FY 2022 Bridge Investment Program (BIP) Planning Projects Application Template

Basic Project Information

Project Name	Roosevelt Memorial Bridge Investment Project
Project Description	

The Oklahoma Department of Transportation (ODOT) is seeking $957,300 in funding from the Federal Highway Administration (FHWA)'s Bridge Investment Program (BIP) to complete planning activities for the Roosevelt Memorial Bridge Investment Project (Roosevelt Bridge). The Roosevelt Bridge carries US-70 over Lake Texoma and provides a critical east-west connection across southern Oklahoma (**Figure 1**). The bridge is 4,943 feet long and carries two traffic lanes, one in each direction, on a 24-foot-wide deck with no shoulders. The bridge was constructed in 1942 and is composed of 87 spans, including a 250-foot-long Warren through-truss, and is eligible for inclusion in the National Register of Historic places. The bridge is functionally obsolete and at-risk of falling into poor condition and becoming structurally deficient. The bridge currently carries 8,500 vehicles per day (vpd). The US-70 roadway on either side of the bridge has four through lanes (two in each direction) that have been built to accommodate the existing and growing traffic demands.

Figure 1: Roosevelt Memorial Bridge

1.2 Transportation Challenges

In 2020, ODOT initiated a Preliminary Engineering study to investigate alternatives to improve the Roosevelt Bridge. The study began with a detailed analysis of the existing bridge to assess the condition of its various components. Using the current Load and Resistance Factor Design (LRFD) Specifications as a baseline for comparison, the analysis showed that many of the existing bridge components do not meet the current standard levels of capacity or reliability. Because of the bridge's historic significance, ODOT began an analysis of alternatives to correct the structural and geometric deficiencies of the existing bridge while preserving its historic integrity, as prescribed by Section 4(f) of the Department of Transportation Act. The Section 4(f) avoidance alternatives include rehabilitation of the existing structure to maintain vehicular traffic as well as preserving the existing bridge as a pedestrian facility or as a monument.

Traffic demand on US-70 over Lake Texoma is anticipated to increase substantially due to local and regional development. The existing two-lane facility is not sufficient to accommodate the anticipated future traffic growth. Adding traffic capacity to the Roosevelt Bridge presents a significant complication. Lake Texoma is one of the largest lakes in Oklahoma and is nearly 100 feet deep at this location. The lake is owned and operated by the U.S. Army Corps of Engineers

(USACE) and serves the primary functions of flood control and recreation. A billion-dollar planned development by PointeVista (Pointe Vista | Premiere Master-Planned Community | United States) is currently under construction at the west approach and is anticipated to double the traffic demand along US-70. The approaches also include lands owned by the Chickasaw Nation and lands managed by Oklahoma State Parks, requiring extensive collaboration and communication among the stakeholders.

The Roosevelt Bridge Project is anticipated to be the largest project ever let by ODOT. Less than 10% of the expected construction costs have currently been funded in ODOT's 8-Year Construction Work Plan (CWP, see map at ODOT Roosevelt Bridge). However, the growing corridor traffic demand combined with the deteriorating Roosevelt Bridge conditions warranted the development of the project. To date ODOT has expended roughly $3,500,000 towards planning future improvements of the bridge.

This BIP planning grant will help facilitate the study of design feasibility for bridge alternatives, including utility relocation, geotechnical exploration, additional inspection, and pedestrian accommodations. Accelerated Bridge Construction (ABC) techniques will also be investigated in more detail to determine their costs and feasibility. Finally, the grant will fund additional survey and traffic analysis to more fully incorporate the future PointeVista development. Ultimately, ODOT will conclude the planning activities with a set of feasibility plans incorporating the findings. These activities are described in more detail below.

- **A study of bicycle/pedestrian accommodations** will include both the feasibility of reusing the existing structure for this purpose, as well as connecting the bicycle/pedestrian facility on either end of the bridge. Currently, there is no bicycle/pedestrian accommodation on the Roosevelt Bridge, or anywhere across Lake Texoma
- **Underwater inspection** is needed to assess the condition of the 80-year substructure inclusive of timber piling capacity exploration. The study of partial removal of the bridge may be warranted. A detailed study to re-purpose the existing Roosevelt Bridge to function as a pedestrian facility will be performed.
- Significant overhead electric lines are supported on the existing bridge. This utility will require **coordination with the owner to maintain and/or relocate (Figure 2)**. Determination of how to accommodate this utility is a major factor in selection of a bridge alternative.
- Because Lake Texoma is a relatively deep lake,

Figure 2: Overhead Power Lines on the Roosevelt Bridge

geotechnical exploration is needed to determine the feasibility of replacement alternatives. This data will eventually allow ODOT to optimize the design of the supporting substructures and determine foundation design parameters.

- Because Lake Texoma is a USACE owned and operated lake and functions as a flood control facility, **methods to minimize fill** into Lake Texoma will be studied. Coordination with USACE and studies of potential flood storage replacement options will also be included.
- The **PointeVista development (Figure 3)** is under construction and requires additional as-built survey. This survey will allow the study of methods to mitigate impacts and provide public access to the development. Significant traffic changes are anticipated requiring a traffic compatibility study and determining appropriate improvements and need for controlled access.

Figure 3: PointeVista Rendering (www.pointevista.com)

- **Accelerated Bridge Construction** (ABC) methods will be studied as an innovative way to potentially reduce construction duration and increase cost efficiency, safety, and quality control. A detailed study, specific to the span arrangement, would help determine feasibility and applicability to the Roosevelt Bridge project.
- **Feasibility Plans,** showing how the Project would be constructed, and sufficient for completing National Environmental Policy Act (NEPA) documentation and approval for right-of-way acquisition. These plans would also serve as the basis for collaboration and coordination with stakeholders.

1.3 Project Location

The Roosevelt Bridge carries US-70 over Lake Texoma, which spans the Bryan and Marshall County lines in southeastern Oklahoma (**Figure 4**). US-70 is a major east-west connection across the southern portion of the state, providing a link bewteen the major north-south freight routes of I-35, US-69 and US-75. All of southeastern Oklahoma is considered rural, including the Project area. The Choctaw Nation Promise Zone is located approximately 6.75 miles east of the Roosevelt Bridge. Economic opportunity for this Promise Zone and for southeastern Oklahoma as a whole is dependent on a reliable connection aross Lake Texoma. As discussed elsewhere in this application, without the Roosevelt Bridge, vehicles would be required to travel 39 additional miles.

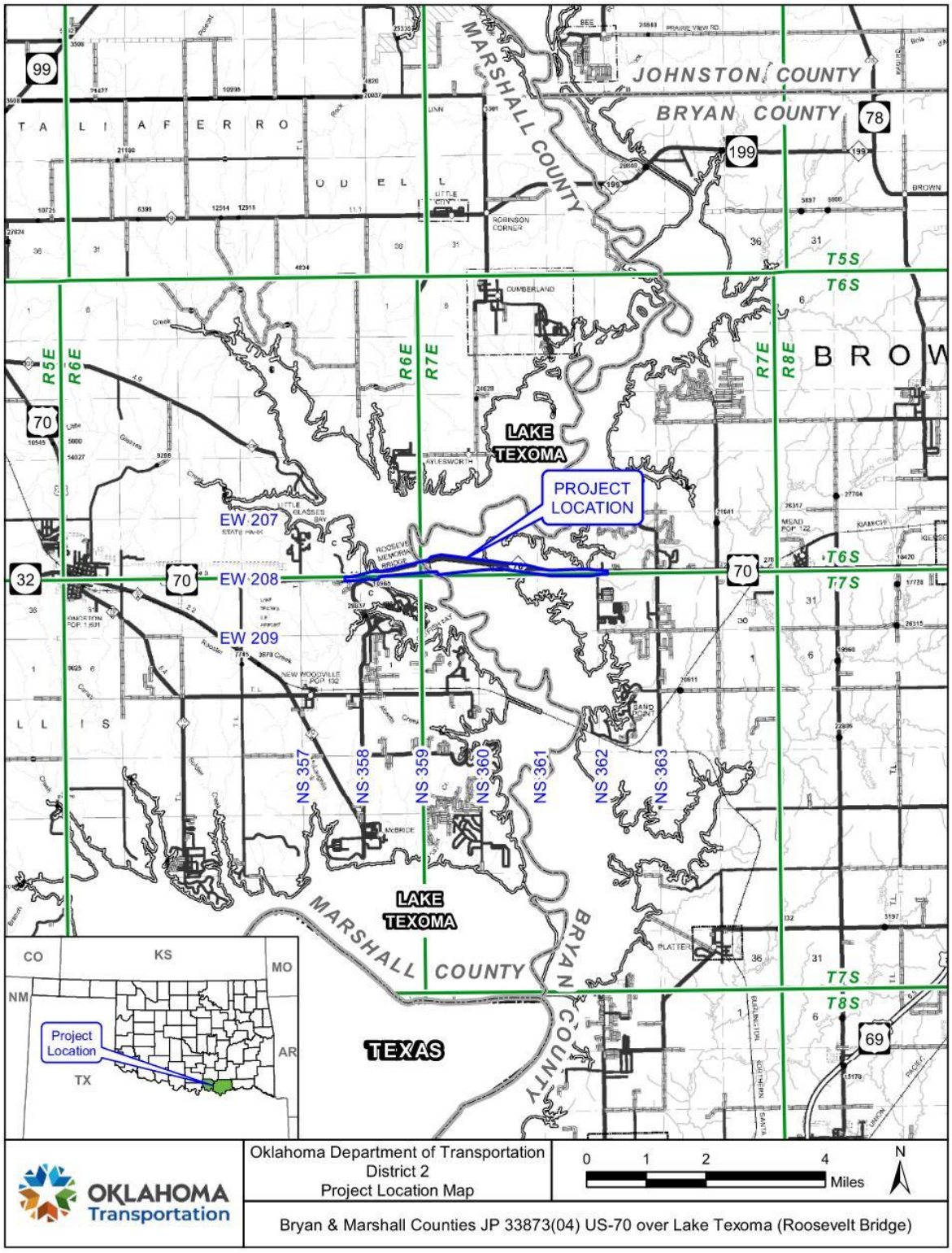

Figure 4: Roosevelt Bridge Location Map

1.4 Project Parties

The Oklahoma Department of Transportation is the lead applicant for the Roosevelt Bridge Project. ODOT routinely receives and expends Federal-aid highway program funds under Title 23, U.S.C. ODOT has a successful history of partnering with other agencies including local governments and tribal nations to complete projects. The US-69 widening and access control project near Durant, Oklahoma, located approximately 7 miles east of the Roosevelt Bridge, is a joint effort between ODOT and the Choctaw Nation. While ODOT typically oversees the construction of these projects, other entities may contribute funding or be responsible for maintenance of certain elements after construction is complete.

State(s) in which project is located	Oklahoma
Does the project serve an urban or rural community?	This project serves a rural community
Total Project Cost	Estimate in year-of-expenditure dollars: $154,000 to $235,000 (depending on alternative selected)

Who is the Project Sponsor?	Oklahoma Department of Transportation
List all Project Co-Applicants.	None
Identify the Lead Applicant	Oklahoma Department of Transportation
Was an application for USDOT discretionary grant funding for this project previously submitted?	No

National Bridge Inventory Data

Identification	
Item 1 – State Code & Name	406 Oklahoma
Item 8 – Structure Number	0706 0000 X
Item 5A – Record Type	Route On Structure
Item 3 – County Code & Name	07 Bryan
Item 6 – Feature Intersected	Lake Texoma (Roosevelt)
Item 7 – Facility Carried	U.S. 70
Item 16 - Latitude	33°59’55.05”
Item 17 – Longitude	096°38’03.70”
Item 98 – Border Bridge	Unknown (P)
Item 99 – Border Bridge Structure Number	Unknown

Classification	
Item 112 – NBIS Bridge Length	Y Yes
Item 21 – Maintenance Responsibility	01 State Highway Agency
Item 22 – Owner	01 State Highway Agency
Age and Service	
Item 42 – Type of Service	Highway / Waterway
Condition	
Item 58 – Deck Condition	5 – Fair
Item 59 – Superstructure Condition	5 – Fair
Item 60 – Substructure Condition	6 – Satisfactory
Item 62 – Culverts	N/A
Geometric Data	
Item 49 – Structure Length	4,942.91 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
Inspections	
Item 90 – Inspection Date	8/12/2021

Project Costs

BIP Request Amount	Exact Amount in year-of-expenditure dollars: $957,300
Estimated Total of Other Federal funding (excluding BIP Request)	Estimate in year-of-expenditure dollars: $1,595,500
Estimated Other Federal funding (excluding BIP) further detail	Program: Federal Aid Highway Funds Amount: $1,595,500
Estimated non- Federal funding	Source: Oklahoma ROADS Fund Amount: $638,200
Total Planning Project Cost	Estimate in year-of-expenditure dollars: $3,191,000

Project Outcome Criteria

Criteria #1: BIP Program Goals
This BIP planning grant would assist ODOT to determine the feasibility of the Roosevelt Bridge Project and assist with the selection of a preferred alternative. These planning activities are envisioned to lead to a Large Bridge Project that would achieve the BIP program goals. The Project

will:

- Improve the safety, efficiency, and reliability of movement of people and freight on US-70 over Lake Texoma,
- Reduce the number of bridges in fair/poor condition by either rehabilitating or replacing the existing bridge that is in fair condition (sufficiency rating of 42) and at risk of becoming structurally deficient,
- Reduce the number of bridges that do not meet current geometric design standards by providing a bridge with sufficient lane and shoulder widths,
- Improve the capacity of the lake crossing that currently cannot meet the traffic requirements anticipated for the network, thus improving the local economy,
- Reducing the total person miles traveled over a bridge that is at risk of falling into poor condition and does not meet current design standards; and
- Leverage non-Federal contributions from ODOT and potentially other stakeholders in the planning, design, and construction of the project.

ODOT has performed an extensive analysis of the condition of the existing bridge, noting deficiencies in the deck, superstructure, and substructure. In 2021 the bridge received a sufficiency rating of 42.30 with ratings of 5 (Fair) for the deck and superstructure components (see ODOT Roosevelt Bridge for a copy of the most recent inspection report). Had it not been for emergency repairs made to the bridge in 2021, the bridge would have received a rating of 4 (Poor) for the superstructure and required load posting. The existing Roosevelt Bridge does not meet current design standards for width (24-foot clear roadway with two 12-foot driving lanes and no shoulder) or vertical clearance (14' 9" clearance at the truss span).

The Project will provide a four-lane bridge with sufficient capacity to meet anticipated future traffic demand and geometry consistent with today's design standards. The Project will also add accommodations for bicycles and pedestrians where none exist today. The new structure will have a design life of 75 years and will remove an at-risk bridge with deficient horizontal and vertical clearances. More detail about the Project's state of good repair, safety, mobility, resiliency, and quality of life outcomes are presented in this application.

ODOT has begun discussions with potential project partners, including the U.S. Army Corps of Engineers (USACE), the Chickasaw Nation, Oklahoma Gas & Electric, Oklahoma State Parks, and PointeVista, a private developer currently constructing a mixed-use development on the west side of Lake Texoma. These potential partners may have an interest in specific components of the Project, and some may be willing to contribute funding to see those interests included.

Criteria #2: Project Description

This planning project will evaluate a Large Bridge project that will, when constructed, provide a safe crossing of Lake Texoma that meets all current design criteria, accommodate future traffic demand, improve the efficiency and reliability of the movement of people and freight, increase resiliency, provide a new bicycle and pedestrian crossing, and consider innovative project delivery methods such as accelerated bridge construction and progressive design build. The project will not only meet the BIP Program Goals but is anticipated to be highly responsive to USDOT's selection criteria for Large Bridge projects. More detail on these criteria is provided below.

2.2.1 State of Good Repair

The Roosevelt Bridge is a 4,943-foot-long bridge composed of 86 approach spans (concrete deck on steel floor beams and girders) and one truss span (250' steel Warren through-truss) all of which are supported on a variety of concrete substructure elements. The bridge is rated in Fair condition and is at risk of becoming structurally deficient. Without major rehabilitation, the bridge would likely fall to poor condition and become structurally deficient in the near term (within three years). ODOT restricted the bridge to overload traffic in 2020 due to the superstructure condition, specifically related to section losses to floor beam members. More detail on the existing bridge conditions can be found in the *Analysis of Existing Bridge Report* (March 2021), available at ODOT Roosevelt Bridge.

The bridge is currently classified as functionally obsolete due to the substandard vertical clearance on the truss span (14'-9") and its narrow width (24') and will not provide sufficient capacity in light of anticipated growth. Existing average annual daily traffic (AADT) volumes on the Roosevelt Bridge are approximately 8,500 vpd, with trucks making up approximately 9% of that volume. Analysis using Highway Capacity Software 7 (HCS7) determined that the bridge currently operates at a Level of Service (LOS) C.

Using a background growth rate of 1.5% alone, traffic volumes on the bridge are anticipated to grow to 12,200 vpd by 2050. However, a large development is currently under construction at the west end of the bridge (PointeVista). PointeVista is planning approximately 2,700 acres of mixed-use development including 2,100 homes, three resort hotels, a conference center, golf course, casino, marina, and shops and restaurants. The additional demand of this development would significantly increase traffic volumes on the Roosevelt Bridge. Projected 2050 traffic volumes inclusive of the development were estimated at approximately 27,300 vpd. With no improvements to the bridge, the 2050 Level of Service is expected to worsen to LOS E and the two-lane bridge would be a significant bottleneck. Adding two 12-foot lanes for a total of four 12-foot lanes and 10-foot outside shoulders would improve LOS to B in 2050.

By 2050, traffic volumes on the Roosevelt Bridge are anticipated to reach

27,300

Vehicles per day

The results of the traffic study demonstrate that the Roosevelt Bridge will not be able to adequately accommodate the proposed 2050 (with Development) volumes as a two-lane facility, as the segment LOS worsens on the bridge to LOS E conditions. Compiled LOS results for the bridge analysis for Build and No-Build conditions are shown in **Table 1** below for each design year scenario.

As part of the planning process to improve the condition of the Roosevelt Bridge, ODOT performed an evaluation of the existing structural condition of the bridge. Results of that analysis indicate the concrete deck has multiple large spalls throughout and areas where the deck lifts off the steel floor beams due to pack rust. All joints have lost their seals allowing water to flow onto

Table 1: Bridge Level of Service Results

Scenario	AADT	Level of Service (LOS) Results	
	Vehicles per day	*No-Build Condition*	*Build Condition*
2021	8,500	C	A
2050 (with Development)	27,300	**E**	B

the steel beams and girders supporting the deck. Many of the steel floor beams in the approach spans have significant corrosion and section loss resulting in substantial member capacity reduction. Numerous bearings have sheared bolts and shifted bearing plates. The metal bridge rail has numerous connections that are sheared, missing, or other failed connections. The rail has also been impacted multiple times by vehicles resulting in misalignment and damaged posts throughout. The steel truss members have minor corrosion throughout. Due to the low vertical clearance, the bracing in the portal frames of the truss has impact damage from vehicular collisions. The concrete substructure elements have minor spalls and cracks throughout. **Figure 5** shows select photographs of existing bridge conditions. More photographs can be found at ODOT Roosevelt Bridge.

Figure 5: Roosevelt Bridge Inspection Photos (2021)

The latest routine bridge inspection report (8/20/2021) gives the existing deck and superstructure NBI ratings as "5 = Fair"; however, this is based on emergency repairs conducted in 2021 to avoid load posting the bridge and otherwise would have been rated "4 = Poor", resulting in a load posting of the structure. The emergency repairs were not intended to be long term and did not address deficiencies such as the railing. The bridge will be inspected again in 2023 and, with grant funding, receive more detailed underwater and substructure inspection to better assess the feasibility of reusing the existing structure. The emergency repairs will also be assessed to determine if they are sufficient to prevent a "Poor" condition rating. It is anticipated that without the Project, the Roosevelt Bridge will fall into poor condition in the next three years.

Because the Roosevelt Bridge is eligible for inclusion in the National Register of Historic Places, ODOT must study alternatives to improve the bridge without affecting its historic integrity (Section 4(f) of the Department of Transportation Act). A detailed investigation of rehabilitation and other preservation alternatives is underway. While rehabilitation alternatives were studied, the need for additional capacity adds a significant complication. Alternatives to rehabilitate and widen the existing structure are extremely high cost, would result in significant disruption of traffic during construction and would be unlikely to preserve the historic integrity of the bridge given the extensive reconstruction of the truss span that would be required. Alternatives that preserve the existing bridge with a non-vehicular function such as a pedestrian/bicycle facility or as a historic monument appear to be more practical. However, no final decision has been made. Regardless of the alternative selected, the Project will provide a new structure designed to meet today's geometric and load rating standards with a 75-year design life. A new structure would resolve the structural deficiencies of the existing bridge.

The Roosevelt Bridge Project would also provide long-term resiliency to extreme weather events. Flooding has become more commonplace and more frequently overtops the existing bridge and causeway. In 2015 a major flood event forced ODOT to close US-70 and the Roosevelt Bridge for several days (**Figure 6**). The new bridge will raise the profile between two and five feet to provide additional clearance above high water. More information about project resiliency is presented in **Section 2.2.4** below.

Figure 6: Roosevelt Bridge Flooding, 2015

Replacing the Roosevelt Bridge will also reduce lifecycle costs. Should no major rehabilitation or replacement occur, it is estimated the existing bridge will require load posting in approximately 5-10 years, and closure 5-10 years after that. **Figure 7** below shows the differences in lifecycle costs between the alternatives under consideration. All alternatives will result in lower lifecycle costs than the "Do Nothing" (Alternative 1). The high user costs are associated with an approximate 39-mile detour required if the bridge were closed. As expressed in user costs, closing the Roosevelt Bridge would have significant negative impact to transportation network efficiency, accessibility and mobility of people and goods, and economic growth. The costs of closing the bridge far outweigh the costs of a new structure. These preliminary investigations suggest that a future Benefit Cost Analysis (BCA) per USDOT guidance would result in a ratio well above one. More discussion of user costs is presented in **Section 2.2.3** below. This lifecycle analysis is consistent with the methodology presented in ODOT's Transportation Asset Management Plan (2019-2028) and the Roosevelt Bridge project is consistent with that plan. Maintenance costs would be funded by ODOT through their dedicated maintenance fund.

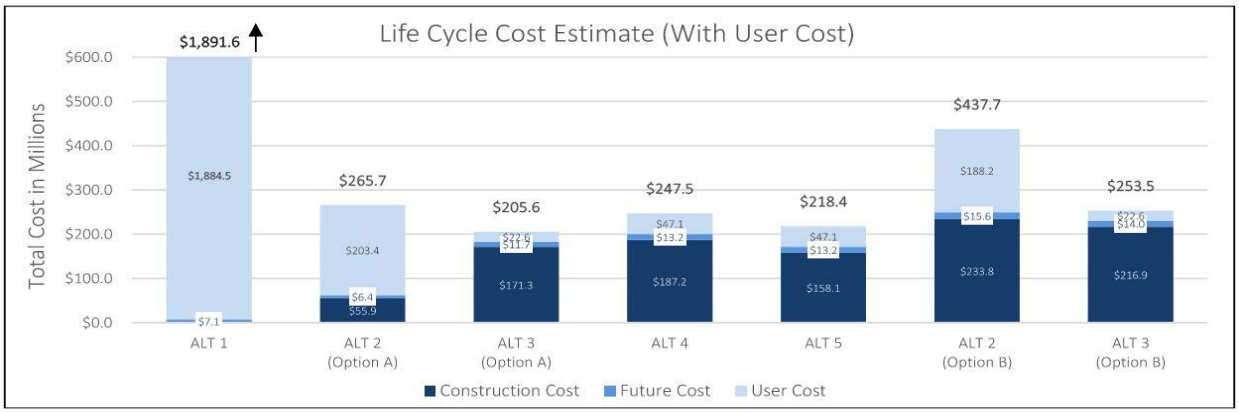

Figure 7: Lifecycle Cost Estimates (including user costs)

2.2.2 Safety

The Roosevelt Bridge has a demonstrated history of high collision rates on and near the bridge, particularly severe collisions such as injuries and fatalities. From 2015 to 2019 there were 52 total collisions, including 16 injury collisions and 4 fatal collisions (**Figure 8**). The corridor crash rate (78 crashes per 100 million vehicle miles traveled (MVMT)) was comparable to the statewide crash rate (76 per 100 MVMT).

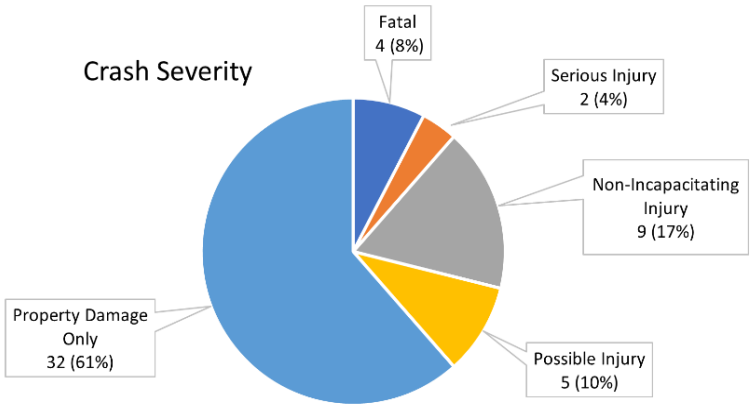

Figure 8: Roosevelt Bridge Crash Severity, 2015-2019

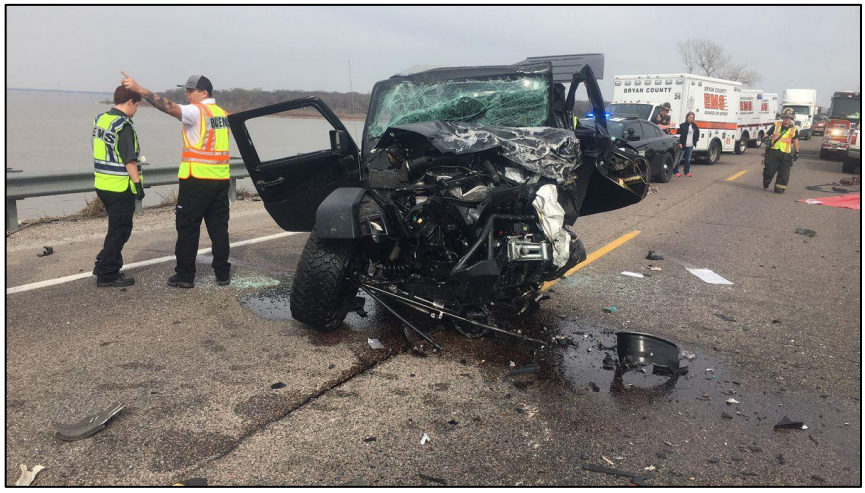

Figure 9: Fatal Collision, March 2018

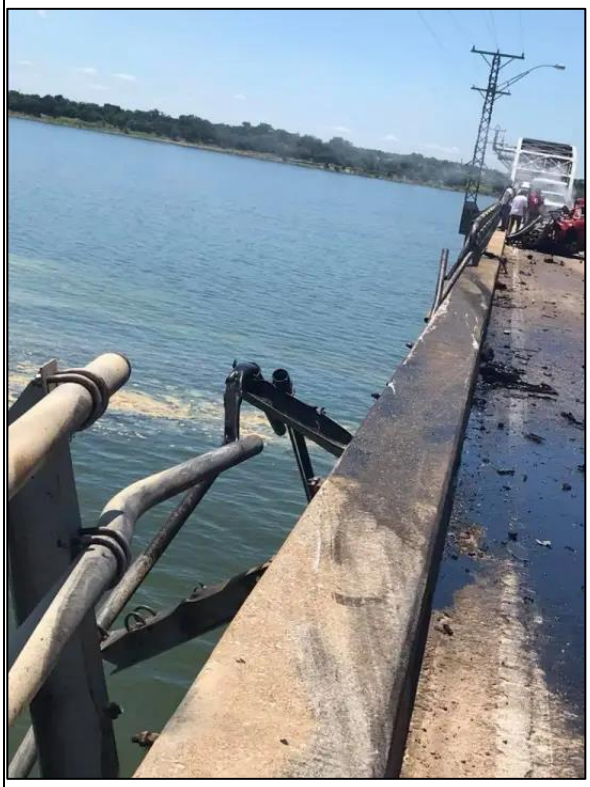

Figure 10: Fatal Collision, June 2018

The Roosevelt Bridge has a fatality rate

250%

higher than the statewide average

However, the **fatal crash rate for the corridor was almost 2.5 times larger** at 6.0 per 100 MVMT than the statewide fatal crash rate at 2.6 per 100 MVMT.

Close to one third (31%) of the collisions involved head on or side swipes which tend to result in more severe outcomes. This relatively high proportion can be attributed in part to the narrow width of the bridge and lack of separation between the two directions of traffic. "Left of center" is the most common event, indicating vehicles are crossing the centerline on the narrow bridge and causeway. This was the case in two fatal accidents that occurred in 2018 (**Figures 9 and 10**). Bridge condition also contributes to safety concerns. As seen in **Figure 10**, the existing bridge railing does not have sufficient capacity to withstand the impact of a crash and contain the vehicle(s) on the bridge. ODOT's analysis of existing bridge condition showed that **approximately 1/3 of the metal railing attachments are missing, providing no capacity**.

A closer look at the collision locations suggests that two areas related to the bridge have experienced a high number of collisions (**Figure 11**): the west approach, where the 5-lane US-70 roadway to the west transitions to the 2-lane bridge, and at the location of the truss span on the bridge itself. The intersections at either end of the project also have higher numbers of collisions.

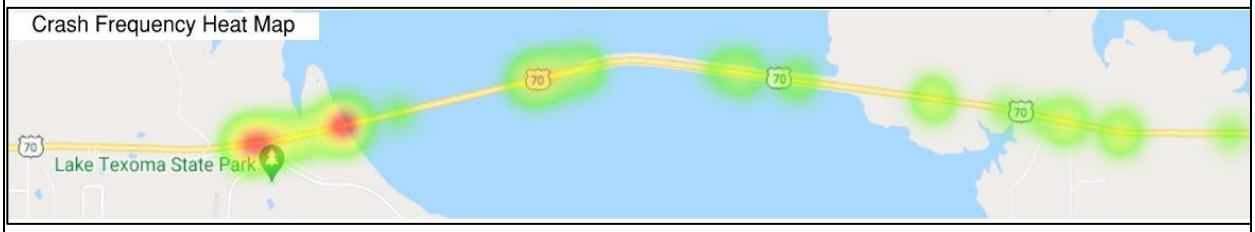

Figure 11: Collision Frequency Heat Map, 2015-2019

The US-70 roadway in the vicinity of the bridge also has characteristics that contribute to safety issues (**Figure 12**). There are no shoulders, median, or rumble strips on the bridge, leaving little room for error should a driver leave their lane. While there is lighting on the bridge, the roadway to the east and west is not illuminated. The west approach transitions from 5 lanes to 2 lanes on a steep grade (4.7%), and there is limited sight distance at the intersections on either end.

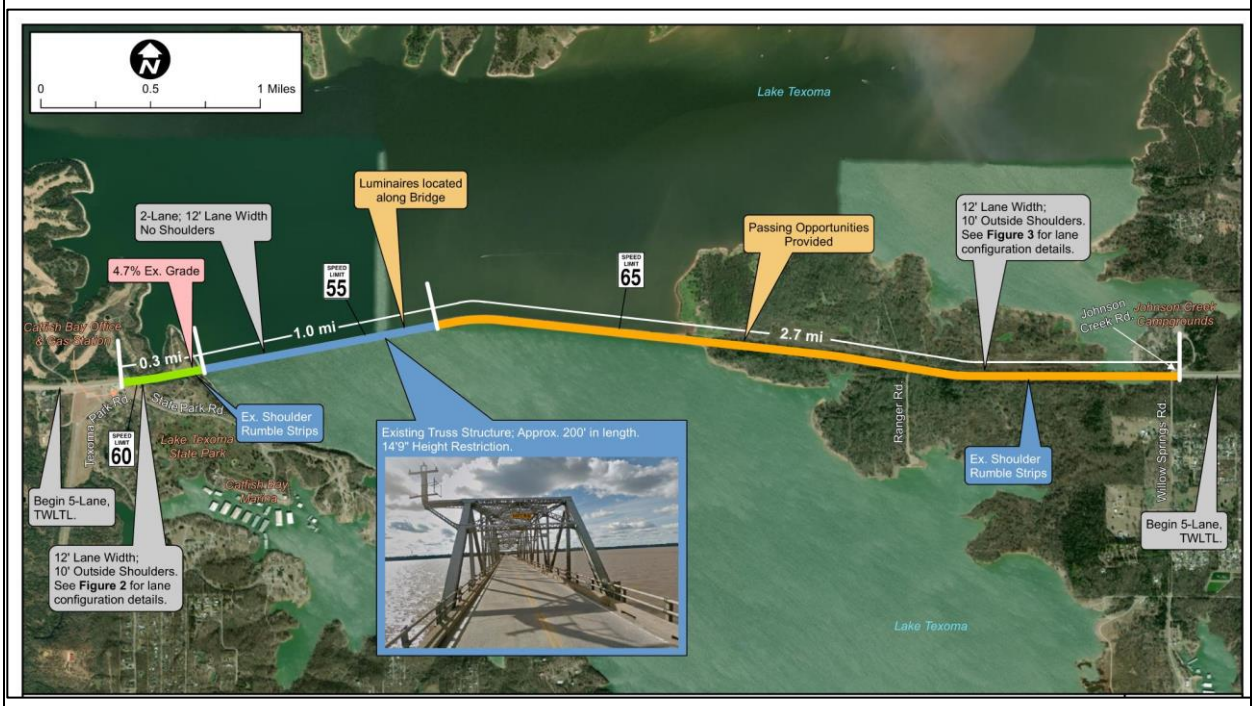

Figure 12: US-70 and Roosevelt Bridge Existing Conditions

The current configuration of the bridge (2-12’ lanes with no shoulders) is narrow and provides no opportunity for passing or safe refuge for vehicles. Widening the route from one-lane to two-lanes in each direction will provide additional passing opportunities and a safer route for the projected traffic volumes along US-70. The options being considered for replacement of the Roosevelt Bridge all assume the future bridge will have four 12-foot driving lanes and two 10-foot outside shoulders. While the additional lanes are needed to accommodate future traffic volumes, they are also anticipated to increase safety. The ultimate project will also remove all vehicular traffic from

the truss structure, eliminating the safety concerns related to the low vertical clearance. Modern crash-tested railing will be provided to minimize the potential of vehicles leaving the bridge.

Accommodations for bicycles and pedestrians will be studies as part of project planning. Using the existing bridge as a pedestrian/bicycle facility would maximize the use of existing right-of-way and infrastructure while increasing safety and connectivity for these modes. A portion of the BIP Planning Grant would be used for additional inspection and study of the safe accommodation of bicycles and pedestrians.

Potential safety benefits of adding cross-section elements such as median, lighting, or wider shoulders to the Roosevelt Bridge project was analyzed using Highway Safety Software (HSS). HSS considers Safety Performance Functions (SPFs) for rural two-lane and multi-lane highways to predict the number of expected crashes, then adjusts this total based on Crash Modification Factors (CMFs) from the presence of a limited number of cross-sectional elements (lane width, shoulder type and width, presence of horizontal curve and superelevation, number of driveways, rumble strips, grade and lighting presence) using data published in the original Highway Safety Manual (HSM). Results of this study show that adding median barrier and/or lighting to the new bridge could reduce crashes by up to 50%. ODOT will consider these results in the design of the future bridge. More detail can be found in the *Traffic Analysis Memo* available at ODOT Roosevelt Bridge.

Median barrier and lighting on the new bridge could reduce collisions by

50%

2.2.3 Mobility and Economic Competitiveness

The existing Roosevelt Bridge currently carries 8,500 vpd with 9% trucks. This number is expected to increase to 27,300 vpd by 2050. The PointeVista development currently under construction on the west side of the bridge is contributing heavily to the future demand (**Figure 13**). PointeVista is planning a master planned destination resort community including homes, golf courses, hotels, shopping, and restaurants. The Chickasaw Nation is also building a new casino within the PointeVista development. At full build-out, PointeVista is anticipated to generate 30,000 trips per day with over half of those projected to use the Roosevelt Bridge. A portion of the requested BIP Planning Grant will be used to complete additional survey, traffic analysis, and feasibility studies of intersections and retaining walls to ensure the needs of the future bridge project will be met while accommodating the development as necessary. Without improvements, Level of Service on US-70 is anticipated to worsen to LOS E by 2050 and result in significant congestion. The additional two lanes planned as part of the Roosevelt Bridge Project will improve safety and Level of Service on the bridge to LOS B, and remove a bottleneck created by the existing two-lane facility.

US-70 is an important link on the National Highway System (NHS) and provides critical east-west connectivity across southern Oklahoma, linking major freight routes such as I-35, US-69, and US-75 (**Figure 14**). Most of Oklahoma's freight tonnage and value continues to be carried by truck.

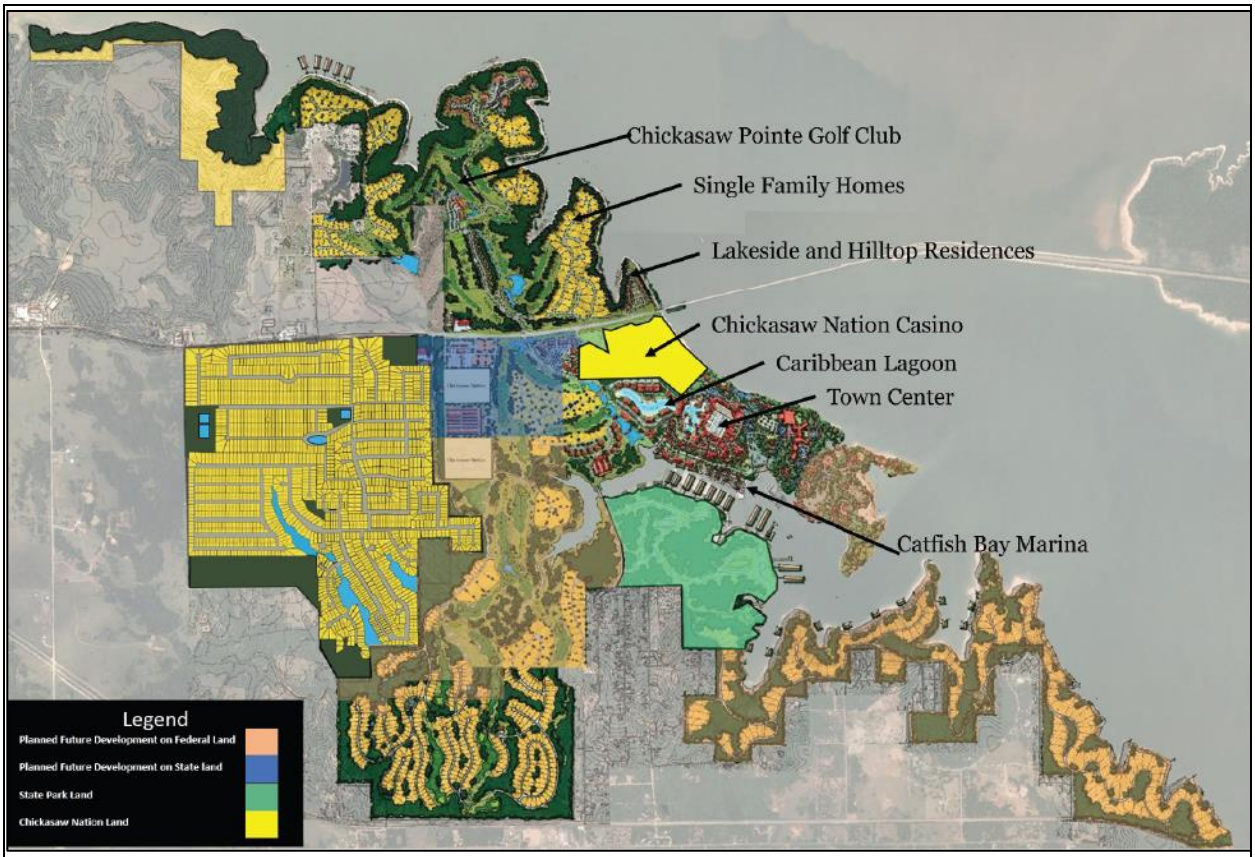

Figure 13: Proposed PointeVista Development

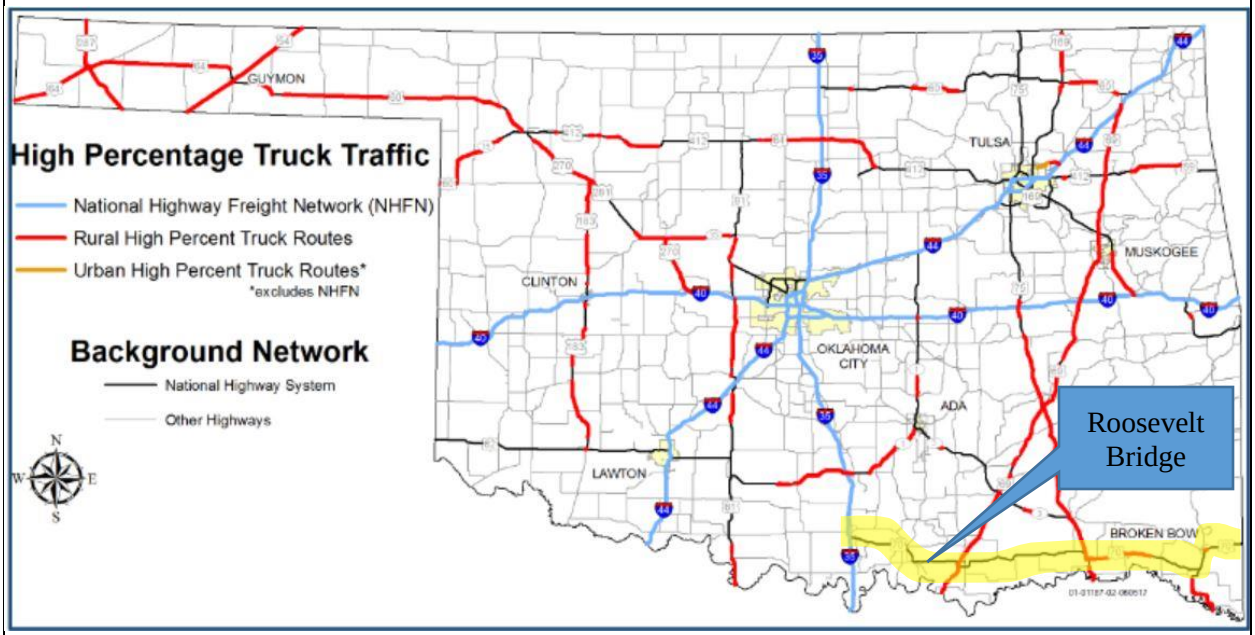

Figure 14: Oklahoma Truck Freight Routes (US-70 highlighted in yellow)

US-69 carries approximately 5,300 trucks per day and represents a key north-south route that runs

from Minnesota to Texas, forming an important connection between the Midwest and Dallas (Oklahoma State Freight Plan 2018-2022). With improvements to US-69 currently under construction near Durant (a joint ODOT/Choctaw Nation project funded in part by a FASTLANE grant of $62 million), freight mobility on this corridor will be improved and volumes are expected to increase. I-35 is the highest volume freight route in the state, with over 8,000 trucks per day in 2021.

As discussed in **Section 2.2.1**, the existing Roosevelt Bridge does not have sufficient capacity to accommodate the anticipated traffic demand. The City of Ardmore at I-35 and US-70 is the home of several large distribution centers including DOT Foods, Dollar General and Best Buy. Congestion on I-35 is well documented and is the subject of a major new study recently initiated by ODOT. As congestion worsens on I-35, US-70 to US-69 becomes a more attractive route for the freight supply chain to the Dallas Metroplex.

The Roosevelt Bridge becomes an even more critical transportation link in the light of regional freight patterns and lack of alternative routes. As described in **Section 2.2.1**, closure of the Roosevelt Bridge would result in a detour of approximately 39 miles. for the purposes of determining a detour distance, it is assumed the majority of the traffic is travelling a distance at minimum the 17 miles between Kingston and Durant (shown in green in **Figure 15**). In the event a detour is needed, the only feasible route is to the north. The detour is shown in red on **Figure 15**). As reflected in the user costs presented in **Section 2.2.1**, providing a new bridge would relieve the costs of 27,000 vehicles per day using a 39-mile detour.

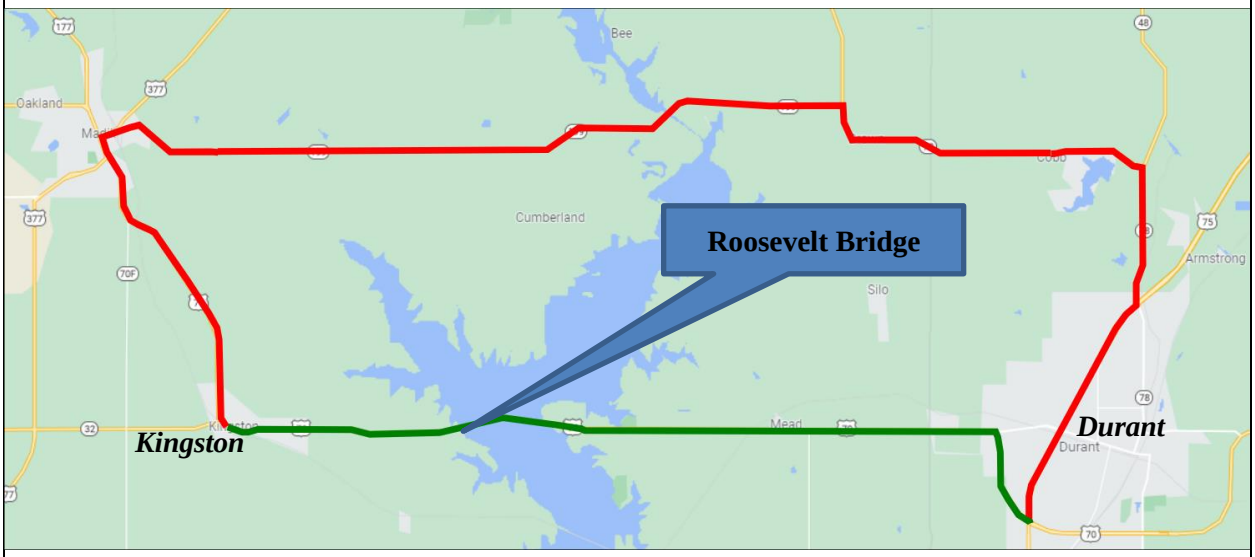

Figure 15: Detour Route

2.2.4 Climate Change, Resiliency, and the Environment

The Roosevelt Bridge Project will address climate change through the reduction of emissions from motor vehicles and providing opportunity for lower-carbon travel modes such as walking and cycling that does not exist today. As discussed in **Section 2.2.1 and 2.2.3**, traffic volumes on the Roosevelt Bridge are anticipated to grow significantly by 2050 with the large development occurring on the west side of Lake Texoma. Without improvements, traffic operations would

worsen to LOS E, which implies severe congestion and stop and go conditions. These conditions tend to increase air pollution as vehicles spend more time idling. In addition, without improvements the bridge would require load posting and eventual closure. The detour route (**Figure 15**) is almost 39 miles long. The emissions savings from avoiding 27,300 vehicles using this detour would be substantial.

In addition to emissions savings, the project will study the feasibility of bicycle/pedestrian accommodations. This could take one of two forms, either rehabilitating the existing bridge for bicycle/pedestrian use or adding bicycle/pedestrian accommodations to the new bridge. While multiple alternatives are still under consideration, the project will address the need for pedestrians and cyclists to safely cross Lake Texoma, where no opportunity exists today. **Figure 16** shows the narrow deck on the existing bridge that currently does not provide a separated space for bicycles or pedestrians. With limited crossings of Lake Texoma, the Roosevelt Bridge project would provide a critical link for non-vehicular users. Oklahoma State Parks, who operate Lake Texoma State Park on the west side of the Roosevelt Bridge have expressed an interest in providing bike/ped accommodations for park users. The US Army Corps of Engineers (USACE) and a number of other agencies maintain recreational sites and hiking/biking trails across Lake Texoma (see Lake Texoma Map at ODOT Roosevelt Bridge). Increasing connectivity across the lake for campers and trail users would not only reduce emissions and further reduce air pollution but would also support one of the USACE's Recreational Objectives of expanding existing trails and developing new ones. A portion of the BIP Planning Grant would be used to study bicycle and pedestrian accommodations in more detail. More information on the recreational benefits of the Roosevelt Bridge project is described in **Section 4.2.5** below.

Figure 16: Narrow Deck on Roosevelt Bridge

The Roosevelt Bridge Project will improve the resiliency of at-risk infrastructure by raising the profile grade of the bridge to reduce flood risk. As mentioned in **Section 4.2.1**, there have been several historic floods that have forced closure of the Roosevelt Bridge for a period of days. The most recent, in 2015, saw record floodwaters and resulted in a full closure in both directions for multiple days. To prepare for future floods and ensure long term resiliency, the Roosevelt Bridge Project will construct the new bridge between two and five feet higher than the existing (depending on location). The new bridge will have a low-beam elevation of 647 feet, two feet higher than the top of the flood pool and just over one foot higher than the record 2015 elevation of 645.72 feet. The driving surface would be at 655 feet, six feet higher than existing and almost 10 feet higher than the previous flood record level. These new bridge elevations were selected to keep the superstructure above water during the 200-year storm event, or an event that has 0.5% chance of occurring in a given year (**Figure 17**).

As a flood control facility, the USACE monitors the levels of Lake Texoma closely to determine the appropriate downstream releases through Denison Dam. Specific elevations define different functional "pools" of the lake that serve to contain water during flood events. As shown in **Figure 18**, the flood pool of Lake Texoma is between 619 and 640 feet. The USACE must maintain this capacity in the event of a large storm. Therefore, fill within the lake between these elevations, including new bridge piers and roadway embankment, is strictly controlled and must be offset by additional flood storage if impacted. The requested BIP Planning grant funds will be used to study flood storage impacts in more detail and determine how they can be reduced or mitigated. This study will be completed in coordination with the Texoma Lake Office of the USACE.

Frequency	Annual Frequency	Pool Elevation
0.99	1-Yr	611.0
0.5	2-Yr	621.0
0.2	5-yr	628.8
0.1	10-Yr	636.0
0.05	20-Yr	641.0
0.04	25-yr	642.0
0.02	50-Yr	646.0
0.01	100-Yr	646.5
0.005	200-Yr	647.0
0.004	250-Yr	647.1
0.002	500-Yr	647.3

Figure 18: Lake Texoma Storm Event Summary

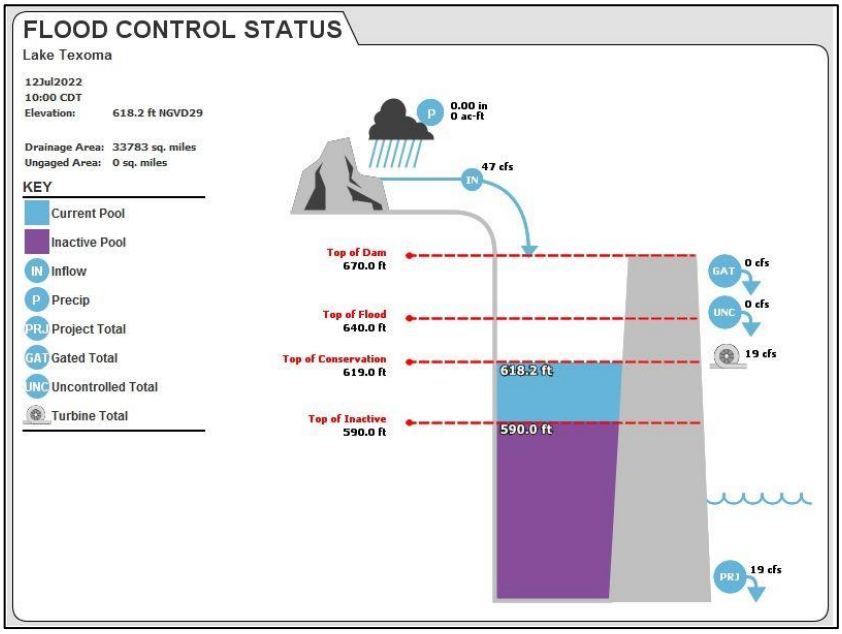

Figure 17: Lake Texoma Flood Control Status (7/12/2022)

2.2.5 Quality of Life

The Roosevelt Bridge Project will improve the quality of life for local and regional users. As a critical east-west link, the Roosevelt Bridge provides one of only two crossings of Lake Texoma within the 30 miles between Tishomingo, OK and Denison, TX. Improving the bridge to provide a safe crossing with sufficient capacity to meet current and future demand will improve mobility for all users for future generations. While congestion on the bridge is not common today, future traffic volumes of over 27,000 vpd will far exceed the capacity of the existing two-lane facility. Reliability will be improved with increased capacity providing improved traffic flow, as well as additional bridge width to provide a safer facility, allow collisions to be cleared more quickly, and provide emergency responders better access. Today, if there is a collision on the bridge, there is no room to clear vehicles from the roadway and traffic can quickly back up, causing delay for travelers and acting as an obstacle for police and ambulances trying to reach the scene.

As discussed in **Section 2.2.1**, the Project will study the feasibility of providing accommodation for pedestrians and bicyclists where none exist today. It is desirable that these users have a safe, separated space to travel separately from vehicles. As a major recreational destination also serving

to manage water and wildlife resources, Lake Texoma would benefit from a potential reduction in vehicle trips that would reduce emissions (see **Section 2.2.4**) and provide better connectivity for its visitors.

Lake Texoma sees more than 6 million visitors per year. The lake offers 580 miles of shoreline with two wildlife refuges, two state parks, 54 USACE-managed parks, and 23 commercial campgrounds. The lake's primary attractions include camping, boating, and fishing, and hiking (**Figure 19**). As primarily public land with abundant access, Lake Texoma provides a relatively affordable recreation option for residents of Oklahoma, Texas, and the surrounding area. Given the proximity of several Areas of Persistent Poverty, Historically Disadvantaged Communities, and the Choctaw Nation Promise Zone, providing bicycle and pedestrian accommodations on the bridge would increase mobility options for local underserved communities. It would also allow park users to cross this part of Lake Texoma without having to drive. With Catfish Marina on the west end of the bridge, offering food, gas, and other services, users would be able to access these destinations on the new bridge. With a safe, separated pedestrian and bicycle facility, the bridge could become a recreation destination in and of itself, offering a unique perspective on Lake Texoma not often experienced outside a vehicle.

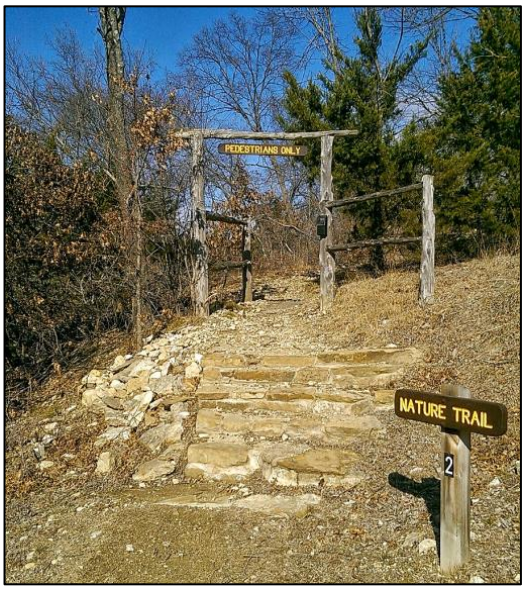

Figure 19: Hiking Trail at Lake Texoma

A review of the Environmental Protection Agency (EPA) EJSCREEN tool indicates that there are minority and low-income populations in the vicinity of the project. Although the Project is not within an Area of Persistent Poverty or a Historically Disadvantaged Community as defined by USDOT, these areas are immediately adjacent to the Project. 2020 Census data shows that minority populations are primarily Native American, not surprising given that the project is within the jurisdictional boundary of the Chickasaw Nation. Public outreach will be guided by the presence of these disadvantaged populations and outreach methods will be designed accordingly. The Chickasaw Nation has been participating in the project and may be able to offer assistance in engaging its citizens.

ODOT has begun engaging stakeholders in the planning of the Roosevelt Bridge Project. Initial meetings with the USACE, Chickasaw Nation, Oklahoma State Historic Preservation Office, Oklahoma Archaeological Survey, and Oklahoma State Parks have been held. These agencies were briefed on the existing condition of the bridge and the potential alternatives to provide a safe crossing of Lake Texoma that meets future demand, while preserving the historic integrity of the existing structure. These options are still under consideration along with options to replace the existing bridge. Next steps include presenting alternatives to the public.

Public meetings are anticipated to be combination of in-person and virtual outreach. Because US-70 is a significant regional facility, and Lake Texoma attracts visitors from a large area, on-line

engagement is anticipated to be the most appropriate way to reach these users. On-line engagement proved to be a successful method of information dissemination over a large audience. Many of ODOT's on-line meetings during the COVID-19 pandemic received thousands of visitors, far more than would ever be able to attend an in-person event. However, in-person meetings are important to provide opportunity for the local population to participate in projects that may directly affect their access or properties. Therefore, ODOT proposes both means of outreach for the Roosevelt Bridge Project. Input on the options to preserve the historic integrity of the existing bridge, on the provision of pedestrian and bicycle facilities, as well as potential impacts to public lands will be especially important.

2.2.6 Innovation

The Roosevelt Bridge Project provides opportunities for innovation in technology and project delivery.

Accelerated Bridge Construction

ODOT has considered Accelerated Bridge Construction (ABC) techniques under the assumption that a new bridge will be constructed to carry US-70 over Lake Texoma. The new bridge is anticipated to be a 10,625' long bridge with 71 repetitive spans resting approximately 30' above the normal pool water elevation of Lake Texoma. The use of ABC techniques has the potential to shorten construction time, reduce construction costs, reduce traffic impacts, improve worker safety and improve the quality control of materials. Float-in Modular Spans, Precast Concrete Pier Caps and Precast Concrete Deck Panels are some of the techniques that would be further studied for benefit to the project.

A Float-in Modular Span concept is shown in **Figure 20**. This technique includes construction of the superstructure in an on-site staging and fabrication area located near the bridge at an accessible bank of the lake. Each span would be constructed sequentially and stored away until time for erection. This assembly line type method would improve the quality of construction due to laborers working in a more controlled setting while erecting the material components. Precast concrete pier caps and precast concrete deck panels will also be investigated to explore benefits that would contribute to the efficiency of the float-in Modular Span concept.

This potential ABC method would improve safety of the construction laborers by removing many of the construction activities from the hazards associated with lake construction. Construction time would be reduced because the superstructure can be constructed at the same time as the substructure. Once the drilled shafts are cured, the pre-constructed spans would be individually moved with controlled Self-Propelled Modular Transporter (SPMT)'s to falsework supported on barges. The barge would then transport individual spans by floating each into the desired location. Once positioned, water would be pumped into the barge to partially sink the system and set the superstructure in its final position on the bridge. Repetition, efficiency, speed, safety and control could be some of the benefits of this method. A detailed study of this methodology, specific to the span arrangement, would help determine its feasibility. A portion of the requested BIP funds would be used for this study.

Figure 20: Illustration of a Float-in Modular Span Technique

Progressive Design Build

The complexity of the US-70 over Lake Texoma Bridge has many features that would benefit from early owner and contractor collaboration. The size of the drilled shafts, the depth of the lake, the length of the bridge, and the potential for Accelerated Bridge techniques are a few of the features. For these reasons, a Progressive Design-Build (PDB) method of construction delivery will be investigated to allow the owner and design-builder to collaborate at the earliest stages of the project development. This would be ODOT's first PDB project delivery.

Criteria #3: Project Schedule

ODOT began planning for the Roosevelt Bridge project in 2019, when the project was added to ODOT's 8-Year Construction Work Plan (CWP) and ODOT collected reconnaissance data for the bridge and adjoining roadway, as a tool for planning future improvements. In 2020, ODOT initiated study of alternatives to correct the structural and geometric deficiencies of the Roosevelt Bridge in 2020. Because the bridge is eligible for listing in the National Register of Historic Places, it is subject to analysis under Section 4(f) of the Department of Transportation Act. Section 4(f) requires that ODOT evaluate alternatives that would address the project purpose and need without affecting the historic integrity of the existing bridge, including doing nothing, rehabilitating the existing bridge, and building a new bridge in a new location (i.e. "avoidance alternatives"). With stakeholder input, ODOT completed a detailed analysis of the existing bridge conditions and potential avoidance alternatives and submitted this to FHWA Oklahoma Division in February of 2022. Initial comments were received by FHWA and ODOT resubmitted the revised report in June 2022.

Concurrent with the Section 4(f) design analysis, ODOT completed a preliminary engineering study to examine replacement alternatives (June 2022). Results of the design analysis suggest that

rehabilitation of the existing structure is unlikely to be feasible due to the need to widen the existing bridge to accommodate future traffic growth. Therefore, a new bridge is likely to be needed. ODOT studied several alternatives to replace the existing bridge, including offset alignments and new alignments. The schedule for the remaining planning activities is presented in **Table 2**.

Table 2 - Summary of Schedule Milestones

Roosevelt Memorial Bridge Investment Project											
Task	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Planning											
Reconnaissance Data Collection											
Consultant Procurement											
Existing Conditions											
Section 4(f) Analysis											
Preliminary Engineering Study											
Public Meetings											
Design Feasibility											
Accelerated Bridge Study											
Geotechnical Exploration											
Development Study											
Feasibility Plans											
NEPA Approval and Final Design											
NEPA Document											
Final Design											
Right-of-Way and Utilities											
Right-of-way Acquisition											
Utility Relocation											
Construction											
Roosevelt Bridge Construction											

Criteria #4: Project Budget

The planning project budget includes $3,191,000 for completion of the activities described in this application. Major milestones are shown in **Section 2.3.** A detailed breakdown of the budget is shown in **Table 3** on the next page. ODOT intends to match the $957,300 BIP request with $638,000 of its own funds (Oklahoma ROADS Fund) as well as $1,595,500 of its Federal-aid allocation from FHWA.

Table 3: Proposed Project Budget and Sources and Uses of Funds

Planning Activity	Estimated Budget	BIP Funds	Other Federal Funds	ODOT Funds
Design Feasibility	$804,000	$241,200	$402,000	$160,800
Ped/Bike Feasibility	*$472,000*			
Utility Relocation	*$23,000*			
Compensatory Storage Study	*$75,000*			
Inspection	*$234,000*			
ABC Study	$60,000	$18,000	$30,000	$12,000
Geotechnical Exploration	$1,800,000	$540,000	$900,000	$360,000
Development Studies	$212,000	$63,600	$106,000	$42,400
Feasibility Plans	$315,000	$94,500	$157,500	$63,000
TOTAL PLANNING	**$3,191,000**	**$957,300**	**$1,595,500**	**$638,200**
Percent	100%	30%	50%	20%

Planning Priority Considerations

This application supports the following DOT Planning Priority Considerations:

1. Without BIP grant the applicant would be unable to complete the planning process. The existing consultant contract does not include the planning activities requested in this application. ODOT has not programmed the full amount required to complete planning for this complex project. Therefore, BIP funds are requested.
2. To complete planning for a Large Bridge project that will replace/rehab/protect/preserve a bridge in poor condition on NBI and anticipated to begin construction within 2 years of completion of planning. The Roosevelt Bridge is in fair condition, at risk of falling into poor condition and warrants a new structure to carry vehicular traffic. With an anticipated total cost of $150 - $234 million, the Roosevelt Bridge would be classified as a Large Bridge project. The schedule presented in this application shows that with BIP funding, ODOT can complete planning for the Project at the end of 2024. Construction would then be anticipated to start within two years of this date, in mid-2026.