic on [July 25, 1998](#).

Table 3 includes average annual daily traffic (AADT) and identifies existing non-vehicular accommodations on each overpass to support a comprehensive evaluation of corridor needs. It should be noted that many of these overpasses have narrow lanes with minimal shoulders and carry substantial freight traffic. Replacement of the I-40 COVER bridges would improve the safety of these facilities.

Table 2

Condition of Project Bridges (Bold indicates bridges in Poor condition. Prior NBI data in parentheses if different)

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) 4	(5) 4	15.0
95	98	Causby	SR 1147	(9) 8	(9) 8	7	16.9*
106	n/a	Conley	SR 1168	(6) 8	5	6	14.3
112	100	Jamestown	SR 1142	(6) 7	5	(5) 4	14.7
129	n/a	Hopewell	SR 1102	6	5	(5) 4	14.7
25	103	Burkemont	US 64	6	5	(5) 4	14.9

Bridge No.	Exit No.	Road Name	Route No.	Deck Condition	Super-structure Condition	Sub-structure Condition	Vertical Clearance (ft) ¹
134	104	Enola	SR 1922	6	8	7	17.9*
137	n/a	Old NC 18	SR 1924	6	(6) 5	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) 4	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) 9	(5) 9	(5) 8	15.7*
156	n/a	Coldwater	SR 1755	(6)	(7) 8	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

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

Table 3

2024 AADT and Non-vehicular Accommodation of Project Bridges

Bridge No.	Exit No.	Road Name	Route No.	AADT North of I-40	AADT South of I-40	Non-vehicular Accommodation
37	94	Dysartsville	SR 1129	3,700	3,000	None
64	96	Kathy	SR 1138	2,200	1,800	None
95	98	Causby	SR 1147	1,000	1,500	None
106	n/a	Conley	SR 1168	1,000	3,200	None
112	100	Jamestown	SR 1142	13,000	6,300	None

Bridge No.	Exit No.	Road Name	Route No.	AADT North of I-40	AADT South of I-40	Non-vehicular Accommodation
129	n/a	Hopewell	SR 1102	2,000	1,800	None
25	103	Burkemont	US 64	25,000	23,000	Sidewalk adjacent to bridge
134	104	Enola	SR 1922	6,500	10,500	Sidewalk
137	n/a	Old NC 18	SR 1924	2,200	1,900	None
143	n/a	East Parker	SR 1708	2,300	1,500	None
144	106	Bethel	SR 1704	3,700	3,000	None
29	107	Drexel	NC 114	7,300	2,700	None
146	n/a	Jacumin	SR 1843	650	n/a	None
147	n/a	Carolina	SR 1734	3,900	1,300	None
154	113	Malcolm	SR 1001	14,000	1,600	Sidewalk north of bridge
156	n/a	Coldwater	SR 1755	700	n/a	None
166	n/a	Pedestrian Bridge	n/a	n/a	400	None
169	n/a	Berry	SR 1765	750	2,400	None
171	118	Old NC 10	SR 1761	5,000	4,800	None
173	119	Henry River	SR 1002	7,200	4,400	Sidewalk south of bridge
Catawba 176	n/a	N. Lookout St / Bunkerhill School	SR 1716	4,200	10,000	None

III. Project Budget and Schedule

The proposed budget for the planning study is shown in Table 4. Table 5 shows the estimated structure replacement costs that will be updated for a subsequent Large Bridge Project BIP grant application (NC bridge numbers are shown for ease of display). One innovative aspect of this planning grant is that part of NCDOT’s match will come from OSOW non-federal 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).” Overall, the budget includes \$890,000 in BIP Planning funds (79.1%), \$235,000 in a non-federal match (20.9%), and \$0 in other federal funds.

Table 4

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
Feasibility Analyses	\$890,000	Grant Funds
Planning Level Concepts	\$50,000	NCDOT State Bridge Program funds
Report Development	\$65,000	NCDOT State Bridge Program funds
Project Management	\$15,000	NCDOT State Bridge Program funds
Administration/Expenses	\$25,000	NCDOT State Bridge Program funds
Total		\$1,125,000

Table 5

Estimated Replacement Costs for Planning Study Bridges

Structure No.	Bridge No.	Exit No.	Vertical Clearance	Replacement Cost
230037	37	94	16.9	\$12,601,058
230064	64	96	15.0	\$7,519,658
230095	95	98	16.9	\$6,863,974
230106	106	n/a	14.3	\$7,245,722
230112	112	100	14.7	\$9,125,870
230129	129	n/a	14.7	\$8,747,213
230025	25	103	14.9	\$13,090,061
230134	134	104	17.9	\$16,261,503
230137	137	n/a	15.2	\$9,478,403
230143	143	n/a	15.1	\$6,411,486
230144	144	106	14.9	\$6,312,696
230029	29	107	14.5	\$8,231,129
230146	146	n/a	15.5	\$6,140,011

Structure No.	Bridge No.	Exit No.	Vertical Clearance	Replacement Cost
230147	147	n/a	14.4	\$6,318,982
230154	154	113	14.6	\$8,231,129
230156	156	n/a	21.0	\$7,566,826
230166	166	n/a	14.4	n/a (pedestrian bridge)
230169	169	n/a	14.5	\$6,531,010
230171	171	118	14.7	\$7,935,107
230173	173	119	14.8	\$13,319,702
350176	Catawba #176	n/a	15.3	\$8,162,261
Total:				\$176,093,801

Figure 3

Project Schedule from Obligation of Grant Funds

Months After Obligation of Funds	1	2	3	4	5	6	7	8	9	10	11	12
Information Gathering												
Crash Analysis												
Public Involvement												
Feasibility Studies												
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

This planning study is expected to advance the following Bridge Investment Program (BIP) goals:

- (1) improving the safety, efficiency, and reliability of the movement of people and freight; and
- (2) improving bridge conditions by reducing deficient structures and addressing outdated design and capacity limitations.

Criterion 1. State of Good Repair

NCDOT is responsible for maintaining the nation’s 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. Division 13 has the largest bridge inventory in the state, meaning it faces a greater maintenance challenge than any other division and without supplemental funding, addressing needed improvements and replacements will take decades. All of the I-40 COVER bridges were constructed at the same time and are now beyond their design life. As Table 2 shows, these structures are falling into poor condition and will continue to decline without replacement. This study will balance the needs of each structure with the necessary sequencing to maximize benefit to the traveling public and freight operators.

Prioritizing which bridges to replace first is a substantial challenge. When weighing where replacements will yield the greatest economic return, the interstate network is the logical starting point.

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 initially 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	

Due to the number of low bridges, timely replacement of the remaining 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. Immediately to the east, NCDOT has included improvements to the I-40 overpass in their TIP. Accommodations for non-vehicular transportation on that facility will be explored to avoid loss of non-vehicular connectivity. These efforts will not be sufficient to allow accommodation of OSOW-permitted vehicles without the additional funding the I-40 COVER project will provide.

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)

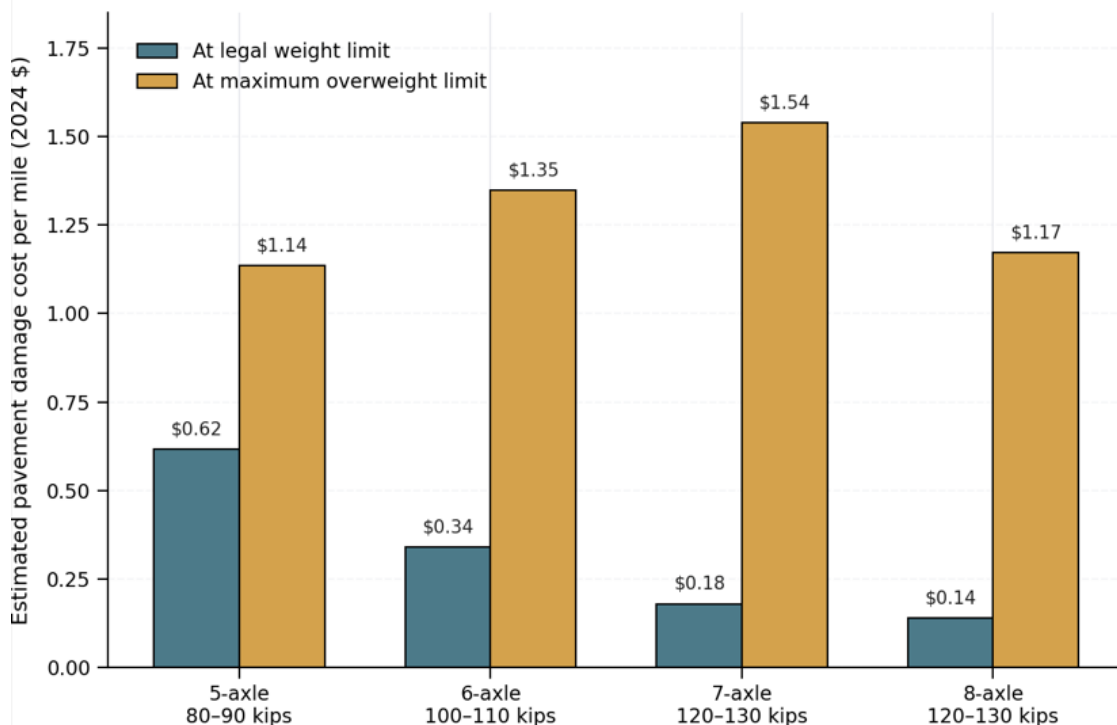
Each I-40 COVER Structure will be evaluated using the following criteria:

- NBI data
- Maintenance burden
- Bridge clearance
- Overpass truck traffic and overall AADT
- Detour burden for OSOW-permitted vehicles
- Crash history
- Replacement complexity
- Benefit/cost assessment
- Staging/sequencing advantages.

Another important consideration is the damage diverted OSOW permitted vehicles cause to secondary roads. These routes are designed for “normal” traffic – cars and standard trucks. OSOW vehicles are heavier, wider, and place more stress on these roads than they were designed to handle. As a result, even a small number of OSOW trips can accelerate pavement deterioration by causing rutting and structural cracking. Koh et al., demonstrated that OSOW vehicles can generate significantly higher damage than standard trucks, in some cases producing multiple times the pavement wear per pass. Because rural roads are designed for lighter traffic, these impacts lead to faster pavement degradation, increased maintenance needs, and higher lifecycle costs for agencies.

As shown in Figure 4, Koh states that an OSOW vehicle carrying a maximum load can damage pavement to a far greater degree than the average truck. Extrapolating that article’s cost to 2024 dollars, a 7-axle OSOW vehicle with the maximum permitted load (120 to 130 thousand pounds of weight) causes more than 8 times the damage per mile to low-volume rural roads as a legally permitted non-OSOW vehicle.

Figure 4 How OSOW Detours Translate into Pavement Damage (costs in 2024 dollars)



Data updated from [Koh et al., 2023](#). Mechanistic Basis for Permit Fee Decision of Superloads Traveling on Low-Volume Roads Using Structural Damage Evaluation.

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 6 shows the bridge strike crashes on I-40 bridges over the past 10 years.

Table 6

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
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 7. 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 7

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 are documented over height collisions with the project overpasses. The damage is visible in Figure 5. 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 8 for structure closures or lane restrictions apply following an over height collision with an overpass.

Table 8

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

Figure 5

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



Crash at Bridge 230106 Closing I-40



Crash at Bridge 230144 Closing I-40



Crash Damage on Bridge 230106 – 11/23/24. Spalling.



Crash Damage on Bridge 230106 – 11/23/21. Spalling with Exposed Rebar.



Crash damage on Bridge 230129 – 2021. Beam Out of Plumb.



Crash damage on Bridge 230129 – 2021. Beam Out of Plumb.



Crash damage on Bridge 230169 – 2023. The north side of the diaphragm is ripped loose.



Crash damage on Bridge 230169 – 2023. Only 3 out of 10 bolts remained on the south side of Diaphragm 3.

Oversize/overweight truck operations traveling east-west through the project area must currently 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 6.

Figure 6

Oversize Load with Secondary Push Trucks



The I-40 COVER 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 7 and 8, these low bridges require vehicles to travel circuitous paths on their east or west routes.

Figure 7

OSOW Routes for Eastbound Vehicles

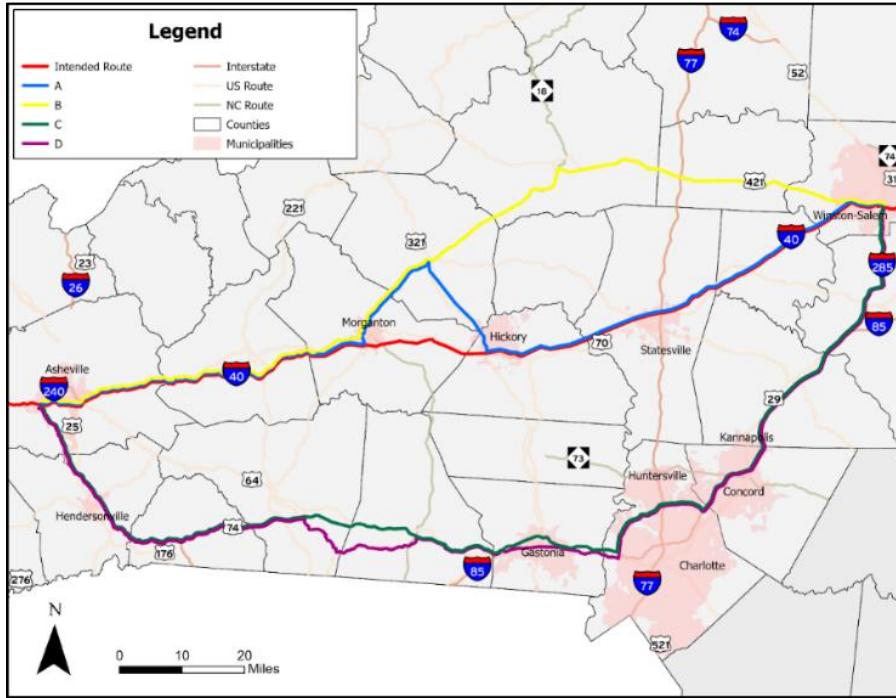
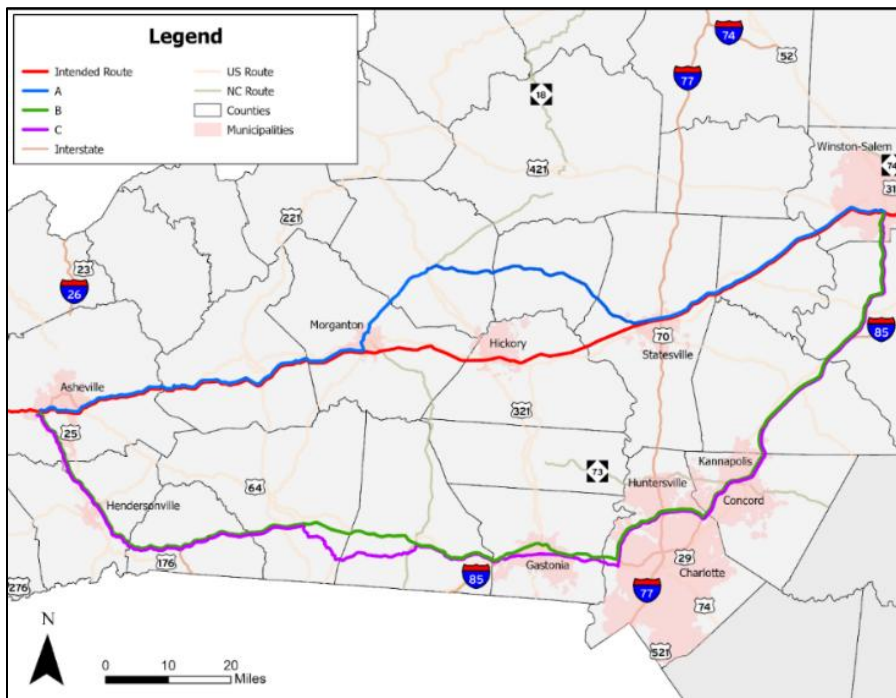


Figure 8

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, and non-vehicular travel. It should be noted that if an OSOW vehicle has a failure in these areas, its removal provides substantial challenges. The disabled vehicles could take several hours to move and special, heavy-duty tow trucks are required. Many diversion routes take OSOW vehicles through foothill communities that do not have a highly integrated transportation network. Incidents could paralyze traffic in an entire region.

As part of the planning study, NCDOT will evaluate appropriate non-vehicular and public transportation facilities and will include a review of county and municipal non-vehicular plans, as well as coordination with local planners and stakeholders.

Criterion 3. Economic Competitiveness and Opportunity

The I-40 COVER planning study aligns with the goals of the [North Carolina Statewide Freight Plan](#), as it supports improved freight efficiency, reliability, safety, and competitiveness. 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. Table 9 shows the extra miles and time traveled on the detour routes shown above. The direct route (I-40) covers 207 miles. Travel times for I-40 and detour routes were estimated using StreetLight data and Google Maps. Currently, the required diversions impose a meaningful mobility penalty on OSOW vehicles. The shortest detour shown still adds 5 miles and 30 minutes, while the longest detours add 51 miles and up to 55 minutes for both the OSOW vehicle and any escort vehicles.

In 2023, the American Transportation Research Institute (ATRI) estimated that the average tractor-trailer achieved 6.7 miles per gallon of fuel. 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 9

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
West Route C	51	50 minutes	8 gallons

* Rounded to the nearest mile

In addition to fuel consumption, diversions add to the cost of transport. Longer diversions increase repair and maintenance, tire wear, driver expenditures and benefits, and permit costs. Increased costs generally find their way to consumers.

Maintaining OSOW vehicles on I-40 also provides benefits with respect to truck parking. There are three I-40 rest area locations west of Statesville: Haywood at Mile Marker (MM) 10, McDowell at MM 82 and Catawba at MM 136. Each rest stop has eastbound and westbound facilities with truck parking access. There are also a number of truck stops (for example the Canton Sandy’s Auto Truck Plaza, the Candler Travel Centers of America, and the Nebo Truck Stop) that provide truck parking opportunities. This provides truck drivers with more reliable and safer facilities constructed for their use.

Few corridors in the United States have the economic significance of I-40. A 2023 National Bureau of Economic Research (NBER) [Working Paper entitled Highways and Globalization](#) evaluated the economic value of highway corridors. Maintaining reliable operations along I-40 is therefore critical to both national and regional economic performance. The research found that removing the Interstate Highway System would reduce U.S. real GDP by \$421 to \$578 billion (2012 dollars). Within that system, the loss of I-40 alone is estimated to result in \$39.7 to \$50.1 billion (2023 dollars) in economic impact, including \$19.9 billion in domestic trade losses and \$25.0 billion in international trade impacts. These findings underscore the importance of maintaining uninterrupted, efficient freight movement along I-40, including reducing constraints such as low-clearance structures that limit its use by OSOW vehicles. The recent events associated with the closure of sections of I-40 due to Hurricane Helene, and the subsequent supply chain issues that diverted trucks along rural routes in western North Carolina and Eastern Tennessee highlights the critical importance of I-40.

OSOW permitted vehicles carry economically significant cargo, from manufactured 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 10.

Table 10

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. Resiliency and the Environment

The I-40 COVER planning study will improve corridor resiliency and environmental performance by identifying how to keep more OSOW traffic on the interstate system rather than diverting those vehicles and their support vehicles onto longer, less suitable routes. Today, low-clearance barriers on I-40 force OSOW detours require additional miles, additional fuel consumption, more stop-and-go operating conditions, and more conflict with community travel patterns. Reducing these diversions would improve both corridor efficiency and the resilience of the regional freight network. Bridges in this section of I-40 were designed more than 70 years ago. Upgrading structures to current design standards using updated construction materials and methods will produce a safer, more resilient corridor that will require much fewer resources to maintain and reduce crashes and other delays that require valuable resources.

In addition to operational benefits, the study will support improved resilience to extreme weather events and natural disasters. The current structures are approaching or exceeding their design life, increasing vulnerability to deterioration and damage from flooding, severe storms, and other hazards common in North Carolina. By prioritizing the replacement of aging and low-clearance structures, the study will help position future investments to meet current design standards and better withstand future climate conditions.

Maintaining reliable routing along I-40 is also critical for emergency response and recovery. OSOW permitted vehicles frequently transport essential equipment such as transformers, cooling systems, and generators needed to restore power and support emergency operations following hurricanes and severe weather events. These loads currently represent approximately 4.60 percent of OSOW movements, with higher proportions during emergency response conditions. When low bridges force these vehicles onto secondary routes, response times can be delayed, potentially prolonging recovery efforts. This study will allow the future construction project to prioritize replacements that minimize OSOW diversion, speeding the delivery of critical emergency materials by an hour or more. In emergency situations, each hour is critical.

The results of the study and the subsequent large bridge grant will remove OSOW barriers on I-40 and improve the resiliency of the I-40 corridor by preserving reliable access for critical equipment

movement and reducing dependence on secondary-road detours that are more vulnerable to operational delay, weather disruption, and community conflict. The sequence of replacement will provide the greatest dollar-for-dollar benefits, allowing for more direct OSOW routing.

From an environmental perspective, the study identifies ways to reduce detour-related fuel use and emissions by allowing more OSOW traffic to remain on the most direct and operationally appropriate route. The future bundled construction projects would also reduce the need to route large loads through smaller communities and lower-speed facilities where stop-and-start conditions can increase fuel consumption and pollutant emissions. In this way, the planning study supports both long-term corridor resiliency and improved environmental performance through more efficient freight movement.

Bringing modern energy and infrastructure components to their destinations more efficiently also strengthens the resilience of the broader transportation and utility network. By reducing travel time, costs, and routing constraints for these critical loads, the project supports more reliable upgrades to power systems and other essential infrastructure, particularly during periods of increased demand following major weather events.

Criterion 5. Quality of Life

The I-40 COVER planning study will improve quality of life by reducing the need to divert OSOW permitted vehicles away from the interstate system and through smaller communities, local roads, and facilities that are less suitable for unusually large freight movement. Today, these diversions can affect driveway access, school-area traffic, non-vehicular, public transportation users, and ordinary local travel in the communities crossed by alternate routes. Keeping more OSOW traffic on I-40 would reduce those burdens and improve the day-to-day travel environment for residents and local businesses in the corridor.

Maintaining OSOW-permitted vehicles on I-40 also provides tangible quality of life benefits for truck drivers. It reduces the extra miles traveled to deliver loads while allowing truck drivers to access commercial truck parking facilities. They would also avoid the stress inherent in maneuvering large vehicles on small rural roads where there is a greater risk of conflicts with drivers, more challenging roadway geometries, and more non-vehicular traffic.

NCDOT has developed public involvement plans (PIPs) for the current bridge replacements in the project area, and public involvement will be a critical component of this effort. Outreach will focus on gathering targeted input from stakeholders, including OSOW operators, local governments, emergency responders, and corridor communities, to better understand existing routing constraints, safety concerns, and community impacts. Stakeholder input will be used to identify locations where OSOW detours create operational or safety challenges, inform strategies to minimize disruption during construction, and refine recommendations for bridge replacement and interchange improvements that are both constructable and permissible. Feedback will also support evaluation of non-vehicular needs and intersection configurations. The study will also incorporate local non-vehicular plans and broader stakeholder input to ensure that recommended improvements align with the region's vision for multimodal mobility.

As mentioned previously, bridges in the project area pass through Burke and Catawba counties, home to numerous rural communities such as Connelly Springs, Valdese, and Morganton. These populations will directly benefit from the construction of a future project due to increased safety

of the structures and ramps, potential employment opportunities and economic stimulus from workers using local restaurants, hotels, and other services.

Burke and Catawba Counties are facing economic challenges. The [North Carolina Department of Commerce](#) (2025), provided the most recent complete data on the economic status of North Carolina counties. Burke County is listed as a Tier 1 county (most distressed economically) and Catawba County is listed as a Tier 2 County. Catawba County had an adjusted property tax base per capita of \$124,913, below the statewide average of \$155,940 and an adjusted median income of \$63,934. Burke County had the eighth lowest tax base per capita at \$90,203 and the median income for the county was \$60,629, which is below the North Carolina average of \$67,516.

The areas through which OSOW vehicles are diverted are also facing challenges. As shown below, 6 of the counties through which OSOW vehicles are diverted are Tier 1 counties and 9 are Tier 2 counties. Removing OSOW vehicles from rural routes would avoid traffic bottlenecks, reduce local infrastructure improvement costs, and increase travel time reliability.

County	Urban/Rural ¹	Tier Designation
Alexander	Rural	1
Wilkes	Rural	1
Yadkin	Rural	2
Forsyth	Urban	2
Caldwell	Urban	1
Burke	Urban	1
Davidson	Urban	2
Buncombe	Urban	2
Catawba	Urban	2
Rutherford	Rural	1
Cleveland	Rural	1
Henderson	Urban	2
Polk	Rural	2
Iredell	Urban	3
Rowan	Rural	2
Mecklenburg	Urban	3
Cabarrus	Rural	3
Gaston	Rural	2

1 – Urban/Rural designation based on [Census Data](#)

According to the [Interstate Bridge Replacement Program](#), bridge replacement projects impact local economy through jobs and spending. This includes:

- Direct impacts (construction jobs)
- Indirect impacts (goods and services needed for the work being completed by those with direct jobs)
- Tertiary impacts (money spent at restaurants, hotels, retail stores by those benefiting from direct or indirect impacts).

Additionally, eliminating diversions off I-40 will provide definitive benefits to quality of life for the small, rural communities in the project corridor. 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. Table 11 shows the miles OSOW vehicles are diverted onto two-lane roads or facilities that provide median spacing (control of access).

Table 11

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

Route (E/W)	Total Non-Access Control Miles
West A	39.71
East A	38.6
East B	47.19
West B East C	17.09
West C / East D	31.03

The presence of OSOW permitted vehicles can cause significant difficulties when diversions take them to smaller facilities. One example of this is in the Town of Morganton in Burke County. This rural town 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. 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 mobility through an entire community.

Figure 10

Manufactured House Oversized Load



Criterion 6. Innovation

The I-40 COVER planning study incorporates innovation in project strategy, funding, and future delivery approach. The most important innovation is the bundled corridor strategy. Rather than addressing low-clearance bridges one at a time as funding becomes available, the study will evaluate the I-40 corridor as an integrated system and identify the most effective sequence of improvements to maximize OSOW clearance, freight efficiency, and bridge-condition benefits. This approach supports the development of a future large bridge or other grant investment. The planning study, as noted in Criterion 1, sets out the following evaluation criteria:

- NBI data
- Maintenance burden

- Bridge clearance
- Overpass truck traffic and overall AADT
- Detour burden for OSOW-permitted vehicles
- Crash history
- Replacement complexity
- Benefit/cost assessment
- Staging/sequencing advantages.

This strategy and the final planning study report can serve as a model for other states with similar low-clearance bridge issues.

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 reduces the reliance on taxpayer-supported funding.

NCDOT has been a leader in using innovative structure materials. NCDOT's Research webpage notes that the [Harkers Island Bridge Replacement](#) project was the first bridge in which all primary load-carrying components use internal fiber-reinforced polymer (FRP) reinforcement. The project combines carbon FRP (CFRP) prestressing strands and spirals with glass FRP (GFRP) bars in piles, girders, substructure, and deck.

If this project achieves subsequent construction grants or funding, the Department will evaluate innovative construction methods including retaining substructure components for project bridges where possible to reduce costs and potentially expand the structure's life cycle. The Department also evaluates the use of recycled concrete to reduce waste and greenhouse gas emissions.

NCDOT also knows the value of innovative contracting methods for construction, including various design-build (DB) and public-private-partnership (P3) contracting techniques. North Carolina has completed a number of successful DB and P3 projects and the North Carolina Legislature is considering expanding the number of P3 projects that can be pursued.

V. Administration Priorities and Departmental Strategic Goals

As noted throughout this application, the I-40 COVER planning study 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 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 the need for OSOW permitted vehicles to travel on non-access-controlled facilities. 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.

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 cost for all the I-40 COVER bridges is over \$170 million dollars. These 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 rural 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 initially 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. According to that report, 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.