

**FY 2022 Bridge Investment Program (BIP) Bridge Projects
Oklahoma Department of Transportation**

SH-100 Bridge over the Arkansas River at the Muskogee/Sequoyah County Line

September 8, 2022

<p>Total Project Cost (total project cost cannot exceed \$100 million for Bridge Projects):</p>	<p>Estimate in year-of-expenditure dollars: \$25,520,000.00</p>
<p>Applicant:</p>	<p>State of Oklahoma - Oklahoma Department of Transportation</p>
<p>Maintenance Commitment</p>	<p>Applicant must certify the completed project will be maintained, if a co-applicant will maintain the completed structure, the co-applicant provides the certification.</p> <p>The Oklahoma Department of Transportation will maintain this project.</p>
<p>Bike and Pedestrian Accommodation required by 23 U.S.C. 217(e)</p>	<p>Federal law provides that all projects with Federal financial participation that replace or rehabilitate a highway bridge deck are required to provide safe accommodation of pedestrians or bicyclists when two conditions are met. If bicyclists and pedestrians are allowed to operate at each end of the bridge, and the anticipated project will be for replacement or rehabilitation, the applicant must detail how bicyclist and pedestrian access is included in the project or provide FHWA with the information needed to determine whether or not such access can be provided at a reasonable cost.</p> <p>The proposed improvements include 8-foot wide outside shoulders to accommodate cyclists along each end of the bridge and thus complies with state and federal law pursuant to 23 U.S.C. 217(e).</p>

List State(s) in which the project is located:	Oklahoma
Does the project serve an urban or rural community?	Rural Community: Muskogee and Sequoyah Counties
List all Project Co-Applicants:	None
Identify the Lead Applicant (who will also be the applicant responsible for administration of BIP funds if application is selected, and the point of contact for the application)	<p>Lead Applicant: Oklahoma Department of Transportation</p> <p>Point of Contact: Daniel Nguyen Project Management Division Manager (405) 522-3618 dnguyen@odot.org</p>
Was an application for USDOT discretionary grant funding for this project previously submitted?	No
Is the project located (entirely or partially) in Federal or USDOT designated areas?	No

National Bridge Inventory Data

Identification (SH-100)

Item 1 – State Code & Name	Oklahoma
Item 8 – Structure Number	5159 0300 X
Item 5A – Record Type	Route on Structure
Item 3 – County Code & Name	Muskogee
Item 6 – Feature Intersected	Arkansas River
Item 7 – Facility Carried	S.H. 100
Item 16 - Latitude	35 31 14 59
Item 17 – Longitude	095 04 24 89

Classification

Item 112 – NBIS Bridge Length	Y, Long Enough
Item 104 – Highway System of Inventory	0 Not on NHS
Item 26 – Functional Classification	07 Rural Major Collector
Item 110 – Designated National Network	0 Not part of National Truck Network
Item 21 – Maintenance Responsibility	01 State Highway Agency
Item 22 – Owner	01 State Highway Agency

Age and Service

Item 27 – Year Built	1969
Item 106 – Year Reconstructed	Unknown
Item 42 – Type of Service	1 Highway
Item 28A – Lanes on the Structure	2 lanes
Item 29 – Average Daily Traffic (2019)	4300
Item 109 – Average Daily Truck Traffic	15%
Item 19 – Bypass, Detour Length	9.9m

Structure Type and Material

Item 43 – Structure Type, Main	Steel Continuous, Girder-Floorbeam
--------------------------------	------------------------------------

Condition

Item 58 – Deck Condition	6 Satisfactory
Item 59 – Superstructure Condition	5 Fair
Item 60 – Substructure Condition	6 Satisfactory
Item 61 – Channel and Channel Protection	6 Bank Slumping
Item 62 – Culverts	N N/A (NBI)

Geometric Data

Item 49 – Structure Length	1,928.1 ft
Item 50 – Curb of Sidewalk Widths	4.0 ft

Item 51 – Bridge Roadway Width, curb-to-curb	28.0 ft
Item 52 – Deck Width, out-to-out	35.3 ft
Item 32 – Approach Roadway Width	w/shoulders – 44.0 ft; Deck Area – 68,060.9 sq.ft
Item 47 – Inventory Route, Total Horizontal Clearance	28.0 ft
Item 53 – Minimum Vertical Clearance over Bridge Roadway	328.1 ft
Item 54 – Minimum Vertical Underclearance	N Feature not hwy or RR 0.0 ft
Item 55 – Minimum Lateral Underclearance on Right	N Feature not hwy or RR 0.0 ft
Item 56 – Minimum Lateral Underclearance on Left	0.0 ft

Load Rating and Posting

Item 70 – Bridge Posting	5 At/Above Legal Loads
Item 41 – Structure Open, Posted, or Closed to Traffic	A Open, no restriction

Appraisal

Item 113 – Scour Critical Bridges	8 Stable Above Footing
-----------------------------------	------------------------

Inspections

Item 90 – Inspection Date	07/21/2021
---------------------------	------------

Project Costs

Provide information detailing the costs associated with the project. These costs will be used to determine eligible award amount, how the project supports financial goals of the program, and other factors. More information on this section can be found in Section D.2.d.III of the NOFO.

BIP Request Amount	Exact Amount in year-of-expenditure dollars: \$12,760,000.00
Estimated Total of Other Federal funding (excluding BIP Request)	Estimate in year-of-expenditure dollars: N/A
Estimated Other Federal funding (excluding BIP) further detail	(List each Federal Program and identify Formula or Discretionary and the amount for each Federal Program, e.g. Program: _____ Amount: _____, and repeat for each source)
Estimated non- Federal funding	(Identify each source of non-Federal funding and estimated amount, e.g. Source: <u>State Funds</u> Amount: <u>\$12,760,000.00</u> , and repeat for each source)
Future Eligible Project Cost (Sum of BIP request, Other Federal Funds, and non-Federal Funds, above.	Estimate in year-of-expenditure dollars: <u>\$25,520,000</u>
Previously incurred project costs (if applicable)	Estimate in year-of-expenditure dollars: \$ <u>1,244,114</u> Project Design: \$1,225,193.00 Utility Award: \$18,921.00
Total Project Cost (Sum of 'previous incurred' and 'future eligible')	Estimate in year-of-expenditure dollars: \$ <u>26,764,114</u>

<p>If more than one bridge, will bridge bundling be used to deliver the Project?</p>	<p>No</p>
<p>If proposed project utilizes bundling, Cost of Unbundled Projects</p>	<p>Estimate in year of expenditure dollars: N/A</p>
<p>Amount of Future Eligible Costs by Project Type</p>	<p>Indicate Improvement Type by Structure Number (Bridge Replacement, Bridge Rehabilitation, Bridge Preservation, Bridge Protection, or Culvert Replacement or Rehabilitation) and amount per bridge (if bundling, include the unbundled cost in brackets[\$__]¹) (Ex.</p> <p style="padding-left: 40px;">Bridge Replacement Str. 001: \$20,000,000[\$25,000,000] Bridge Replacement Str, 002, \$15,000,000[\$18,000,000] Bridge Rehabilitation Str. 003, \$5,000,000[\$5,500,000]</p> <p>1. Bridge _____ Str. _____ : \$ _____ [\$_____]</p> <p>2. Bridge _____ Str. _____ : \$ _____ [\$_____]</p> <p>3. Bridge _____ Str. _____ : \$ _____ [\$_____]</p> <p>4. Bridge _____ Str. _____ : \$ _____ [\$_____]</p> <p>5. Bridge _____ Str. _____ : \$ _____ [\$_____]</p> <p>6. Will request \$_____ of the amounts awarded to the entity to pay subsidy and administrative costs necessary to provide to the entity Federal credit assistance under 23 U.S.C. chapter 6.²</p>

¹ Costs of unbundled project will be compared with bundled costs to determine potential amount of cost savings and as a factor in the ability to unbundle bridges for an award

² Receipt of a BIP award does not guarantee that an applicant will receive TIFIA credit assistance, nor does it guarantee that any award of TIFIA credit assistance will be equal to 49% of eligible project costs. Receipt of TIFIA

Benefit Cost Analysis– Submit the requested information in Section D.2.d.V for the DOT to conduct a review of the benefit-cost analysis for the project and provide a summary of the analysis.

The benefit cost analysis demonstrates this project yields the project yields a Benefit-Cost ratio of 1.60 over a 50-year evaluation period and a 1.37 over a shorter 30-year evaluation period. A detailed summary is discussed in the narrative and BCA memo.

Project Readiness and Environmental Risk

Project Readiness and Environmental Risk – Submit the requested information in Section E.2.b.iii for the DOT to conduct a review of the project readiness and environmental risk criteria for the project and provide a summary. If project includes multiple bridges, indicate the information for each bridge included in the application and what impact would occur on the timeframes if the project were unbundled.

Other Federal Funding and Non-Federal Funding Secured	Yes/No
NEPA Status – Indicate if the determination will likely be the result of a Categorical Exclusion (CE), Environmental Assessment (EA), or Environmental Impact Statement (EIS)	Planned or Actual Start of NEPA Date: <u>May 2020</u> Planned or Actual Completion of NEPA Date: <u>May 2021</u> Final NEPA Determination or current status of NEPA process: A Documented Categorical Exclusion (DCE) was determined and updated as of October 1, 2021.

credit assistance is contingent on the applicant’s ability to satisfy applicable creditworthiness standards and other Federal requirements.

<p>Is the project currently programmed in the:</p> <ul style="list-style-type: none"> • TIP • STIP • MPO Long Range Transportation Plan • State Long Range Transportation Plan 	<p>(please specify in which plans the project is currently programmed, the year in which the project is currently programmed and provide the identifying number if applicable)</p> <p>TIP? N/A</p> <p>STIP? No</p> <p>MPO Long Range Transportation Plan? N/A</p> <p>State Long Range Transportation Plan? No</p> <p>State Freight Plan? No</p>
<p>Is right-of-way acquisition necessary?</p>	<p>No</p>
<p>Right-of way acquisition considerations.</p>	<p>Right-of-way acquisition is not necessary.</p>
<p>Design Status</p>	<p>Planned or Actual Start of Preliminary Design Date: <u>May 2020</u></p> <p>Planned or Actual Completion of Preliminary Design Date: <u>July 2020</u></p> <p>Planned or Actual Start of Final Design Date: <u>January 2023</u></p> <p>Planned or Actual Completion of Final Design Date: <u>May 2023</u></p>
<p>Anticipated Construction Start Date:</p>	<p>Date: <u>FFY 2024</u></p>
<p>Anticipated Project Completion Date:</p>	<p>Date: <u>FFY 2026</u></p>



2022 Bridge Investment Program Application
SH-100 Over the Arkansas River Bridge Replacement Project
Oklahoma Department of Transportation



OKLAHOMA
Transportation

Table of Contents

Project Description	1
Project Overview and Location	1
BIP Program Goals Met	4
Transportation Challenges and Solutions.....	5
Grant Funds, Sources and Use of Project Funds	5
Project Outcome Criteria.....	6
Criteria #1: State of Good Repair	6
Criteria #2: Safety	8
Criteria #3: Mobility and Economic Competitiveness.....	9
Criteria #4: Climate Change, Resiliency, and the Environment	11
Criteria #5: Equity, Partnership, and Quality of Life.....	11
Criteria #6: Innovation.....	13
Project Readiness and Environmental Risk.....	13
Project Schedule	13
Technical Feasibility & Environmental Risks.....	14
Required Approvals.....	15
Project Priority Considerations	15
BCA Overview and Summary of Findings	16
Footnotes	17

Project Description

Project Overview and Location

The Oklahoma Department of Transportation (ODOT) is seeking \$12,760,000 in funding from the Federal Highway Administration (FHWA)'s Bridge Investment Program (BIP) to assist with the replacement of the State Highway 100 (SH-100) Bridge over the McClellan-Kerr Arkansas River Navigation System (MKARNS), a critical navigation waterway that is part of the United States Inland Waterway System in Weber Falls, Oklahoma. The MKARNS waterway in this area primarily consist of commercial barge transportation, passenger, and recreational use. This project begins west of the bridge in Webber Falls, Oklahoma, a town located in southeastern Muskogee County and ends east of the bridge in the town of Gore, Oklahoma, in Sequoyah County. This segment of SH-100, functionally classified by ODOT as a Rural Major Collector, has a dual designation of US-64 and SH-100 and serves as a vital route connecting two local communities.

Although this project is not located in 2010 Census-designated Urbanized Area or any of the four federally designated community development zones (Opportunity Zones, Empowerment Zones, Promise Zones, or Choice Neighborhoods), the SH-100 bridge was originally constructed in 1969 and is nearing the end of its intended life and is currently on ODOT's annual inspection schedule given the need to monitor noted defects as a fracture critical bridge. Additional information regarding annual inspections is discussed in detail in the Project Outcome Criteria 1 State of Good Repair section. The proposed project will improve safety by correcting the existing narrow bridge, eliminating deteriorating structural conditions and substandard functional factors. The current bridge section is a two-lane highway with 11-foot-wide driving lanes and 3-foot outside shoulders.



Figure 1: SH-100 Bridge over Arkansas River



Figures 2 & 3: Oklahoma county boundaries and project location map

The 2019 Annual Average Daily Traffic (AADT) on the bridge is approximately 4,300 vehicles per day (vpd) with an average daily truck traffic of 15 percent. The future (2042) 20-year forecasted AADT using a growth rate of 1% is approximately 5,250 vpd.

Proposed improvements include replacing the bridge with a widened typical section that includes 12-foot driving lanes and 8-foot wide outside shoulders in each direction. The existing bridges 15 spans will be reduced to 7 spans along the new structure. The use of 42" tall railing will be incorporated into the bridge design for increased safety. Scour protection innovation methods will be implemented to improve the new structures long-term resiliency. These improvements are not only anticipated to reduce crashes, but also improve the current travel experience and provide safer recreational bicycling in the region.

The primary purpose of this project is to preserve transportation continuity by providing a safe crossing over and on the MKARNS and improve multimodal transportation usage within the region. This bridge is one of two locations accommodating the crossing of the

MKARNS within this area and thus a critical link to maintain the mobility of people, goods, and services.

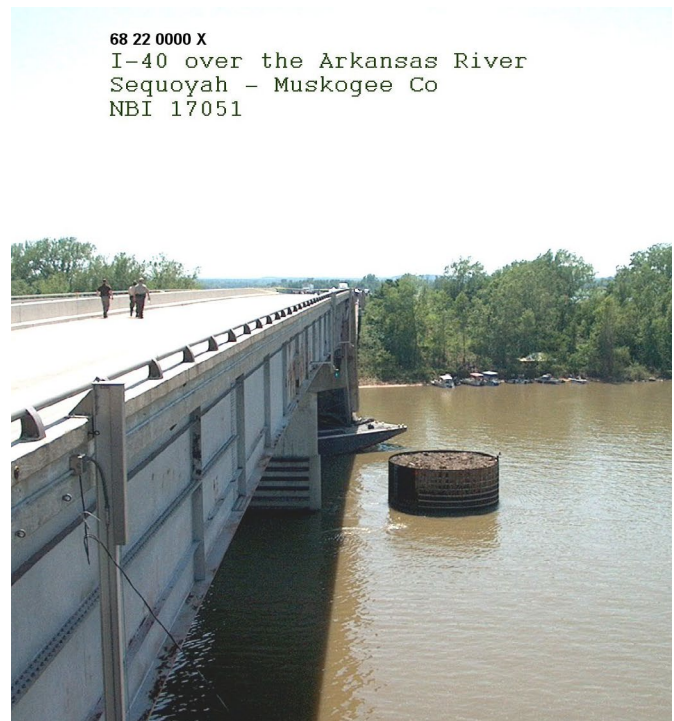
This bridge serves as a critical relief route to Interstate 40 (I-40), which is approximately six (6) miles south of the project location and carries approximately six times the amount of traffic (I-40 AADT (2020) = 20,700 vpd)¹. A major advantage of the SH 100 bridge is the proximity to I-40 and thus functions as a reliable transportation alternative critical for this region. The value of this transportation network link was realized in 2002.

In May of 2002, freight barge traveling along the Arkansas River crashed into an I-40 bridge pier that resulted in nearly 600 feet of the I-40 bridge to collapse into the river along with several vehicles and tractor-trailers. This unfortunate incident led to the loss of 14 fatalities and 11 injuries. Furthermore, there were adverse impacts on the surrounding local transportation network as construction crews rerouted I-40 traffic estimated at approximately 20,000 vpd for months as the bridge was repaired. The SH-100 bridge, six miles north of I-40, served as vital detour route for the region, maintaining mobility, access, and network efficiencies

as the I-40 bridge was reconstructed and reopened for traffic. Both I-40 and SH-100 in this area are the only two bridge roadways that cross the Arkansas River. If the SH-100 detour route were not available, travel times for detoured traffic would increase significantly given the only other connection points to cross the river is approximately 30 miles north at US-62 in Muskogee, Oklahoma.

In addition to the transportation network benefits, the adjoining communities of Webber Falls with a reported 2020 poverty rate of 34% and the town of Gore with a reported rate of approximately 17%, will also benefit from less bridge repair disruption and the reliability of through town traffic commerce will enhance the

economic outlook of this vital transportation network connecting the two towns. Public transportation agencies such as the Muskogee County Transit Authority, which offer Curb to Curb Demand Response for outlying communities such as Webber Falls, will also benefit from these improvements by maintaining connectivity². As the bridge structure ages, alternative methods (e.g., rehab or widen) have been implemented to maintain the existing structure, however maintenance costs continue to increase annually, and disruptions to the surrounding communities become more frequent. Additional benefits are reflected in the BCA analysis³.



Figures 4 & 5: I-40 bridge collapse photos

BIP Program Goals Met

This project advances the goals of the BIP by improving the safety, efficiency, and reliability of the movement of people, goods, services and freight over bridges and assist with the reduction in number of bridges that do not meet current geometric design standards. The roadway segment in this project is one of two links to cross the Arkansas River in this area and thus serves as a critical link between rural local communities and the interstate highway network, such as connections to I-40 that link Oklahoma and Arkansas. Maintaining route redundancy in this area addresses the BIP goal to improve efficiency and reliability of the movement of people and freight over bridges. Based on the latest NBI report (07-21-2021), the condition rating of the superstructure is 5 (Fair Condition) and 6 (Satisfactory) condition for both the deck and substructure. However, the 2-lane undivided narrow 11-foot driving lanes and 3-foot shoulders along the bridge pose a serious threat to the traveling public along ODOT's rural roadway system. Oklahoma's rural roadway accounts for nearly two-thirds of all fatal collisions, despite accounting for approximately one-third of the state's population. This percent of fatalities along the rural roadway network normalized by the state's percent share of rural population exceeds the national average, which is why ODOT has such a strong emphasis on addressing two lane rural roadways with a

deficient shoulder. Replacing the SH-100 bridge will address the BIP goals to reduce the number of bridges that do not meet current geometric design standards and provide increased safety, efficiency and the reliable movement of people and freight.

This project is supported by the strategic goals outlined in both of Oklahoma's Statewide Long Range Transportation Plan and State Freight Plan. This project provides the State of Oklahoma benefits that include:

1. Improving safety of bridges that don't meet modern design standards and
2. Increased safety along two-lane rural highways with deficient shoulders and
3. Maintain bridges in state of good repair.

This project is currently programmed in ODOT's 8-Year Construction Work Plan (CWP). The \$12,760,000 in BIP Bridge grant funds in addition to the state's 50% match, will be used for construction of the new bridge and can advance construction to end of FFY 2023 or early FFY 2024, within 12 months of receiving grant funds. This funding request will allow the State of Oklahoma to accelerate the delivery of prioritized safety improvements.

Transportation Challenges and Solutions

ODOT is responsible for planning, designing, constructing, operating, and maintaining the state’s transportation system, with no other partners responsible for any aspects of project development or delivery. ODOT has a long history of delivering similar projects and this project aligns with ODOT’s progress-to-date of addressing deficient bridges and two-lane rural roadways with deficient shoulders. As of 2021, Oklahoma ranked 5th in the nation among states with the lowest percentages of structurally deficient bridges on the highway system⁴. This improvement from 49th place in the nation in 2004 demonstrates ODOT’s

commitment to today’s transportation needs by strengthening connections, ensuring highway safety and reliability.

Several local, regional, and state partners from both the public and private sector are supportive of this project including Senator James Inhofe, the Town of Gore, Muskogee Board of County Commissioners, Gore Chamber of Commerce, the Greater Muskogee Area Chamber of Commerce and ODOT’s Secretary of Transportation, Tim Gatz. All letters of support are enclosed and can be found on the website⁵.

Grant Funds, Sources and Use of Project Funds

The cost of the project will be \$25,520,000. ODOT is requesting a 50% BIP grant and will provide the remaining 50% match cost share of \$12,760,000. There are no other federal funds anticipated. In the event of a partial award, ODOT will adjust its match contribution and utilize awarded

funds exclusively for construction costs associated with this project. ODOT’s funding contribution has been budgeted and is available upon award of the BIP Bridge grant funding. There are no other participating parties in this project.

PROJECT COSTS	
BIP Request:	\$12,760,000
Total Construction Costs:	
• Total Federal Funding:	\$0
• Total Non-Federal Funding:	\$8,676,800
• Contingency (10%):	\$2,552,000
• E&C (6%):	\$1,531,200
Total Incurred Costs:	
• Project Design:	\$1,225,193
• Utility Relocation:	\$18,921
Total Project Costs:	\$26,764,114

Figure 6: Available funds for bridge repairs

Project Outcome Criteria

Criteria #1: State of Good Repair

This project contributes to the State of Good Repair criteria by improving a bridge that does not meet modern geometric design standards and at-risk of falling into “poor” condition in the next three years as it approaches the end of its design life. The existing bridge is a fracture critical structure and thus given the steel members that are not load path redundant, any failure of these members would result in a catastrophic failure of the entire bridge or significant portion similar to the Webber’s Falls incident in 2002. As a proactive measure, notable defects are inspected on a more frequent basis that includes a full inspection every 24 months and a focused special inspection to monitor noted defects. The full and special inspections occur in alternating years, referred to by ODOT as a 24/24 inspection cycle.

Regarding the substandard roadway segment, the current bridges’ lane configuration is narrow and exposes vehicles traveling in opposing directions to potentially severe crashes (e.g., head-to-head collisions) and thus poses significant safety concerns as discussed in the next section. Narrow two-lane rural roadways with deficient shoulders do not meet current design standards and thus aligned with ODOT’s strategic goals and objectives outlined in ODOT’s 8-Year CWP, Statewide Long Range Transportation Plan and Statewide Transportation Improvement Program (STIP)⁶. Furthermore, this project aligns with the current CWP scheduled dates that has construction scheduled to begin FY-2026⁷. However, upon receiving BIP grant funds the proposed schedule would advance construction to FY-2024. The new bridge will incorporate scour protection innovation

to provide long-term resiliency to extreme weather events, flooding, and other natural disasters as noted in the current design plans⁸. More information can be found in the most recent Bridge Inspection Report (July 2021)⁹.

The existing bridge is 53 years old and has a condition rating of 5 (Fair) for the superstructure and 6 (Satisfactory) for both the deck and substructure. If any of these ratings decrease to a rating of 4 (Poor), the bridge would become Structurally Deficient (SD). If this bridge becomes SD and not replaced, ODOT would have to spend additional funds with an approximate rehab in the next 5-7 years. As part of the No Build alternative, the rehab is estimated to be approximately two million dollars. Currently, on-going maintenance costs are anticipated to increase and still require the need for replacement.

A SD rating along this bridge would have detrimental effects for both local, intra-state (statewide) and interstate transportation systems. One of the unique aspects of this project is that SH-100 serves as one of two primary means of travel across the Arkansas river in this area. I-40 is located approximately six miles south and carries approximately 20,700 vpd. This bridge project is critical and serves as a redundant route to I-40, which carries approximately six times the amount of AADT as noted in the Project Description section. I-40 is one of the state’s most vital interstate connection points for both public travel, commercial and freight corridors across the country. The importance of this project was highlighted in its use as a relief route across the Arkansas river during reconstruction and repair of the I-40 bridge



Figures 7-10: Photographs of good repair conditions

during the Webber Falls Bridge Incident along I-40 that occurred in 2002. Similar to the 2002 incident at the I-40 bridge, a failure scenario at the SH-100 bridge location may require extensive measures (monitoring, load restrictions, etc.) and increased maintenance costs. Worst-case scenario, a bridge closure of at least six months would be required during the bridge rehabilitation and thus have negative effects on the local community's mobility and access. These negative effects would exacerbate to the nearby surrounding transportation network as vehicles and trucks would be forced to use an alternate route, such as I-40, with increased travel times.

By receiving the requested grant funds, benefits to the State of Good Repair criteria include:

- Reduction in maintenance costs associated with maintaining the bridge in its current condition
- Avoid additional costs involved with extensive closures for major bridge rehabilitation that will be required with no replacement.
- Improved safety with a reduction of spans in the new bridge design from 17 to seven (7).
- Advancing the overall BIP and Statewide goals of improving long-term resiliency with scour protection innovation incorporated into the new bridge design
- Minimize increased travel time associated with alternate routes and overall improve safety for the traveling public.

Criteria #2: Safety

Approximately one-third of the states' population reside in rural areas, however this population accounts for approximately two-thirds of the state's fatalities associated with crashes. This is well above the national average and thus serves as a strategic goal for ODOT. Additionally, collisions along rural roadway networks in the state outpace urban crashes in all the remaining injury severity types.

Collision data over a 10-year period (2012 to 2021) indicates there were a total of three collisions reported along the roadway project area that comprised of two property-damage only (PDO) and one possible injury. None of the collisions were cited along the bridge. Also, there were no fatalities, incapacitating injuries or crashes involving pedestrians or bicyclists. The reported collision types involved a rear-end, head-on and fixed object. The crash rate (no. of collisions per 100 million vehicle miles traveled (MVMT) is 37.1, less than half the statewide crash rate (92.53) for comparable roadway facilities statewide.

Ten-year data was reviewed given the small sample size of approximately one collision every three years and thus inferences



regarding expected crash reductions at this location with improves safety enhancements are limited. Proposed safety improvements for this bridge include 12-foot driving lanes and 8-foot shoulders, opposed to the current two-lane 11-foot driving lanes with 3-foot shoulders.

Crash Modification Factors (CMFs), a measure of the expected number of crashes after implementing a countermeasure on a road or intersection, is summarized as follows¹⁰.

COUNTERMEASURE	CRASH MODIFICATION FACTOR*
Increase Lane Width from 11 feet to 12 feet	0.95
Install Shoulder Rumble Strips and Widen Shoulder Width	0.50
Install Edge line Pavement Markings on Narrow, Rural, Two-Lane Roads	0.78
Install Wider Edge Lines (4-in. to 6-in.)	0.825
<i>*Note: CMFs were selected that apply to ALL crash types (O, K, A, B and C)</i>	

Figure 11: A summary of Crash Modification Factors (CMFs)

In general, the combined improvements applied to a roadway similar to this project are anticipated to reduce collisions by approximately 50%. These countermeasures were applied together in terms of how they address all crash types along the project.

Overall, the proposed roadway bridge section would match the typical section at the roadway approaches on both ends enhancing the mobility for the community and general public. Currently, vehicles traveling along the bridge at both ends experience increased exposure to high

severity type crashes such as head-on collisions.

This bridge replacement would match the current roadway approaches that contain two 12-foot driving lanes and 8-foot-wide shoulders. A full shoulder provides several safety benefits that include increased driver comfort, permit emergency vehicles through access and increased safety for bicyclists.

In summary, the proposed improvements are anticipated to deliver a reduction in collisions by half for all crash types and provides safety for non-motorized travelers in this area.

Criteria #3: Mobility and Economic Competitiveness

This project contributes to the Mobility and Economic Competitiveness criteria by maintaining the regional economy, access and continuous movement of goods and services across the MKARNS. As of 2019, the bridge carried approximately 4,300 vpd with 15% trucks. Level of service is expected to remain adequate in either the No-Build or Build scenarios over the next 20 years. However, this bridge project is unique in that although SH-100 is not on the National Highway System, it serves as a vital and critical relief/connection route for the community and the public traveling along I-40.

The MKARNS waterways are an economic and environmentally friendly method of transporting goods and services in and out of Oklahoma. The navigation system is in the Eastern part of the State of Oklahoma, however, serves the entire state. Over five million tons of cargo are shipped yearly using the waterways of the Muskogee Port. There are three major Oklahoma ports providing job security to over 7,000 people. Port of Muskogee, which runs through the waterways at I-40 bridge and the SH-100



bridge in Muskogee/Sequoyah Counties, are public ports and lease land to companies that utilize the MKARNS. Ensuring the SH-100 bridge does not slip into structurally deficient is of most importance to continue the productivity of the MKARNS and the shipping of goods. There are three private ports owned by Consolidated Grain & Barge (CGB) Company which are housed in Wagoner and Webbers Falls, Oklahoma and one in Van Buren, Arkansas; CGB owns grain elevators at each location.

The SH-100 bridge in this area will be designed with less spans (by less than half the existing spans) and thus aligns with safety benefits and increased throughput along the MKARNS. Recently, USACE was awarded a grant for approximately \$92,600,000 for a study to deepen the Arkansas-Oklahoma MKARNS from 9 feet to 12 feet. The grant is part of the Civil Works studies, projects, and programs that the U.S. Army Corps of Engineers (USACE) will implement in Fiscal Year 2022 with the \$22.81 billion in supplemental funding provided in two recently enacted laws – the Infrastructure Investment and Jobs Act and the 2022 Disaster Relief Supplemental Appropriations Act. A benefit of increased water depth includes increased barge capacity up to 400 tons per barge and serve 86 percent of the tonnage inland of the Webbers Falls Lock and Dam on the MKARNS Oklahoma segment system wide¹¹.

The MKARNS makes a huge impact on providing jobs, lower shipping costs, and less road congestion. The navigational system on the MKARNS plays a vital role to the regional, state, and national economy and serves as the primary navigable waterway in the State of Oklahoma. The new SH-100 bridge replacement allows a continuing flow of productivity on the waterways with minimal disruption associated with closing routes through the Muskogee Port due to multiple maintenance and rehabs of SH-100 bridge. The Oklahoma segment of the MKARNS supports over 22,000 full and part-time jobs

across the state¹². These jobs directly impact and provide opportunities to nearby towns and communities such as Webber Falls and Gore.

I-40 is approximately six (6) miles south of this location and carries approximately six times the amount of traffic (I-40 AADT (2020) = 20,700 vpd)¹³. The SH-100 bridge provides a safe and reliable alternate route for I-40 travelers in the area. The importance of this network link was displayed in 2002 during the I-40 bridge collapse incident at Webber’s Falls. The SH-100 bridge, six miles north, served as a detour route to maintain mobility, access, and network efficiencies.

Overall, this bridge is one of two locations to cross the MKARNS within this area and thus a critical link to maintain the mobility of people, goods, and the overall transportation network efficiency. The next viable crossing option occurs approximately 30 miles north at US-62 in Muskogee, Oklahoma.



Criteria #4: Climate Change, Resiliency, and the Environment

This project contributes to the Climate Change, Resilience, and the Environment criteria by enhancing access to infrastructure that promotes healthier, active travel modes such as walking and bicycling, and continuous use of the waterways for shipping and less road congestion. The new bridge will allow for safer and wider roadway, with wider shoulders, enhancing the safety of the traveling public and community. The project is in a rural area of the state, with an average of approximately 4,300 vehicles per day over the SH-100 bridge, comprised of primarily local and commercial traffic.

This project will replace existing barge tie-down structures that were not designed for the type of flood events experienced in the region. The new mooring structures in the waterway will replace the existing obsolete anchors. The new mooring infrastructure will be an investment in long-term strength, security, and resiliency. Replacing the existing bridge with new infrastructure and modern materials would address the structurally deficient concerns and offer an opportunity to improve resiliency to hazards and disasters of all types.

Criteria #5: Equity, Partnership, and Quality of Life

The SH-100 bridge replacement project will improve the quality of life for residents in Gore and Webber Falls by providing economic investment opportunities, improving safety for the community, and traveling public across the Arkansas River. Approximately, eight miles northeast of Gore and Webbers Falls, there's a vacation area (Lake Tenkiller), residents and visitors frequent, and the use of SH-100 bridge plays a viable role to their travel plans. The bridge replacement will allow more efficient and frequent travel across the Arkansas River. The bridge replacement will continue to provide equity, opportunities, and access to services, goods, jobs, and facilities in Gore, Webbers Falls and other surrounding communities. The detour through the I-40 bridge will provide a challenge for a few residents due to travel time and possible mobility constraints.

The public engagement phase of the project captured the community's enthusiastic agreement with the replacement of SH-100 bridge over the Arkansas River, along with concerns of: (1) longer travel times to the other side of the bridge, (2) low-income



populations have minimum transportation access and cannot walk across the bridge to the other side, and (3) closure time of the bridge during construction. ODOT has services available within short distance to assist during the construction phase of this project, minimizing the potential adverse impacts to the community. It was also noted in the Community Impact Assessment indicated that no relocation plan was needed. A Community Impact Assessment and Public Involvement Executive Summary the presence of two transit agencies providing services to Sequoyah County and

Muskogee County for healthcare, grocery, and other needs of the residents. The two transit agencies will continue to provide the needed services using the detour route then post-construction and reopening of the bridge, the transit agencies will return to their regular route by use of the SH-100.

An additional benefit of replacing SH-100 bridge over Arkansas River, is farmers and residents with large farming equipment can utilize the newly constructed bridge (once reopened) opposed to taking a longer route on I-40. ODOT replacing the bridge within the next few years it will reduce lane or bridge closures for repair, rehabilitation, and maintenance which reduce occurrences for disruption to the travel of the residents, both Gore and Webbers Falls; less wear and tear on the detour route, I-40 roadway, and bridge.



This Photo by Unknown Author is licensed under CC BY

During the Community Impact Assessment, it was identified that Environmental Justice (EJ) populations are present in the project area. There are two readily identifiable groups of minority persons existing within the town of Gore, Census Block 302.02, of Sequoyah County. American Indian and Alaskan Natives compose the largest individual minority groups in the readily identifiable groups. There will be a disproportionate effect on low-income EJ populations in the town of Gore but, not disproportionately high because it



Figure 12: Virtual open house platform

would be temporary during the time of construction. The low-income EJ populations are in the town of Gore but will not lose access to essential goods and services in the town. There were low-income EJ populations identified in the project area in the town of Webbers Falls; there will be a disproportionate effect for the populations identified. The disproportionately effect will only be temporary during the time of the closure of the bridge for construction. The low-income EJ populations will have options available to utilize the detour route on I-40 or utilize the services and goods in nearby towns.

The replacement of the Webbers Falls bridge will be beneficial to the low-income EJ populations on both sides of the bridge, allowing the low-income EJ population to return to normalcy and not add undue costs and stresses. Without the replacement of the bridge, low-income EJ populations will need to prepare for additional closures, detours, possibly spending additional monies for gas, services, and travel time, which will furthermore increase their disproportionate position.

Criteria #6: Innovation

This project will benefit from innovative technology and project delivery strategies.

travel speeds and support incident management

Innovative Technologies

- ITS Deployment during Construction – ITS technology will be integrated during the bridge reconstruction to ensure work zone safety and minimize travel delays for drivers. The use of radar, cameras, Dynamic Message Signs (DMS) and probe data will be used together to monitor

Innovative Project Delivery

- For construction, ODOT will incentivize contractors to achieve early delivery of the project by using no excuses bonuses. These no excuse bonuses are incentives tied to substantial completion and other key project elements.

Project Readiness and Environmental Risk

Project Schedule

Overall, this project has committed source of funds as discussed in the Budget Narrative section of this report and programmed in the latest 8-Year CWP. NEPA for this project was completed in May of 2021 and cleared as a Documental Categorical Exclusion (DCE). There is no need for the acquisition of right-of-way and the project is on schedule to complete development milestones outlined

in the 8-year CIP. However, by receiving BIP grant funds, the proposed construction letting would be advanced two years to FY-2024. Final plans are anticipated to be shelf-ready by May of 2023.

The current project milestones and dates include:

PROJECT MILESTONE	YEAR						
	2020	2021	2022	2023	2024	2025	2026
Preliminary Design	■						
Public Involvement		■					
NEPA Completion		■					
Utilities			■	■			
Final Design				■			
Construction					■	■	■

Figure 13: Projected project milestones

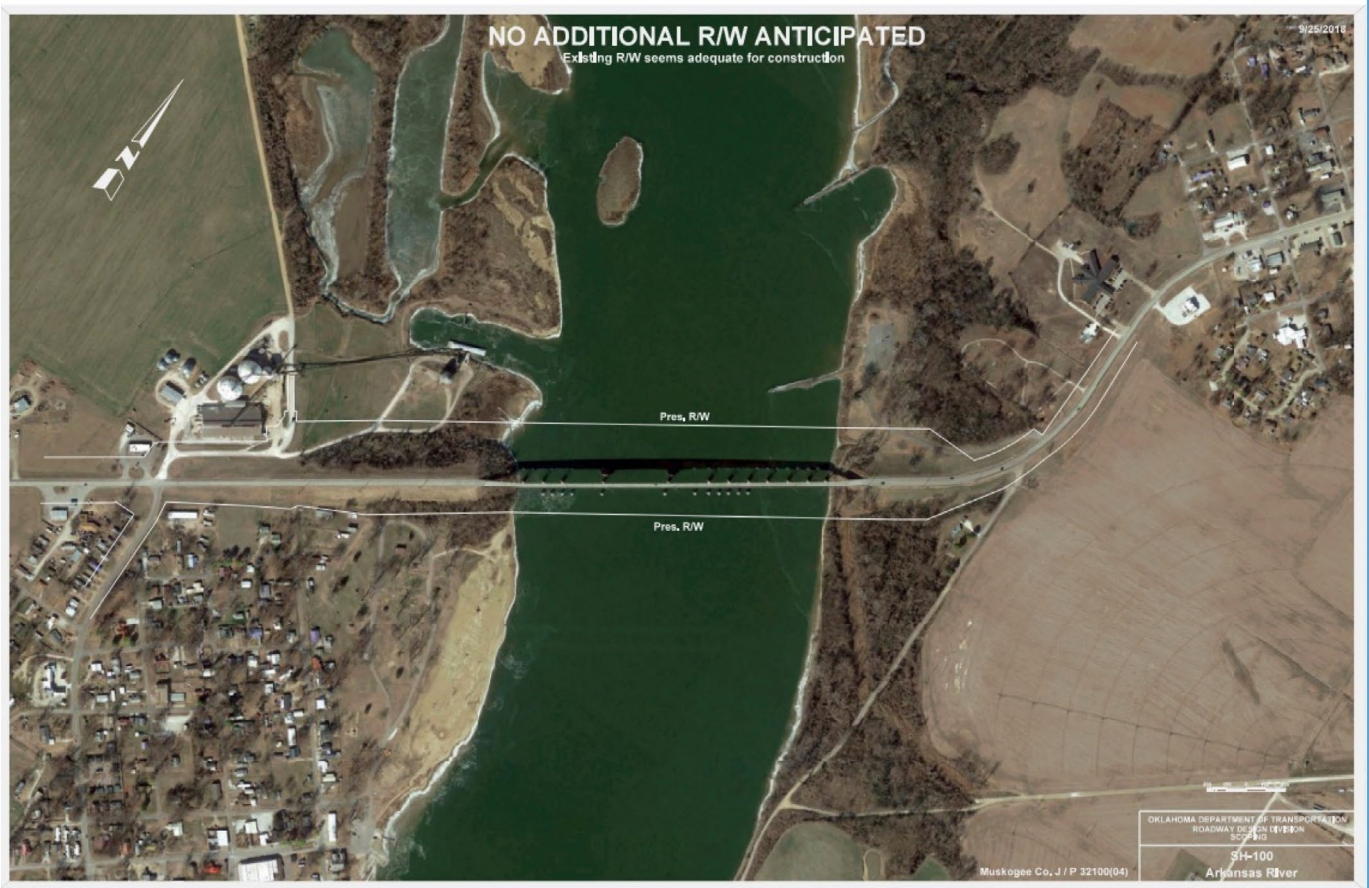


Figure 14: Project aerial view showing no additional R/W anticipated

Technical Feasibility & Environmental Risks

This project was designed using the most recent ODOT Bridge and Roadway Design Standards and the 2019 ODOT Specifications, noted in the latest design plans¹⁴. ODOT has a history of design and delivering several Bridge and Approaches projects of similar nature and thus has a high degree of confidence there is a low likelihood of significant project delay or budget risk. Since ranking 49th nationally in 2004 regarding highway bridge conditions, ODOT has

ascended into the top ten list with a ranking of 7th nationally. As of 2021, there were less than 1% of the total bridges (67 of 6,737) were rated as bridges in poor condition¹⁵.

Environmental review has been completed for this project and cleared as a Documented Categorical Exclusion (DCE). The DCE noted there were no findings of permanent environmental impact that could not be mitigated.

Required Approvals

- **Environmental Permits and Reviews:** This project has been environmentally cleared as of the drafting of this applications and is not expected to have significant impacts.
- **State and Local Approvals:** There are no approvals remaining for this project.
- **Federal Transportation Requirements Affecting State and Local Planning:** The state includes as a goal to correct deficient bridges and rural two-lane roadways with deficient shoulders. Refer to BIP Goals section for more details.
- **Assessment of Project Risks and Mitigation Strategies:** ODOT has completed an assessment of project risks and mitigation strategies. Material and labor availability are two well-known risks that ODOT will apply typical project management mitigation strategies.
- **Coordination Delays:** Coordination regarding 404 permitting, USACE and the Coast Guard are not expected to delay the project's proposed schedule.

Project Priority Considerations

This application supports the following DOT Planning Priority Considerations:

1. As discussed in the State of Good Repair section, the SH-100 bridge superstructure is rated in Fair condition and is at risk of falling into Poor condition within the next three years and warrants a new structure. Furthermore, this roadway bridge segment is below modern design standards along the bridge and exposes vehicles and non-motorized modes of travel to safety concerns. Crash modification factors associated with a widening two-lane rural highway with deficient shoulders along with other countermeasures yields a reduction in expected collisions of 50% for all crash types and provides increased safety for cyclists.
2. A Documented Categorical Exclusion (DCE) was approved and updated as of May 2021 and thus meets the 12-month preferred timeline prior to completion of final design. Final design plans (PS&E) and supporting documents are on schedule for completion May of 2023. There is no right-of-way acquisition necessary for this project.
3. Upon receipt of BIP funds, this project will be reasonably expected to begin construction within 18 months of the first obligation of these funds and no later than September 30, 2025. As noted in the Project Schedule section, preliminary engineering has been completed and the project is scheduled to be shelf-ready in May 2023.
4. Without a FY-2022 BIP grant, construction is unlikely to commence before September 30, 2025. This project is currently programmed for construction to begin in FY-2026 as noted in the 8-Year CWP. However, with the receipt of this BIP grant, construction can be expected to be expedited and begin FY-2024.

BCA Overview and Summary of Findings

A Benefit Cost Analysis (BCA) was completed for the SH-100 bridge replacement project in accordance with benefit-cost methodology outlined by USDOT and discussed in detail in the BCA technical memo¹⁶. All monetary values were presented in real 2020 dollars, unless otherwise stated.

The estimated total capital cost of the SH-100 over Arkansas River project for construction costs is \$25.52 million in year of expenditure dollars, or \$18.6 million in 2020 dollars. Additional costs and benefits captured by the BCA include travel time savings, vehicle

operating savings and emission savings. Based on the assumptions, methodology and other information presented in the BCA Technical Memo, the project yields a Benefit-Cost ratio of 1.60 over a 50-year evaluation period and a 1.37 over a shorter 30-year evaluation period. A detailed summary is shown in the table. In addition to the monetized benefits, this project is expected to have benefits related to safety, mobility and community connectivity, route resiliency and other benefits that are more difficult to quantify.

BENEFIT-COST ITEM	BUILD SCENARIO	NO-BUILD SCENARIO
Project Construction Costs	\$18,615,721	N/A
Rehabilitation Costs	N/A	\$10,813,994
Operations and Maintenance Costs	\$1,699,752	\$1,190,207
Additional Travel Time	\$12,165,565	\$29,618,864
Additional Vehicle Operating Costs	\$9,164,911	\$22,313,327
Emissions Costs	\$705,783	\$3,970,078
Total NPV	\$42,351,732	\$67,906,471
Benefit-Cost Ratio	1.60	
Unmonetized Benefits	<ul style="list-style-type: none"> Reduction in potential for crashes of approximately 50% System redundancy for Interstate 40 between Oklahoma City and Little Rock 	

Figure 15: Summary of costs for Benefit-Cost Analysis

Footnotes

1. <https://spotlight-okdot.hub.arcgis.com/apps/aadt-traffic-counts-2/explore>
2. <https://www.okdrs.gov/guide/muskogee-county-transit-authority>
3. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>
4. <https://oklahoma.gov/odot/citizen/newsroom/2022/oklahoma-climbs-to-no--5-in-the-nation-for-good-highway-bridge-c.html>
5. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>
6. https://oklahoma.gov/content/dam/ok/en/odot/stip/STIPPRO_FULLL.pdf
7. https://www.odot.org/cwp-8-year-plan/cwp_ffy2022-ffy2029/8_year_cwp_district1_map.pdf
8. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>
9. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>
10. <https://www.cmfclearinghouse.org/>
11. <https://www.usace.army.mil/Media/News-Releases/News-Release-Article-View/Article/2903380/army-civil-works-studies-projects-and-programs-to-be-accomplished-with-bipartis/>
12. <https://oklahoma.gov/content/dam/ok/en/odot/documents/sapm/branch/planning/federalgrantawards/build2020/mkarns/reports-and-technical-information/mkarns-inland-waterway-fact-sheet.pdf>
13. <https://spotlight-okdot.hub.arcgis.com/apps/aadt-traffic-counts-2/explore>
14. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>
15. <https://oklahoma.gov/odot/progress-and-performance/bridge-progress-to-top-ten-nationally.html>
16. <https://oklahoma.gov/odot/progress-and-performance/federal-grant-awards/bridge-investment-program/2022/sh-100-over-the-arkansas-river.html>