



I-40 Bridge Replacement over the Arkansas River at Webbers Falls

Opportunity #: 693JJ324NF00006

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Table of Contents

1 Basic Project Information	1
1.1 Project Description	1
1.2 Project Location	4
1.3 Lead Applicant	5
1.4 Other Public and Private Parties	5
1.5 Additional Eligibility Requirements	5
2 National Bridge Inventory Data	6
3 Project Budget – Grant Funds, Sources, and Use of all Project Funding	6
4 Merit Criteria	7
4.1 State of Good Repair	7
4.2 Safety and Mobility	9
4.3 Economic Competitiveness and Opportunity	12
4.4 Climate Change, Sustainability, Resiliency, and the Environment 1	13
4.5 Equity and Quality of Life 1	16
4.6 Innovation 1	17
5 Benefit-Cost Analysis 1	18
6 Project Readiness and Environmental Risk 2	20
6.1 Technical Feasibility and Technical Competency	20
6.2 Project Schedule	20
6.3 Required Approvals	21
7 Administration Priorities and Departmental Strategic Plan Goals	23
8 DOT Priority Selection Considerations	24
9 Application Components	24

> Application Snapshot

Project Title: I-40 Bridge Replacement over the Arkansas River at Webbers Falls Applicant: Oklahoma Department of Transportation (ODOT) Application Contact: Daniel Nguyen, Director of Project Delivery UEI: P14MNTH7JM37 Project Website



Table of Figures

Figure 1: I-40 Bridge over the Arkansas River at Webbers Falls	1
Figure 2: Existing Bridge Elevation	1
Figure 3: Navigation Chart Showing Channel Bends (USACE)	2
Figure 4: I-40 Bridge Collapse on May 26, 2002	3
Figure 5: Project Location	4
Figure 6: I-40 Map	5
Figure 7: 2023 Bridge Rating Form	8
Figure 8: 2014-2023 Crash Data	10
Figure 9: Collision Severity by Year	10
Figure 10: Road Condition by Year	10
Figure 11: Concentration of Roadway Fatalities	11
Figure 12: Fatal Crashes in the Project Area	. 11
Figure 13: Fatality Rate Target Areas	12
Figure 14: Project Schedule	21

List of Tables

Table 1: Geospatial Data	4
Table 2: National Bridge Inventory Data	6
Table 3: Project Costs and Funding Sources (YOE\$)	7
Table 4: EJScreen Community Report (Census Tracts 15 and 302.02)	15
Table 5: USDOT ETC Explorer Data	16
Table 6: Summary of Benefits and Costs in Millions (2029-2058, 2022\$)	18
Table 7: Project Risks and Mitigation Strategies Matrix	22
Table 8: Project Alignment to Administration Priorities and Departmental Strategic Goals	23



1 Basic Project Information

1.1 Project Description

The Oklahoma Department of Transportation (ODOT) requests \$70 million in Bridge Investment Program (BIP), Bridge Project Grant funds for the I-40 Bridge Replacement over the Arkansas River at Webbers Falls (NBI Bridge Number 17051) Project (hereafter, Project) (see Figure 1). The I-40 Bridge over the Arkansas River at Webbers Falls spans from Muskogee County (western terminus) and Sequoyah County (eastern terminus) in eastern Oklahoma. The existing bridge was built in 1967 and construction was completed in 1968.The bridge is 2,003.16 feet long and consists of 10 composite steel plate girder spans and 3 prestressed concrete bulb tee girder spans on concrete piers (see Figure 2). The main span is 330 feet long over the McClellan-Kerr Arkansas River Navigation System (MKARNS) channel at river mile 360.3.

Figure 1: I-40 Bridge over the Arkansas River at Webbers Falls



Figure 2: Existing Bridge Elevation





- Spans 1-3: Simple prestressed concrete girder approach spans (131.4 feet, 130 feet, 130 feet)
- Spans 4-6: Continuous variable-depth steel girder main spans (201 feet, 330 feet, 201 feet)
- Spans 7-10: Continuous steel girder approach spans (125 feet, 125 feet, 125 feet, 126 feet)
- Spans 11-13: Continuous steel girder approach spans (126 feet, 125 feet, 126.3 feet)

The original bridge design was completed in 1965 prior to the development of criteria for vessel collision design. Two dolphins on the upstream side of the bridge were provided in 1983 to protect the piers adjacent to the navigation channel. The additional pier protection was designed for an impact load of 2,400 kips from a three barge long loaded hopper barge tow traveling at six mph (5.2 knots), or from larger barge tows through plastic deformations. The Arkansas River at the I-40 Bridge at Webbers Falls is approximately 1,400 feet wide, and the navigation channel is 300 feet wide. The MKARNS is maintained as a nine-foot-deep draft navigation channel. There are bends in the channel on both the upstream and downstream sides of the bridge, and the bridge is aligned slightly skewed relative to the channel as shown in Figure 3. The vessel types on the MKARNS include mainly hopper and tanker barge tows.

The bridge is fracture-critical, meaning it is more susceptible to collapsing than other types of bridges because it does not have redundant structural elements to compensate load bearing for areas where multiple cracks exist. Due to the presence of Nonredundant Steel Tension Members (NSTM) main span girders, lapsed fatigue life, and historical precedence, the I-40 Bridge over the Arkansas River at Webbers Falls has a high likelihood of becoming structurally deficient. Fatigue cycles are driven by the



Figure 3: Navigation Chart Showing Channel Bends (USACE)



amount of heavy truck traffic that uses the structure daily. Given that this structure is a major stream crossing on I-40, the fatigue cycles it receives are staggering. The most recent fracture critical report for the I-40 Bridge over the Arkansas River at Webbers Falls lists a number of fatigue cracks that have been arrested with cored holes. Currently, the cracks appear to be mostly dormant, or inaccessible. Given the uncertain nature of the fatigue life cycle (i.e., initiation, propagation, failure), there is a certain degree of uncertainty about if or when these cracks will reinitiate and propagate further, or if new cracks will initiate elsewhere. Additionally, there is uncertainty about remaining fatigue life, as there is no definitive way to know how much has lapsed or how much remains. ODOT has prioritized this Project due to the uncertainties surrounding the bridge's future serviceability and the sensitive nature of the structure.

On May 26 2002, a barge collided with a pier supporting the I-40 Bridge over the Arkansas River at Webbers Falls (see Figure 4)¹. The captain of the towboat suffered a medical emergency and lost control of the tow, which in turn caused the barges he was towing to collide with the bridge. The resulting failure of the supports caused a section of the bridge to collapse, killing 14 people and injuring another 11 people. A 580-foot section of the bridge collapsed, causing eight passenger vehicles and three semi-trucks to fall into the river or on collapsed bridge pieces. An estimated 20,000 vehicles per day were rerouted for about two months while crews rebuilt the bridge. Following the barge collision with Pier 3, several modifications were made to the bridge

as part of the emergency repair plans. Spans 1, 2, and 3 were replaced with prestressed concrete beams. A section of Span 4 was also replaced, with new plate girders spliced onto the remaining existing ones. Also, Piers 1, 2 and 3 were replaced with bents consisting of three 108-inch diameter drilled shafts with a web wall. Abutment 1 and the west approach slab were also replaced. The emergency repairs were later followed by the construction of additional pier protection consisting of 12-foot diameter drilled shafts placed at selected locations upstream and downstream of the bridge.





¹ <u>https://www.muskogeephoenix.com/news/ceremony-set-to-honor-i--bridge-collapse-victims/</u> article_374575c6-27e0-582c-b632-a3fab0b6b319.html



Absent the Project, ODOT will post load limits that restrict truck access by 2038, at which time, freight truck traffic will have to detour, which would add approximately four miles and nearly eight minutes of travel time for detoured trucks. Absent the Project, ODOT will close the bridge to all traffic by 2052. At this time, I-40 will be closed to all traffic between Exit 287 and Exit 291, resulting in all traffic detouring on Oklahoma State Highway 10, U.S. Highway 64, and Oklahoma State Highway 100. These three highways are not designed for the level of traffic that would be rerouted from the detour.

Following the implementation of the Project, the I-40 Bridge over the Arkansas River at Webbers Falls will continue operations and it will not be load posted to trucks or be closed to all vehicles, resulting in detour time and detour distance avoided.

1.2 Project Location

The Project is located in a rural area in eastern Oklahoma, as shown in Figure 5. The I-40 Bridge crosses the Arkansas River at the town of Webbers Falls. The bridge is approximately 2,083 feet long, with a western terminus in Muskogee County and an eastern terminus in Sequoyah County. Geospatial data for the Project is presented in Table 1.

Table 1: Geospatial Data

Location	Latitude	Longitude
Project Begins (W)	35.484891	-95.102126
Project Ends (E)	35.488530	-95.092270

The Project is located within Census Tracts 40135030202 (302.02) and 40101001500 (15), both of which are classified as Persistent Poverty Census Tracts (2020 Census) and Disadvantaged Census Tracts from the Climate and Economic Justice Screening Tool (CJEST) (2010 Census). The Project is located in a rural area and is not within the boundary of a 2020 Censusdesignated Urbanized Area.



Figure 5: Project Location



I-40 is a major east-west transcontinental interstate highway spanning over 2,500 miles from California to North Carolina. It is the third-longest Interstate Highway in the US and passes through many major cities including Flagstaff (AZ), Albuquerque (NM), Amarillo (TX), Oklahoma City (OK), Little Rock (AK), Memphis (TN), Nashville (TN), Knoxville (TN), Asheville (NC), Durham (NC), and Raleigh (NC) (see Figure 6). This Project is essential to ensuring the functioning of the regional and national economy and ensuring freight connectivity.

Figure 6: I-40 Map



1.3 Lead Applicant

As the Project sponsor, ODOT has the technical capacity to successfully deliver the Project, along with decades of experience with receipt and expenditure of federal transportation funds. ODOT has the technical expertise and resources dedicated to the Project to provide quality control throughout implementation, keep the public informed of the Project's progress, and confirm the Project meets all federal requirements. ODOT has a successful track record collaborating with various entities, including local governments and tribal nations, to deliver projects to construct, improve, and maintain Oklahoma's transportation

infrastructure. ODOT has also received hundreds of millions of dollars in federal discretionary funding and has experience managing large and complex projects funded in part by USDOT, including the US-75/I-44 Tulsa Project which received 2018 INFRA, 2022 RAISE and Mega awards.

ODOT has a commitment to improving its bridge conditions. From 2004 to 2021, Oklahoma improved from 49th to 5th in the nation for highway bridge condition. The agency's 8-year plan marks the continuation of ODOT's commitment to improving bridges at risk of becoming structurally deficient. The plan addresses 290 bridges currently at risk of becoming structurally deficient. This Project will align with ODOT's progress to date of addressing safety and capacity improvements.

1.4 Other Public and *Private Parties*

No additional public or private parties will be involved in delivering the Project. No private or non-private entity will receive a direct and predictable financial benefit if the Project is selected for award.

1.5 Additional Eligibility Requirements

1.5.1 Maintenance

ODOT will uphold the maintenance of the constructed bridge in alignment with the organization's Transportation Asset Management Plan (TAMP). As documented in ODOT's TAMP (2022-3031)², maintenance and preservation funds come from state and federal

² <u>https://oklahoma.gov/content/dam/ok/en/odot/programs-and-projects/transportation-programs/odot_tamp.pdf</u>

sources. ODOT forecasts future funding based on historical data and allocates this revenue to its field districts. Maintenance funds are allocated based on a lifecycle analysis of existing assets to determine the most cost-effective uses of those funds. ODOT currently has \$43.7 million in the TAMP for bridge maintenance and preservation. ODOT will allocate the funding for the Project's maintenance costs through their dedicated maintenance fund. Operations and maintenance costs avoided for the Project amounts to \$32.3 million (in 2024\$).

In addition to the TAMP, ODOT's comprehensive \$500 million Asset Preservation Plan strategically targets issues pertaining to bridges, roadways, and accessibility. Leveraging funding support from the state legislature through the ODOT Rebuilding Oklahoma Access and Driver Safety (ROADS) initiative, ODOT has successfully reduced the number of structurally deficient bridges on Oklahoma highways. The commitment to ensuring that fewer than 1% of bridges in Oklahoma are structurally deficient has resulted in a remarkable reduction, from 1,068 in 2006 to 49 by 2023.

1.5.2 Bicyclist and Pedestrian Accommodations

For safety reasons, bicycle and pedestrian accommodations cannot be made along the I-40 Bridge over the Arkansas River at Webbers Falls given that the roadway is a transcontinental interstate highway.

2 National Bridge Inventory Data

National Bridge Inventory (NBI) condition data for the I-40 Bridge over the Arkansas River at Webbers Falls is presented in Table 2. See the Application Template for a full list of requested NBI components and numbers.

Table 2: National Bridge Inventory Data

Condition	
ltem 58 –	6 - Satisfactory
Deck Condition	Condition
Item 59 – Superstructure Condition	6 - Satisfactory Condition
Item 60 – Substructure Condition	6 - Satisfactory Condition
Item 61 – Channel and Channel Protection	6 – Bank Slumping

3 Project Budget – Grant Funds, Sources, and Use of all Project Funding

The total cost for the Project is approximately \$99 million. ODOT is requesting \$70 million (71%) in BIP grant funding, matched by \$9 million (9%) from the Federal Surface Transportation Block Grant (STBG) program, and \$20 million (20%) from the Rebuilding Oklahoma Access and Driver Safety (ROADS) Fund, a fund of ODOT that was created by the Legislature in 2005 to ensure dedicated revenue for the maintenance and repair of

² https://oklahoma.gov/content/dam/ok/en/odot/programs-and-projects/transportation-programs/odot_ tamp.pdf

state highway and bridges. Table 3 presents project costs and funding sources. ODOT is confident there will be no challenges providing the specified non-federal match for the Project and has attached documentation to this application demonstrating its commitment of the local match (see Letter of Financial Commitment, included as an Attachment to this application). Federal funding has not been previously requested for this Project.

ODOT has committed substantial resources to the Project to advance it to 65% design, however without the assistance of USDOT, the bridge is at risk of deteriorating condition and requiring additional maintenance work, as ODOT is unable to fully fund the replacement in the near future. Federal funding is needed to deliver this critical Project.

ODOT is committed to the long-term maintenance of its infrastructure assets and conducts regular maintenance on its assets to ensure they remain in a state of good repair. ODOT allocates funding to budget maintenance activities and plans to allot the appropriate amount to maintain the Project.

4 Merit Criteria

As per the FY 2023-2026 BIP NOFO, all merit criteria, including 1) State of Good Repair, 2) Safety and Mobility, 3) Economic Competitiveness and Opportunity, 4) Climate Change, Sustainability, Resilience, and the Environment, 5) Equity and Quality of Life, and 6) Innovation are met with this Project. Each criterion is discussed in further detail in this section.

4.1 State of Good Repair

4.1.1 Bridge Condition

The Project will contribute to a state of good repair by replacing a fracture critical bridge that is more susceptible to collapsing than other types of bridges because they do not have redundant structural elements to compensate load bearing for areas where multiple cracks exist. Due to the presence of NSTM main span girders, lapsed fatigue life, and historical precedence, the I-40 Bridge over the Arkansas River at Webbers Falls has a high likelihood of becoming structurally deficient. Fatigue cycles are driven by the amount of heavy truck traffic that uses the structure

Table 3: Project Costs and Funding Sources (YOE\$)

BIP Grant								
Cost	Total	Funding R	equest	Federal	STBG	ODOT ROA	DS Fund	Previously
Category	Cost	\$	%	\$	%	\$	%	Incurred Cost
Construction	\$99,000,000	\$70,000,000	71%	\$9,000,000	9%	\$20,000,000	20%	<\$1M

* *Includes 10% contingency on construction costs and 6% E&C.

daily. Given that this structure is a major river crossing on I-40, the fatigue cycles it receives are staggering. The existing bridge has an average daily traffic (ADT) of 15,900 (2020), which is projected to grow to 25,440 ADT by 2040³.

The most recent fracture critical report for the I-40 Bridge over the Arkansas River at Webbers Falls lists a number of fatigue cracks that have been arrested with cored holes. Currently, the cracks appear to be mostly dormant, or inaccessible. Given the uncertain nature of the fatigue life cycle (i.e., initiation, propagation, failure), there is a certain degree of uncertainty about if or when these cracks will reinitiate and propagate further, or if new cracks will initiate elsewhere. Additionally, there is uncertainty about remaining fatigue life, as there is no definitive way to know how much has lapsed or how much remains. ODOT has prioritized this Project due to the uncertainties surrounding the bridge's future serviceability and the sensitive nature of the structure.

The 2023 bridge inspection report (included as an Attachment to this application) found a number of issues to be repaired. As shown in Figure 7 (on the following page), one change from the 2021 to the 2023 inspections was the decline of the Deck Joints (NBI Item # 58c) from a 5 (fair condition) to 4 (poor condition). Traffic Safety (NBI Item #36), Superstructure Floor Bracing System (NBI Item #59e), and Substructure Bearings (NBI Item #60c) are all in 5 (fair condition) with the potential to decline further.

The current bridge was constructed in 1967 and elements do not meet current FHWA, AASHTO, or ODOT design standards. The current railing is 33 inches above the raised section of deck, well under the minimum standard of 42 inches above the deck. Given the bridge's age and condition, ODOT will continue to monitor to ensure the bridge does not move into a "Serious, Critical, or Imminent Failure" inspection rating. If the bridge were to continue to fall in rating levels, ODOT would need to take actions that include restricting heavy gross weighted vehicles (load posting), restricting traffic flow, or in a worst-case scenario a complete bridge closure. If the

Figure 7: 2023 Bridge Rating Form

NBI 17051 Structure 6822 0000 X County Sequoyah Division 1	Facility Carried I-40 Feature Intersected		
	Arkansas	River	
NBI Item #	2023	2021	
36 - Traffic Safety	5, PX	5, PX	
58 - Deck	6, PX	6, PX	
a. Driving Surface	0, FA	0, FA	
c. Joints	4, PX	5, PX	
59 - Superstructure*	6, PX	6, PX	
a. Beams (Steel, P/S Concrete)	6, FX	6, FX	
b. Stringers**	6, PX	6, PX	
c. Floor Beams	6, PX	6, FX	
d. Pier Beams	N/A	N/A	
e. Floor Bracing System	5, PX	5, PX	
f. Truss Upper Chord***	N/A	N/A	
g. Truss Lower Chord***	N/A	N/A	
h. Truss web Members	N/A	N/A	
i. Truss Elia Posis	N/A	N/A	
k Paint/Coating	6	6	
Load Deflection	6	5	
	•		
60 - Substructure****	6, PX	6, PX	
a. Abutments	6, PX	6, FX	
b. Piers	6, PX	6, PX	
c. Bearings	5, PX	5, PX	
61 - Channel & Channel Protection	6	6	
a. Flowline Stability	6	6	
b. Channel Bank Damage	6	6	
c. Debris	7	7	
d. Vegetation	7	7	
Approach Roadway	6	5, FX	
a. Approach Roadway Condition	6	5, FX	
b. Approach Roadway Settlement	6	6	
113 - Scour	8	8	
Flowline/Notes	N/A	N/A	

³ 2023 ODOT Bridge Inspection Report

bridge is closed for extensive repair and/ or rehabilitation, the region will face serious ramifications, possibly impacting up to 18,285 person miles traveled (PMT)⁴ using 2020 ADT. By 2040, ADT on the I-40 Bridge over the Arkansas River at Webbers Falls is projected to grow by 60 percent to 25,440, which will increase PMT to 29,256. The new bridge will be constructed to ODOT's design standards, resulting in a service life of over 75 years, which creates a more sustainable and resilient transportation network.

4.1.2 Operations and Maintenance Costs

Replacing the bridge will enable ODOT to avoid major near-term operations and maintenance (O&M) costs needed to maintain current elements and keep operations moving effectively. The deteriorating condition of the bridge requires ODOT to continually reevaluate the condition of the bridge to ensure it is still safe to use. Following any of these more frequent inspections, results could reach the likely conclusion that the bridge has degraded to "critical" condition, and the heightened risk to safety will require it to be closed. If the Project was delayed or unable to be implemented, and the bridge was deemed unsafe, traffic would not be able to use the bridge. Without replacement of the bridge, there is a significant threat to the mobility of goods nationally, as well as to economic growth in the region. As a result, the closure will cause severe travel time and reliability impacts for the traveling public. The detoured route via Oklahoma State Highway 10, U.S. Highway 64, and Oklahoma State Highway 100 increases travel time by four miles or eight minutes in each direction, plus those routes will

face more congestion, safety and reliability challenges. These three highways are not designed for the level of traffic that would be rerouted from the detour.

The implementation of the Project will result significant O&M cost savings for ODOT while also bringing the critical I-40 Bridge over the Arkansas River at Webbers Falls to a state of good repair. Under the baseline, the poor condition of the bridge will require ODOT to allocate funds towards the following over the 30-year analysis period: annual O&M costs, biannual special inspection costs, biannual NBI and NSTM inspection costs, under water inspection costs (every five years), and rehabilitation. O&M costs avoided for the Project amounts to \$32.3 million (in 2024\$, discounted to 2022 at 3.1 percent).

4.2 Safety and Mobility 4.2.1 Bridge Design

The original bridge design was completed in 1965 prior to the development of criteria for vessel collision design. The new bridge will require the bridge superstructure to be widened sufficiently to accommodate a 4 foot wide inside shoulder, two 12 foot wide driving lanes and a 10 foot wide outside shoulder on each side of a median barrier located at the centerline of the bridge. The widening will increase the total width of the deck slab from 68'-6" to 81'-0". This widening will require the deck slab to be extended approximately 6'-3" on each side of the bridge.

In addition, the new bridge will have a railing height of 42 inches above the deck, which is significantly higher than the current 33 inches above the raised section of deck, which will improve safety along the bridge.

⁴ Person Miles Traveled (PMT) = AADT x Length x Vehicle Occupancy. 2020 PMT=15,900 AADT x 1.15 miles x 1 = 18,285; 2040 PMT=25,440 AADT x 1.15 miles x 1 = 29,256

4.2.2 Crash Reduction Benefits

Using ODOT crash data, between 2014 and 2023, there were a total of 39 crashes, with 1 fatal crash, on the I-40 Bridge over the Arkansas River at Webbers Falls (see Figure 8). Figure 9 presents collision severity by year data and Figure 10 illustrates road condition by year data.

Using FHWA's database and methodology for Crash Modification Factors (CMFs),⁵ it is expected that widening the inside shoulders (3' to 4') and widening⁶ the outside shoulders (3' to 10') of the bridge will result in an average crash reduction of 1.0 (all severities) accidents per year.

CMF Calculation:

Average Crashes (after CM implementation) – (CMF × Avg. Crashes (Before CM Implementation)) = Crash Reduction

⁵ <u>https://highways.dot.gov/safety/other/crash-modification-factors-cmfs</u>

⁶ <u>https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fcmfclearinghouse.fhwa.dot.</u> gov%2Fcollateral%2FRatings_Comparison.xlsx&wdOrigin=BROWSELINK_

4.2.3 National Roadway Safety Strategy

USDOT's National Roadway Safety Strategy (NRSS) outlines the Department's comprehensive approach to significantly reducing serious injuries and deaths on our Nation's highways, roads, and streets and is the first step in working toward an ambitious long-term goal of reaching zero roadway fatalities. According to the Our Nation's Roadway Safety Crisis StoryMap Tool,⁷ Muskogee County had an average fatality concentration level with a total of 65 fatalities between 2017 and 2021, and Sequoyah County had a below average fatality concentration level with a total of 37 fatalities between 2017 and 2021 (see Figure 11). During this time period, there were two fatal crashes in proximity to the Project (see Figure 12). The tool illustrates that both Muskogee and Sequoyah Counties have been identified as target areas for reducing fatalities, as Muskogee County has a high fatality rate and high population, and Sequoyah County has a high fatality rate and low population (see Figure 13).

Figure 11: Concentration of Roadway Fatalities

⁷ <u>https://storymaps.arcgis.com/stories/9e0e6b7397734c1387172bbc0001f29b</u>

Figure 13: Fatality Rate Target Areas

4.3 Economic Competitiveness and Opportunity

4.3.1 Freight Movement

I-40 is a major east-west transcontinental interstate highway spanning over 2,500 miles from California to North Carolina. It is the third-longest Interstate Highway in the US and passes through many major cities including Flagstaff (AZ), Albuquerque (NM), Amarillo (TX), Oklahoma City (OK), Little Rock (AK), Memphis (TN), Nashville (TN), Knoxville (TN), Asheville (NC), Durham (NC), and Raleigh (NC) (see Figure 6 earlier in this application). This Project is essential to ensuring the functioning of the regional and national economy and ensuring freight connectivity.

ODOT has explicitly considered the impact of the project on freight movement and supply chains, specifically how the Project will improve reliability for both passengers and freight. The Project is listed in ODOT's Freight Transportation Plan, 2023-2030⁸ (page 6-29). The existing bridge has an average daily traffic (ADT) of 15,900 (2020), which is projected to grow to 25,440 ADT by 2040⁹.

⁸ <u>https://oklahoma.gov/content/dam/ok/en/odot/federal-grants/raise/2023/multimodal-connections-on-i-35-over-the-oklahoma-river/reports-and-technical-info/Oklahoma%20Freight%20Plan%202023-2030.pdf</u>

⁹ 2023 ODOT Bridge Inspection Report

4.3.2 Workforce Development, Job Quality, and Wealth Creation

The project contributes to the economic competitiveness of the U.S. by providing a safe transportation network and improving mobility for people and goods. The Project supports long-term growth in high quality employment in an area with low-income populations.

Consistent with the policy intent of Executive Order 13985, Advancing Racial Equity and Support for Underserved Communities Through the Federal Government, the Project will create good paying construction jobs and, upon completion, support thousands of union and non-union jobs for various skill sets with higher-than-average wages and benefits. Good paying jobs include those within civil engineering and construction companies to accommodate the demand for resources to complete the Project. The goal of the Project will be to maximize opportunities for historically **Disadvantaged Business Enterprises** (DBEs).

ODOT has instituted equity-focused policies related to project procurement and construction to ensure equity in the overall project delivery and implementation. The mission of ODOT's Contract Compliance Division is to ensure equal employment opportunity within ODOT, to level the playing field for DBEs by providing full and meaningful participation opportunities in ODOT's federally funded highway projects and to plan, implement, and provide guidance to prevent discrimination in federal aid programs and activities. ODOT Contract Compliance Division (CCD) implements and oversees the ODOT DBE Program and the Unified Certification

Program for USDOT funded recipients, assuring compliance with 49 CFR Part 26. Both consultants and construction contractors are required to meet the stated DBE commitments. ODOT CCD conducts reviews of contractors and subcontractors at any time to ensure compliance. In addition, ODOT requires the verbatim attachment of Appendices A & E of the Title VI Program Manual to all federally assisted contracts. The appendices specifically and directly address the non-discrimination efforts required.

4.4 Climate Change, Sustainability, Resiliency, and the Environment

4.4.1 Reduction in Greenhouse Gas Emissions

Carbon dioxide (CO2) is the primary greenhouse gas (GHG) emitted through human activities. In the event of a bridge closure or weight restrictions are enforced, trucks and personal vehicles will need to detour. The shortest detoured route via Oklahoma State Highway 10, U.S. Highway 64, and Oklahoma State Highway 100 increases travel time by four miles or eight minutes in each direction, increasing vehicle miles travelled, air pollutants, and congestion, safety, and reliability challenges.

4.4.2 Resiliency

Due to its geology, rivers, and flood plains, ODOT has long recognized the vulnerability of its transportation assets to extreme weather and the risks it can present to the condition and performance of pavements and

bridges; therefore, ODOT has integrated resiliency considerations into its life cycle planning and project programming. ODOT has developed well-regarded resiliency focused design guidelines for bridges and roadways in flood-prone areas to reduce potential damage from extreme weather events and minimize overall life cycle costs and is increasingly incorporating resiliency and redundancy considerations into its decision-making.

Replacing the existing bridge with new infrastructure and modern materials would address concerns regarding the structural deficiency of the existing bridge and offer an opportunity to improve resiliency to natural and man-made hazards and disasters.

4.4.3 Negative Environmental Impacts on Disadvantaged Communities

The Project addresses the disproportionate negative environmental impacts on disadvantaged communities. The Climate and Economic Justice Screening Tool (CEJST) shows information about the burdens that communities experience. Using the tool, both of the Census Tracts in the Project area (15 and 302.02) are identified as "Disadvantaged." Specifically, Census Tract 15 meets the burden threshold for climate change, energy, health, legacy pollution, and transportation; and Census Tract 302.02 meets the burden threshold for the categories of climate change, health, and workforce development.

Using the USDOT Grant mapping application, both Project Census Tracts are categorized as Historically Disadvantaged Communities and Areas of Persistent Poverty.

The US EPA's EJScreen: Environmental Justice Screening and Mapping Tool provides a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators. Table 4 illustrates the highest scoring environmental burden indicators, socioeconomic indicators, health indicators, climate indicators, and critical service gaps for Census Tracts 15 and 302.03 (combined). In these two Census Tracts, the share of people who have asthma is in the 94th percentile and low life expectancy is in the 89th percentile. The National Institutes of Health have determined that there is "consistent evidence that exposure to traffic-related air pollution... is associated with an increased risk of developing asthma."10 Reducing congestion at the Project location may reduce residents' exposure to potentially dangerous air pollution.

ODOT plans to hold an in-person open house to present information about the I-40 Bridge Replacement over the Arkansas River at Webbers Falls and obtain information from the public to further assist in the identification of critical social, economic, and environmental effects that may result from the project.

¹⁰ <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7648850/</u>

Table 4: EJScreen Community Report	(Census Tracts 15 and 302.02)
------------------------------------	-------------------------------

Indicator	Value	US Average	US Percentile			
Environmental Burden Indicators						
Particulate Mater 2.5	8.49	8.45	61			
Drinking Water Non- Compliance	35	2.2	99			
Socioeconomic Ir	ndicators					
People of Color	44%	40%	61			
Low Income	49%	30%	80			
Unemployment Rate	10%	6%	82			
Less than High School Education	16%	11%	74			
Health Indicators						
Low Life Expectancy	25%	20%	89			
Heart Disease	9.3	5.8	96			
Asthma	12.7	10.3	94			
Cancer	7.6	6.4	76			
Persons with Disability	24.8%	13.7%	94			
Climate Indicator	'S					
Flood Risk	9%	12%	64			
Wildfire Risk	84%	14%	89			
Critical Service G	Critical Service Gaps					
Broadband Internet	23%	13%	82			
Lack of Health Insurance	21%	9%	93			
Transportation Access Burden	Yes	-	-			
Food Desert	Yes	-	-			

4.5 Equity and Quality of Life

4.5.1 Equity

This Project sits on the edge of two census tracts, connecting Census Tract 15 on the west side of the Arkansas River with Census Tract 302.02 on the east side.

The Climate and Economic Justice Screening Tool shows information about the burdens that communities experience. Using the tool, both of the Census Tracts in the Project area (15 and 302.02) are identified as "Disadvantaged." Specifically, Census Tract 15 meets the burden threshold for climate change, energy, health, legacy pollution, and transportation; and Census Tract 302.02 meets the burden threshold for the categories of climate change, health, and workforce development.

Using the USDOT Equitable Transportation Community (ETC) Explorer, both Tracts 15 and 302.02 rank as disadvantaged for Social Vulnerability (78 percent and 79 percent respectively) and Transportation Insecurity (99 percent and 88 percent respectively). Table 5 presents all subcategories that the Project Census Tracts ranked as disadvantaged.

ODOT plans to hold an in-person open house to present information about the I-40 Bridge Replacement over the Arkansas River at Webbers Falls and obtain information from the public to further assist in the identification of critical social, economic, and environmental effects that may result from the project.

Disadvantaged Component	Tract 15	Tract 302.02			
Climate & Disaster					
Annualized Disaster Losses	-	88%			
Environmental					
PM2.5 Level	78%	78%			
Social Vulnerability					
200% Poverty Line	78%	74%			
No HS Diploma	73%	73%			
Unemployment	-	68%			
Uninsured	91%	91%			
Lack of Internet Access	87%	86%			
Endemic Inequality	77%	-			
65 or Older	66%	87%			
17 or Younger	-	66%			
Disability	89%	97%			
Mobile Homes	92%	90%			
Transportation Insecurity					
Transportation Access	93%	83%			
Transportation Cost Burden	89%	79%			
Transportation Safety	99%	91%			

Table 5: USDOT ETC Explorer Data

4.5.2 Removing Barriers to Opportunity

ODOT has instituted equity-focused policies related to project procurement and construction to ensure equity in the overall project delivery and implementation. The mission of ODOT's Contract Compliance Division is to ensure equal employment opportunity within ODOT, to level the playing field for Disadvantaged Business Enterprises (DBEs) by providing full and meaningful participation opportunities in ODOT's federally funded highway projects and to plan, implement, and provide guidance to prevent discrimination in federal aid programs and activities. ODOT Contract Compliance Division (CCD) implements and oversees the ODOT DBE Program and the Unified Certification Program for USDOT funded recipients, assuring compliance with 49 CFR Part 26. Both consultants and construction contractors are required to meet the stated DBE commitments. ODOT CCD conducts reviews of contractors and subcontractors at any time to ensure compliance. In addition, ODOT requires the verbatim attachment of Appendices A & E of the Title VI Program Manual to all federally assisted contracts. The appendices specifically and directly address the nondiscrimination efforts required.

4.6 Innovation

4.6.1 Warm Mix Asphalt

The Project will incorporate warm mix asphalt into the paving aspects of the construction. Warm mix asphalt is a proven technology that can offer the following benefits:

- Reduce paving costs
- Extend the paving season
- Improve asphalt compaction
- Allow asphalt mix to be hauled longer distances
- Improve working conditions by reducing exposure to fuel emissions, fumes, and odors and reduce greenhouse gas emissions)

4.6.2 3D Digital Project Plans

ODOT commits to providing 3D digital project plans as part of the contracting process. This technology will allow contractors to use state-of-the-art GPScontrolled automated equipment in the construction process, which reduces the risk of human error in establishing grades and elevations while improving efficiency in earthmoving during the construction process and reducing the overall cost of construction.

4.6.3 Accelerated Bridge Construction

ODOT is committed to exploring Accelerated Bridge Construction (ABC) techniques, which combine innovative planning, materials, designs, and construction methods to reduce construction-related impacts, thereby minimizing overall construction completion times. By utilizing ABC methods, such as design using prefabricated materials (such as pre-cast deck panels), or allowing the use of stay-in-place forms, the construction process for the project may be streamlined, reducing on-site construction requirements. ABC is critically important for minimizing congestion and traffic delays along the I-40 corridor throughout construction.

5 Benefit-Cost Analysis

In compliance with USDOT's guidelines, ODOT has prepared a Benefit-Cost Analysis (BCA) for the Project. The analysis summarizes the Project cost and key economic benefits in 2022 dollars over a 30-year analysis period (2029-2058) discounted at 3.1% and compares the Build Condition to a No Build Condition. Over the 30-year analysis period, the Project generates \$658.5 million (2022\$) in total benefits, discounted at 3.1 percent (apart from carbon dioxide, which is discounted at 2 percent). The project has a Benefit Cost Ratio (BCR) of 9.2, meaning, that for every \$1 the project costs, the region benefits more than \$9.20 in return. Additionally, the Project has a Net Present Value (NPV) of \$587.2 million (2022\$). A summary of the Project's costs and benefits are detailed in Table 6. See the BCA documents, included as an Attachment to this application, for more information on the methodology, assumptions, and findings of the BCA.

Table 6:	Summary o	f Benefits and	Costs in Mil	llions (2029-2058)	, 2022\$)

Costs	Value (2022\$) millions
Capital Costs	\$71.4
Total	\$71.4
Benefits	Value (2022\$) millions
State of Good Repair	
O&M Costs Avoided	\$30.1
O&M Costs	-\$0.4
Residual Value	\$13.4
Pavement Cost Avoided	\$13.5

Benefits	Value (2022\$) millions						
Safety and Mobility							
Construction Impacts - Increased Fatalities and Crashes	-\$53.3						
Reduced Roadway Fatalities and Crashes	\$78.7						
Shoulder Widening	\$0.4						
Higher Bridge Railing (from 33" to 42")	Qualitative						
Sub-Total Safety	\$25.8						
Economic Competitiveness and Opportunity							
Travel Time Savings	\$219.0						
Construction Impacts	-\$23.7						
Vehicle Operating Cost Avoided from Detours	\$227.7						
Congestion Reduction	\$12.9						
Reliability from Detours	Qualitative						
Sub-Total Mobility and Economic Competitiveness	\$435.9						
Climate Change, Sustainability, Resiliency, and the	e Environment						
Emissions Avoided*	\$139.5						
Noise Avoided	\$0.6						
Water Run Off Improvements	Qualitative						
Resiliency to Weather, Seismic, or Other Extreme Events	Qualitative						
Sub-Total Climate Change, Resiliency, and the Environment	\$140.1						
Equity and Quality of Life							
Emergency Response Savings	\$0.1 million						
Sub-Total Quality of Life	\$0.1 million						
Innovation							
Warm Asphalt mix	Qualitative						
3D Digital Project Plans	Qualitative						
Accelerated Bridge Construction	Qualitative						
Sub-Total Innovation	Qualitative						
Total Benefits	\$658.5						
Benefit-Cost Ratio	9.2						
Net Present Value	\$587.2						

*CO2 discounted at 2-percent

6 Project Readiness and Environmental Risk

6.1 Technical Feasibility and Technical Competency

As the project sponsor, ODOT has the technical capacity and competency to successfully complete this Project. ODOT has a close partnership with the FHWA Oklahoma Division through which it receives its federal aid allocation and discretionary grant funding. ODOT has been awarded several discretionary grants from various programs and is familiar with developing grant agreements, administering the funding, and providing the necessary reporting. ODOT has the technical expertise and resources dedicated to the Project to provide quality control over all aspects of design and construction, ensure the Project meets all federal requirements, and keep the public informed of the Project's progress.

The Oklahoma Department of Transportation maintains a Title VI Implementation Plan in accordance with the Civil Rights Act of 1964 and FHWA guidelines. This plan includes active steps that ODOT takes to ensure equitable treatment and participation, as well as procedures for filing a complaint and reviewing complaints. ODOT's Civil Rights Division administers and oversees the department's Title VI, ADA, DBE, and Contractor Compliance programs.

The Project is subject to ODOT design and construction specifications, and the design is required to comply with ODOT's Roadway Design Manual, Drainage Manual, and other standards. The ODOT team will work with the local community to ensure any concerns are documented and evaluated during the design process to mitigate any negative impacts that are discovered.

The ODOT project management team are familiar with the risk management guidance published by FHWA and have followed those guidelines and best practices for the Project. Cost estimate reviews have been coordinated with FHWA, ODOT, and the consultant team for the Project with the most up-to-date information to identify and manage potential risks for the Project. Cost estimate contingencies, appropriate for the relative level of design completion, have been included since the beginning of the Project's design.

6.2 Project Schedule

As shown in Figure 14, construction is expected to begin in the third guarter of 2026, shortly after obligation of funds (in the second quarter of 2026). ODOT is working towards ensuring timely obligation of funds for the BIP Grant ahead of the USDOT statutory deadline. The schedule shows the start and completion dates for design, environmental approvals, rightof-way acquisition, utility relocations, and construction. Preliminary study and survey have been completed for the Project. Preliminary engineering, Access Justification Report, and environmental (NEPA) has already begun on the Project and are projected to be completed by the second quarter of 2025. The Project schedule confirms that the BIP funds would be able to be obligated in advance of the FY 2024 September 30, 2027, deadline and expended well in advance of the September 30, 2032, deadline.

Figure 14: Project Schedule

Year	2023				2024			2025				2026				2027				2028				2029				
Task	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q 2	Q3	Q4	Q1	Q2	Q3	Q4												
Preliminary Study																												
Survey																												
Preliminary Design (up to 65%)																												
Access Justification Report (AJR)																												
NEPA (DCE)																												
Right of Way Acquisition (if necessary)																												
Utility Relocation																												
Final Plans																												
Obligation of Funds																												
Authorization & Letting																												
Construction																												

6.3 Required Approvals

6.3.1 Environmental Permits and Reviews

To date, ODOT has submitted the right of way and utility plans for the Project. Upon completion of 65% design, ODOT will prepare the environmental documentation, which is expected to be a Categorical Exclusion (CE). The NEPA documents will include a biological assessment, a cultural resources survey, an initial site assessment for hazardous waste, a detailed noise study, and a socioeconomic and environmental justice review. ODOT anticipates that NEPA process will be completed by the end of the second quarter of 2025.

ODOT is currently considering the addition of some work that would cross U.S. Army Corps of Engineers (USACE) property and rip rap on the refuge property to the south. If that happens, ODOT would add additional studies and coordination with the USACE and the refuge.

It is expected that the work on the refuge would presumably require Section 4(f).

Additionally, an ARPA permit may be needed to conduct the necessary archeological studies. ODOT plans to hold an in-person open house to present information about the I-40 Bridge Replacement over the Arkansas River at Webbers Falls and obtain information from the public to further assist in the identification of critical social, economic, and environmental effects that may result from the project.

6.3.2 State and Local Approvals

Elements of this Project have been included in the 2024-2027 Statewide Transportation Improvement Program (STIP)¹¹, specifically right-of-way (page 31, #3433405) and utilities (page 44, #3433406).

The Project is currently included in ODOT's 8-Year Construction Work Plan (2025-2032).¹² Construction is currently programmed in 2027 (page 25) but is not fully funded. Should BIP funding become available this Project will be accelerated and moved into the ODOT Statewide Transportation Improvement Program (STIP). A letter demonstrating ODOT's commitment to provide matching funding and to appropriately program the Project is included as an attachment to this application.

The Project has broad support and Letters of Support are provided in an Attachment to this application.

¹¹ <u>https://oklahoma.gov/content/dam/ok/en/odot/stip/2024-2027/2024-2027%20STIP.pdf</u>

¹² https://oklahoma.gov/content/dam/ok/en/odot/programs-and-projects/projects/8-year-construction-workplan/2025-2032%20CWP%20Book.pdf

6.3.3 Federal Transportation Requirements Affecting State and Local Planning

6.3.3.1 Statewide Transportation Improvement Program

Elements of this Project have been included in the 2024-2027 Statewide Transportation Improvement Program (STIP), specifically right-of-way (page 31, #3433405) and utilities (page 44, #3433406).

The Project is included in ODOT's 8-Year Construction Work Plan (2025-2032) [right of way (page 6), utilities (page 6), construction (page 25)].

6.3.3.2 Oklahoma Freight Transportation Plan

The Project is listed in the ODOT's Freight Transportation Plan, 2023-2030¹³ (page 6-29).

6.3.3.3 Transportation Asset Management Plan (TAMP)

The Project improves system resilience and reliability and is consistent with the goals set out in ODOT's 2022-2031 TAMP¹⁴ with the intent of maintaining and preserving Oklahoma's transportation network.

6.3.4 Assessment of Project Risks and Mitigation Strategies

Table 7 assesses the risks that may pose a threat to the ability of the Project to meet its objectives and schedule and identifies mitigation actions for each risk.

Risk	Risk Level	Mitigation
Construction Materials Costs	Medium	Cost estimates have been developed based on the completion of 65% design. A 10% construction contingency and 6% E&C contingency have been accounted for in the Project, which is standard for all ODOT projects at this stage.
Environmental Regulatory Approvals, Permitting, and Clearances	Medium	It is anticipated that the Project will receive environmental approvals well before construction begins.
Procurement, Contracting, and Labor Agreements	Low	ODOT will procure a construction team well in advance of the identified construction date through a competitive process meeting federal requirements.

Table 7: Project Risks and Mitigation Strategies Matrix

¹³ https://oklahoma.gov/content/dam/ok/en/odot/federal-grants/raise/2023/multimodal-connections-on-i-35-over-the-oklahoma-river/reports-and-technical-info/Oklahoma%20Freight%20Plan%202023-2030.pdf

¹⁴ https://oklahoma.gov/content/dam/ok/en/odot/programs-and-projects/transportation-programs/odot_ tamp.pdf

7 Administration Priorities and Departmental Strategic Plan Goals

As shown in Table 8, the Project supports the Administration Priorities and Departmental Strategic Plan Goals.

Table 8: Project Alignment to Administration Priorities and Departmental Strategic Goals

Safety	Section 4.2 Safety and Mobility summarizes the safety benefits of the Project. ODOT is faced with an imminent need to replace the bridge, as it is fracture critical and does not meet current geometric design standards, which impacts the potential safety of all drivers utilizing the bridge. The continued deterioration of the bridge will result in the high probability of implementing weight limit restrictions and potential closure, which would have significant economic, quality of life, and safety impacts for the region. The Project aligns with USDOT's National Roadway Safety Strategy to significantly reduce serious injuries and deaths on roadways. The proposed new bridge will have wider driving lanes and shoulders, which will improve vehicle and truck safety.
Climate Change and Sustainability	Section 4.4 Climate Change, Sustainability, Resiliency, and the Environment summarizes the Project benefits related to climate change and sustainability. Construction of a new bridge reduces air pollutant emissions, as well as congestion, safety, and reliability challenges, that would be caused by a bridge closure. The Project addresses the disproportionate negative environmental impacts on disadvantaged communities.
Equity	Sections 1.2 Project Location, 4.4.3 Negative Environmental Impacts on Disadvantaged Communities, and 4.5.1 Equity, summarize the equity benefits of the Project. The Project is located in Federally designated Areas of Persistent Poverty and Historically Disadvantaged Communities. The closure of the current bridge in a failure scenario would have a catastrophic impact to the entire region in terms of mobility and accessibility, economic opportunities, and quality of life.
Workforce Development , Job Quality, & Wealth Creation	Section 4.3.2 Workforce Development, Job Quality, and Wealth Creation and 4.5.2 Removing Barriers to Opportunity summarizes the Project benefits related to workforce development, job quality, and wealth creation. The Project will create good paying construction jobs and, upon completion, support thousands of union and non-union jobs for various skill sets with higher-than-average wages and benefits. Good paying jobs include those within civil engineering and construction companies to accommodate the demand for resources to complete the Project. ODOT has instituted equity-focused policies related to project procurement and construction to ensure equity in the overall project delivery and implementation. The mission of ODOT's Contract Compliance Division is to ensure equal employment opportunity within ODOT, to level the playing field for DBEs by providing full and meaningful participation opportunities in ODOT's federally funded highway projects and to plan, implement, and provide guidance to prevent discrimination in federal aid programs and activities.

8 DOT Priority Selection Considerations

The I-40 Bridge over the Arkansas River at Webbers Falls is a fracture critical bridge that does not meet current geometric design standards. Due to the existing condition, the bridge is at risk of becoming structurally deficient and closure of the bridge would have a catastrophic impact to vehicle and truck traffic along the busy I-40 corridor. Replacing the bridge will address the BIP goal to reduce the number of bridges that do not meet current geometric design standards and reduce the number of bridges at risk of falling into "Poor" condition.

The schedule and budget demonstrate that the Project is currently wrapping up 65% design, and will allow for construction as early as Q3 2026, well in advance of the deadline to begin construction within 18 months after BIP funds are obligated. ODOT's prior experience with similar projects ensures that the agency is confident it will be able to deliver the Project in a timely manner and will spend the funds well in advance of the September 30, 2032, deadline. ODOT has committed substantial resources to advance the Project, however without a FY24 BIP Bridge Project grant to assist with funding the Project, construction is unlikely to commence until 2027 or later.

9 Application Components

Application Template Benefit-Cost Analysis Workbook (locked) Benefit-Cost Analysis Workbook (unlocked) **Benefit-Cost Analysis Technical** Memorandum Standard Form 424 Standard Form 424C Standard Form 424D Standard Form LLL Grants.gov Lobbying Form Letters of Support Letter of Financial Commitment 2022 Bridge Assessment Report 2022 Other Special Bridge Inspection Report 2023 Bridge Inspection Report 2023 Fracture Critical Bridge Inspection Report 2022 Vessel Collision Risk Assessment 2020 Reconnaissance Data Report Site Photos Preliminary Design Drawings Preliminary Construction Cost Estimate **EJScreen Community Report**

Project Website: <u>https://oklahoma.gov/</u> odot/progress-and-performance/federalgrant-awards/bridge-investment-program/ bip-2025/I-40arriver.html