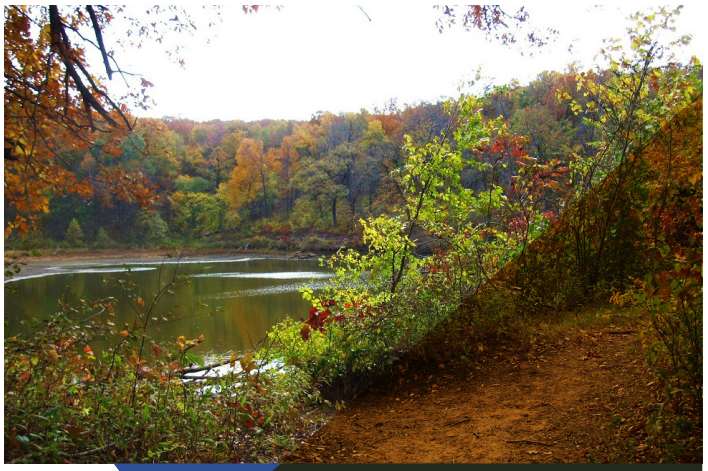

OKLAHOMA Transportation

I-44 and US-75 Corridor Improvements Project FY 2021 RAISE Grant Application

JULY 12, 2021

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1.0 PROJECT DESCRIPTION

The existing I-44/US-75 interchange in Tulsa, Oklahoma features an outdated cloverleaf design that can no longer accommodate today's traffic volumes and poses safety issues due to limited merging opportunity and high ramp density. Congestion is frequent and contributes to an elevated collision rate, which is only expected to worsen in the future. Improving the I-44/US-75 interchange will improve safety and mobility for passenger and freight traffic, contributing to enhanced economic competitiveness and infrastructure in a state of good repair. The I-44 corridor between I-244 and the Arkansas River has not been upgraded since its construction in 1953. As one of Oklahoma's oldest sections of interstate, the pavement has deteriorated over time earning a "Fair to Poor" performance rating. The project will also enhance quality of life by providing additional transportation mode choices and will reconnect two low-income neighborhoods that were split by the original highway construction.

The Oklahoma Department of Transportation (ODOT) is requesting $25 million in 2021 RAISE grant funds to assist with the I-44/US-75 Interchange Project shown in **Figure 1**. The project consists of three work packages (WP 2, 3, and 5), and will result in a completely reconstructed

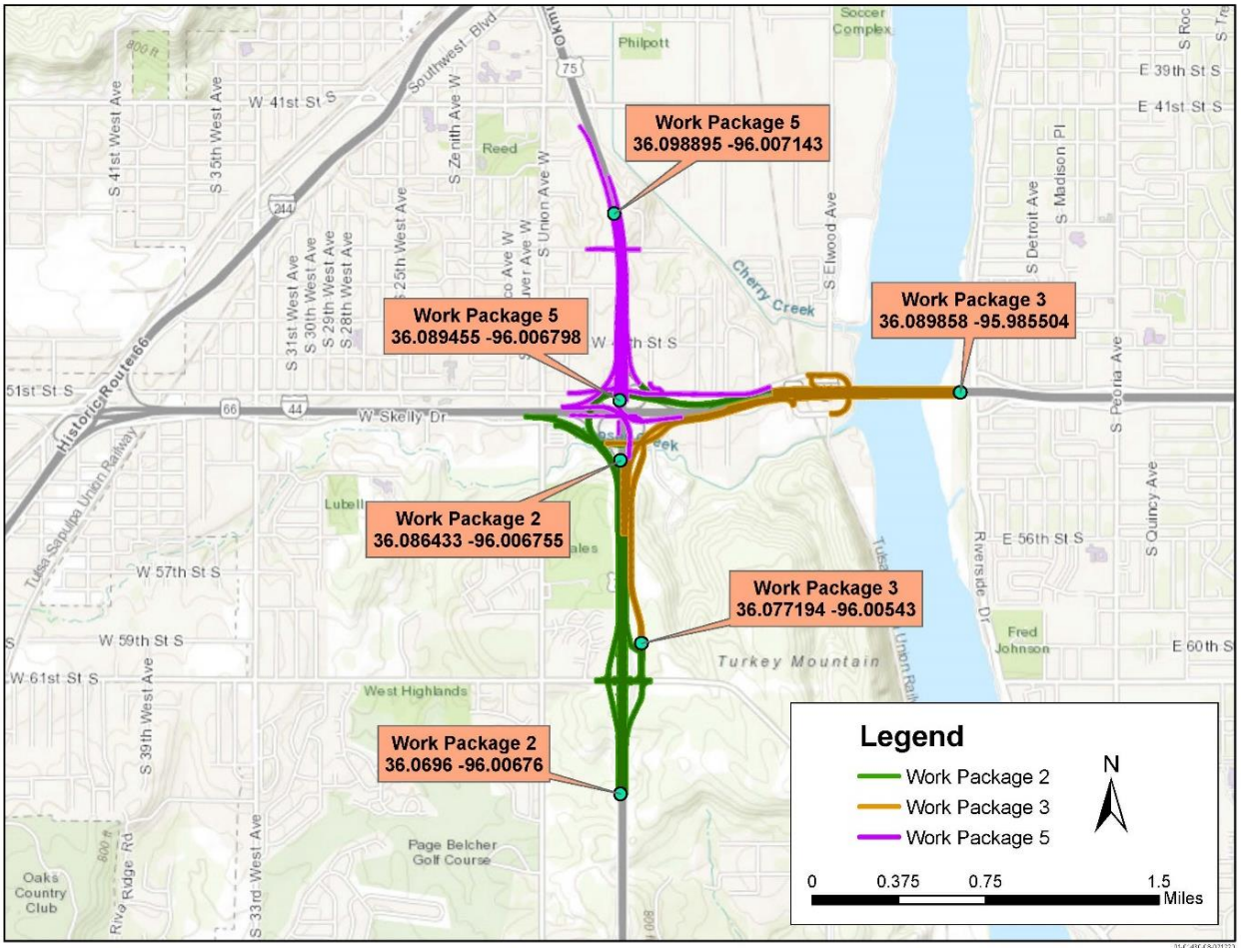


Figure 1: Project Location Map

interchange at I-44/US-75. This application will describe the merits of the project in more detail. Supplementary information can be found at I-44 US-75 RAISE.

1.1 Project Summary

The I-44/US-75 Interchange Project is part of a larger effort to improve the I-44 and US-75 corridors in west Tulsa. The entire 2.5-mile segment of I-44 from I-244 to the Arkansas River will eventually be reconstructed to meet the growing intra- and interstate freight demands, address significant safety issues, and upgrade the corridor to current interstate standards. However, it is necessary to proceed in phases. The first phase (Work Package 1), funded in part by a 2018 INFRA grant of $45.0 million, is currently underway and will open to traffic in Winter 2022.

This application encompasses three of the four remaining project work packages needed to complete the I-44/US-75 interchange. These work packages together form a component of independent utility. This grant application covers projected future eligible costs of $205.8 million. The three work packages for which ODOT is requesting 2021 RAISE funding are summarized below and maps are provided at I-44 US-75 RAISE**.** An interactive map of all of the I-44/US-75 Work Packages can be found at I-44/US-75 Interchange Improvements.

View the Project Interactive Map at I-44/US-75 Interchange Improvements

Work Package 2 constructs several directional ramps and bridges at the I-44/US-75 interchange, reconstructs a portion of US-75 from south of Mooser Creek to near 71st Street, reconstructs the US-75/61st Street interchange, including the 61st Street bridge over US-75, and reconstructs a portion of Skelly Drive from Union Avenue east to US-75.

Work Package 3 builds upon Work Package 1 and continues the widening of I-44 to six lanes east of US-75 with an auxiliary lane in each direction across a wider Arkansas River bridge. WP 3 also constructs a new pedestrian bridge over the Tulsa-Sapulpa Union Railway, continues widening of US-75 to six lanes south of the bridge over Mooser Creek, constructs Skelly Drive east of US-75, and completes the US-75 Frontage Road.

Work Package 5 completes the widening of US-75 to six lanes from 41st Street to 51st Street, constructs the US-75 bridge over 51st Street, replaces existing US-75 bridges over 49th Street, completes several directional ramps and bridges at the I-44/US-75 interchange, and reconstructs 46th Street under US-75. WP 5 also links the disconnected portions of 51st Street on either side of US-75.

1.2 Project History

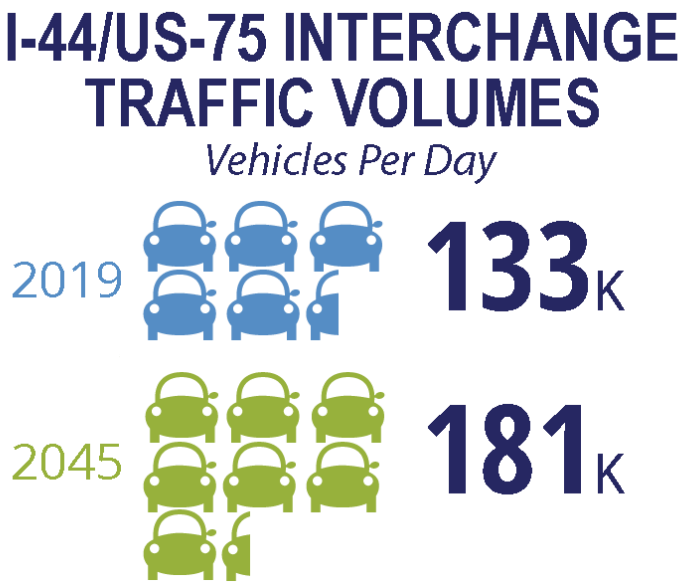
ODOT requested $63.8 million, and received $45.0 million, in 2018 INFRA funds to support the first component of this project (WP 1). This component widens I-44 to six lanes from near Union Avenue to the bridges over the Tulsa-Sapulpa Union Railway, constructs US-75 bridges over I-44 and Mooser Creek, reconstructs a portion of US-75 in association with new bridges, reconstructs

I-44/US-75 loop ramps to match new grade on US-75, partially reconstructs the I-44/US-75 outer ramps, and advances pier construction for future interchange ramp bridges. In addition to construction on WP 1, ODOT has made significant progress on the design and right-of-way acquisition of the remaining work packages. Design has advanced to the 60% level and advanced right-of-way acquisition has begun on select properties. The Access Justification Report (AJR) was approved by FHWA in April 2020. Final plans to complete right-of-way acquisition are scheduled for completion in August 2021. A public open house presenting the remaining work packages was recently concluded, and the NEPA document authorizing construction is expected to be approved by the Fall of 2021.

ODOT has made significant progress since the 2018 INFRA grant award

1.3 Transportation Challenges and Solutions

Tulsa County – in particular, the cities of Tulsa, Jenks, and Glenpool – is experiencing tremendous growth through residential and commercial development. The I-44 and US-75 corridors provide access to important Tulsa County industrial and manufacturing facilities, large employment centers, suburban residential communities, schools and education facilities, and recreational amenities. In 2019, the I-44/US-75 interchange served 133,000 vehicles per day, and future use is anticipated to reach over 181,000 vehicles per day as Tulsa County grows through 2045. The transportation challenges of the project are described below and shown on **Figure 2**.



As the only remaining four-lane interstate in the Tulsa metropolitan area and a critical link in the National Highway Freight Network, growth in Tulsa County cannot be met with existing I-44 infrastructure conditions. Congestion and frequent collisions in the corridor pose a regionally significant transportation challenge, affecting the efficient movement of people and freight which results in greater carbon dioxide (CO_2) emissions. Approximately 12,000 freight trucks per day use the I-44 corridor and the limited number of suitable highway crossings across the Arkansas River has made the river a barrier for oil and gas tanker trucks.

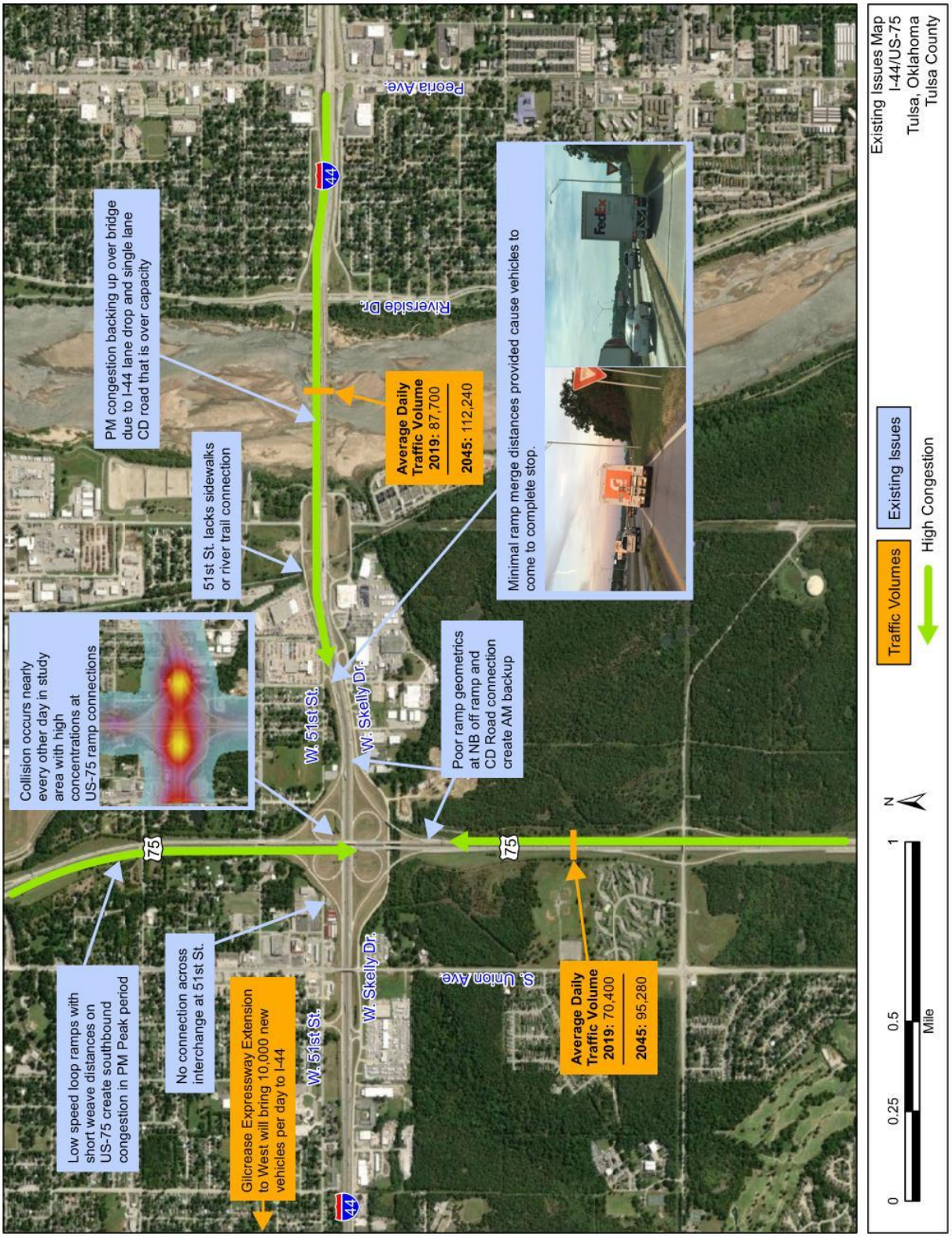


Figure 2: I-44/US-75 Interchange Transportation Challenges

The existing I-44/US-75 cloverleaf interchange is outdated, which further inhibits freight movements. A system of adjacent collector/distributor roads, short weaving sections from the cloverleaf interchange, and a lack of merge distance at multiple entrance ramp locations results in congestion and disrupted reliability (**Figure 3**). Additionally, the relationship between the existing interchange and surrounding communities restricts local bicycle and pedestrian access, creating a mobility barrier between the existing minority, low-income neighborhoods.

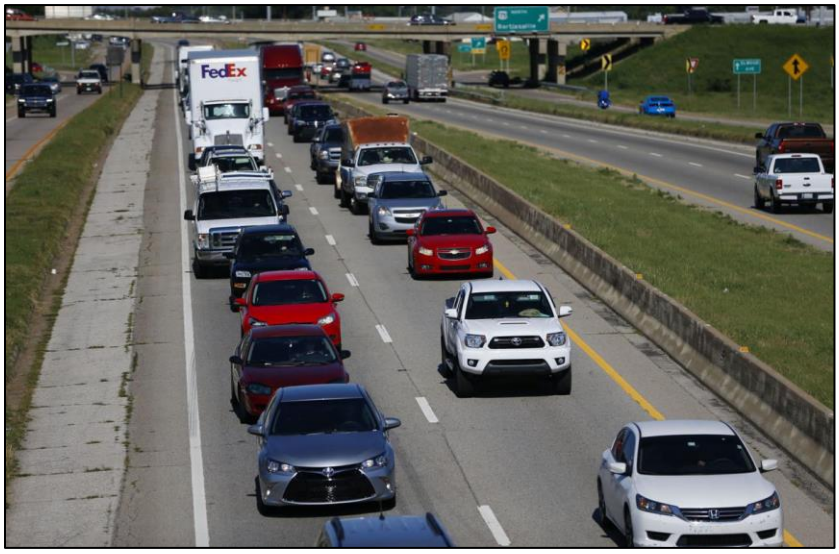


Figure 3: Congestion on I-44 at the I-44/US-75 Interchange

The I-44/US-75 Interchange Project will relieve a significant interstate system bottleneck and contribute to a safer and more reliable interstate corridor of six continuous lanes throughout the City of Tulsa. Although they are not the first or final stages of the larger I-44 and US-75 corridor improvements, WP 2, WP 3, and WP 5 together will improve the most congested and collision-prone areas and will allow ODOT to accelerate and fast track delivery of the remaining corridor improvements.

Designing to modern standards will yield significant safety benefits on bridges and roadways. The work covered under this application will include the construction of seven directional ramps and bridges between I-44 and US-75, replacing the current obsolete and ineffective cloverleaf interchange configuration. Bridge construction will include new bridge rail on all replaced bridges, a new barrier wall and impact attenuators on bridge approaches, pier protection, and a new barrier wall on bridge departures. Roadway safety improvements include a new median barrier protecting both directions and standard 12-foot inside and outside shoulders on mainline I-44 and US-75. The project will also improve safety by consolidating ramp access within the freeway influence area, eliminating low speed loop ramps and minimal weaving distance areas, and significantly improve ramp merging distances. Several current ramps are true yield conditions rather than merges, which violates driver expectancy for freeway conditions.

Existing assets, including the 61st Street bridge over US-75, the US-75 bridges over W. 49th Street, and Skelly Drive from Union Avenue to the east of US-75 will be reconstructed to improve safety and traffic flow. The I-44 bridge over the Arkansas River will be widened from four lanes to six, relieving a major interstate bottleneck and improving regional connectivity over a significant geographic barrier (**Figure 4**).

Figure 4: I-44 Bridge over the Arkansas River

Importantly, WP 2, 3, and 5 will include improved local street connections, including the extension of 51st Street under US-75. The 51st Street extension will help to reconnect the historic neighborhoods of Carbondale and Winnetka Heights, low-income communities that were separated when US-75 was constructed. The I-44/US-75 Interchange Project will also enhance personal mobility and accessibility, not only for regional users accessing jobs and services, but to the residents in the immediate project area. Local street improvements are being designed with either finished sidewalks or shelf spacing for future sidewalk installation. A pedestrian bridge extending over the Tulsa-Sapulpa Union Rail line along 51st Street will connect the Carbondale and Winnetka Heights neighborhoods to the existing River Park Trail System and Turkey Mountain, Tulsa's only urban wilderness with over 600 acres and extensive trails for running, hiking, mountain biking, and horseback riding (see **Figure 5**).

1.4 Other Infrastructure Investments in the Tulsa Area

Heightening the urgency for improvements to the I-44/US-75 interchange is the ongoing construction work on the Oklahoma Turnpike Authority (OTA)'s Gilcrease Expressway Turnpike. The extension of the Gilcrease Expressway, from I-44 north to US 412 (**Figure 5**), is part of the region's long-term plan to complete an outer expressway loop around Tulsa's central business district. The 5.6-mile section currently under construction will provide a critically needed Arkansas River bridge crossing, increasing access to the traditionally underserved west Tulsa area. Notably, the Gilcrease Expressway will deliver an additional 10,000 vehicles per day into the west side of the I-44/US-75 interchange, exacerbating the existing interstate bottleneck. This is another reason the project is timely and must be expedited.

2.0 PROJECT LOCATION

The project is within the Tulsa Urbanized Area (UA-88948) and the Tulsa Transportation Management Area (TMA). The blue line in **Figure 6** is the Tulsa TMA boundary, the red line is the

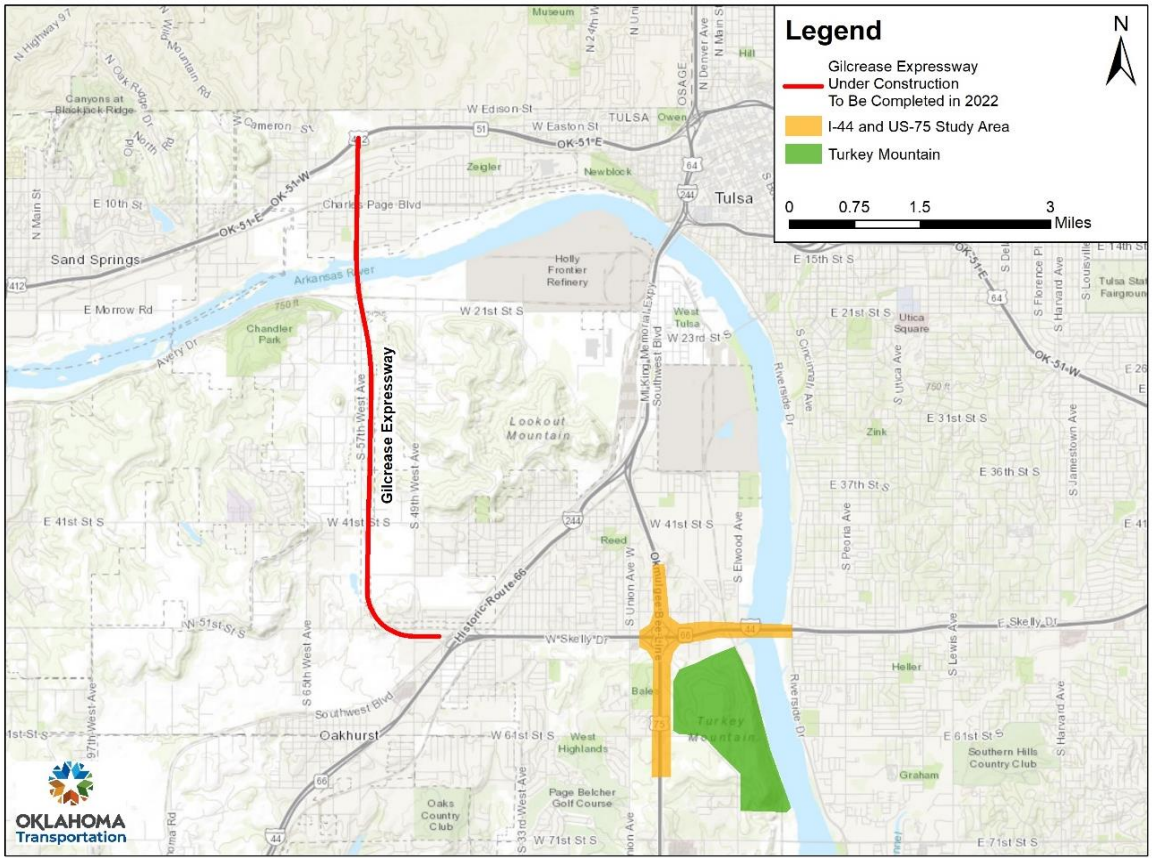


Figure 5: The I-44/US-75 Project, Gilcrease Expressway, and Turkey Mountain

Tulsa UA boundary, and the black box represents the project location. According to the 2010 U.S. Census, the Tulsa UA had a population of 655,479. Therefore, **this project is considered urban**.

The project is on the National Highway System and the Primary Highway Freight Network. The project includes approximately 1.5 miles of I-44 between Union Avenue and the east bank of the Arkansas River, and approximately 2.3 miles of US-75 from south of 61st Street north to the 41st Street exit. The project also includes approximately 4 miles of local streets, including a new connection of 51st Street under US-75, and a new frontage

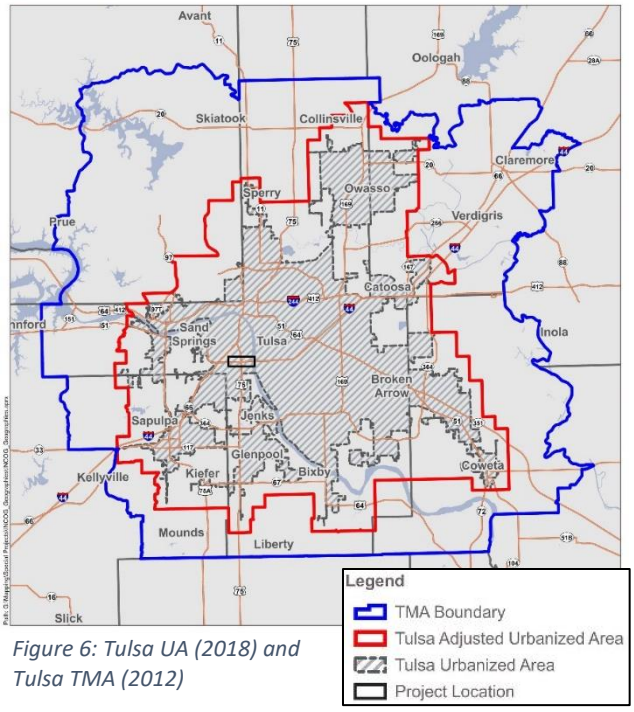


Figure 6: Tulsa UA (2018) and Tulsa TMA (2012)

road on the east side of US-75 between 61st Street and Skelly Drive to facilitate local access due to new ramp patterns at I-44/US-75.

3.0 GRANT FUNDS, SOURCES AND USES OF PROJECT FUNDS

ODOT is requesting $25 million in RAISE funds to contribute to the construction of the project. ODOT intends to utilize Federal aid and state dollars to fund the remainder of the project cost. The future eligible cost for the project components covered in this application is $205.8 million.

Cost estimates were developed by the design engineer based on estimated quantities and recent similar projects constructed in Oklahoma. The budget and schedule include the cost of each project component, and how non-federal (state), RAISE, and other federal funds will be allocated to each component. A summary of the future costs of the different project components and the anticipated cost share is presented in **Table 1**.

Table 1: Sources and Uses of Funding

USE OF FUNDS	SOURCES OF FUNDING (in $1,000s)			
	State Funds	Other Federal Funds	RAISE Funds	Total Future Project Cost
Construction	$32,000	$130,100	$25,000	$187,100
Contingency and Other	$13,000	$5,739		$18,739
TOTAL	$45,000	$135,839	$25,000	$205,839
Percent	**22%**	**66%**	**12%**	**100%**

Design, environmental, and right-of-way costs will be covered 100 percent by ODOT's state transportation funds and federal-aid allocation. These funds will be expended prior to RAISE grant obligation and are not included in **Table 1**. Construction funds are anticipated to be 12 percent RAISE funds, 22 percent state funds, and 66 percent other federal funds. The cost estimate includes a 10 percent contingency.

ODOT's 8 Year Construction Work Plan (CWP) outlines ODOT's commitment to allocate future state transportation funds to the projects in the I-44/US-75 corridor. ODOT has traditionally used state funding sources for all of its maintenance activities, and funding for the future maintenance of the I-44/US-75 improvements would be no different. ODOT is committed to building and maintaining the I-44/US-75 improvements for decades to come.

ODOT currently has over $102 million in improvements programmed in the 8 Year CWP for the corridor, including portions of the I-44/US-75 Interchange Project. WP 2 and 5 are currently programmed in 2025 and WP 3 is programed in 2028. With RAISE funding, all three WPs will be advanced to 2023 in the 8 Year CWP.

3.1 Funding Commitments

ODOT is committing $45 million to the future work of I-44/US-75 Interchange Project, exceeding the 20 percent threshold to qualify for urban RAISE grants. The source of the $45 million in non-federal funds is the Rebuilding Oklahoma Access and Driver Safety (ROADS) Fund created by Title 69, Section 1521, Oklahoma Statutes. This funding has no limit or conditions to satisfy.

ODOT will leverage $135.8 million in federal taxpayer dollars. ODOT strives to be a good steward of public resources and will demonstrate the project's importance to Oklahoma by committing as many in-state funds as possible. The $25 million in requested 2021 RAISE funds are justified by the project's 1.21 BCR and demonstrated benefits to climate change, racial equity, and quality of life. Also, by accelerating a project that would otherwise need to be completed over a much longer timescale, the 2021 RAISE funding will save Oklahoma and federal taxpayers millions of dollars in avoided construction cost inflation.

ODOT's $6 billion FY 2021-2028 8 Year Construction Workplan (CWP) includes a federal share of approximately 50 percent to fund more than 1,300 critical highway and bridge improvements across the state. The 50 percent federal share is much lower than the 80 percent share on federal-aid projects resulting in greater spending power and effectiveness of the federal funds returned to Oklahoma taxpayers.

4.0 SELECTION CRITERIA

This section addresses the selection criteria outlined in the Notice of Funding Opportunity. The primary selection criteria of safety, environmental sustainability, quality of life, economic competitiveness, and state of good repair are followed by the secondary criteria of partnership and innovation.

4.1 Primary Selection Criteria

4.1.1 Safety

The collision rate at the I-44/US-75 interchange is almost double the state average

The I-44/US-75 Interchange Project is designed to provide a safe interchange for the movement of goods and people. Collisions in and around the interchange are a primary driver of the need for the project and are a direct result of the large volumes of traffic passing through an outdated interchange with bridges and pavement in a poor state of repair. Tight, low speed loop ramps with limited weave areas, rough pavement, and multiple on- and off-ramps with little to no merge areas significantly increase the collision exposure of thousands of vehicles that drive through the interchange every day.

Over a 10 year period, from 2010 to 2019, a total of 1,544 collisions occurred along I-44 and US-75 within the limits of Work Packages 2, 3, and 5. A collision rate almost double the statewide average rate exists along the project corridor for all collisions, with a fatal collision rate also higher than the statewide rate. **Table 2** below compares the collision rates of the project area to the rates of similar statewide facilities.

Table 2: Corridor Collision Rates

	Project Corridor Rates	Statewide Rates
Total Collisions	**148.46**	79.27
Fatal Collisions	**0.86**	0.76

As depicted in the heat map in **Figure 7**, high frequency collision areas occur at and approaching the I-44/US-75 interchange. Capacity issues exist on the I-44 bridge over the Arkansas River, causing frequent congestion and increasing the collision potential. The high number of collisions occurring at the I-44/US-75 interchange can be attributed to poor geometrics from the loop ramps to the frontage roads and the weaves – rear-end and sideswipe crashes are high in number at all of the weaving sections between the cloverleaf ramps. Extremely short merge distances are

Figure 7: I-44/US-75 Collision Heat Map, 2010-2019

also present in the current configuration, particularly on the single lane C-D road system, resulting in a large cluster of crashes. In total, rear-end collisions dominated the corridor, accounting for over half of the total crashes due to congestion and low speed ramps (**Figure 8**). Nine (9) fatal collisions occurred along the limits of I-44/US-75, along with 720 injury-related collisions (47%).

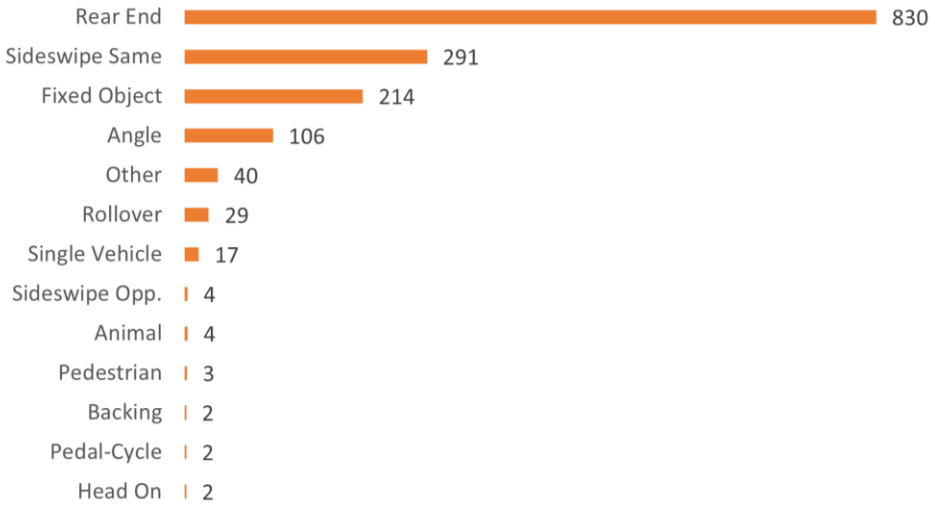


Figure 8: Collision Types at the I-44/US-75 Interchange, 2010-2019

In addition to traffic safety benefits, the project will contribute to preventing the unintended release of hazardous materials. Development on the south side of I-44 within the project area is characterized by industrial and commercial development. An Initial Site Assessment performed for the project indicated the presence of known hazardous materials and site contamination in the area. As part of their due diligence to identify and minimize risk to the project, ODOT performed additional investigations consisting of ground-penetrating radar (GPR) survey of a former gas station in the vicinity. Results of this work suggest that while the tanks have been removed, product lines may still be in place. ODOT intends to sample the site prior to construction to determine if there is contamination present. Completing this work in advance of construction **significantly decreases the risk of any releases of hazardous materials** and increases worker and public health and safety.

4.1.2 Environmental Sustainability

Climate Change

The I-44/US-75 Interchange Project will reduce emissions, support fiscally responsible land use and efficient transportation design, and increase resiliency. The travel time savings of the project (discussed in more detail in Section 4.1.4), will create a positive and lasting impact on emissions in the Tulsa area through alleviating congestion. The emission reduction impacts will strongly benefit the local vulnerable populations and the sensitive environmental assets of Turkey Mountain adjacent to the project area. WP 2, 3, and 5 also further enhance the availability and

access to 157 existing electric charging stations located throughout the Tulsa metropolitan region. Several fast-charging stations are located within five miles of the project location.

The project is anticipated to reduce over 8.6 tons of CO2 emissions through 2045

A portion of the project is located within the mapped floodplain of Mooser Creek, including a regulatory floodway (**Figure 9**). The reconstruction of Skelly Drive and the new bridge structures over Mooser Creek are designed to accommodate the 100-year storm, per City of Tulsa requirements. Any flood storage removed by the project will be replaced to make certain the project does not increase flooding risk. Stormwater runoff will be adequately controlled and incorporated within Tulsa's MS4 system. Improving infrastructure resiliency for the adjacent low-income and minority neighborhoods will provide security for those that often disproportionately experience climate-change-related impacts.

Figure 9: Mooser Creek Floodplain

Environmental Justice

The I-44/US-75 Interchange Project considered environmental justice throughout project planning. From the initial Preliminary Engineering Report completed in 2016 through three subsequent public meetings, ODOT has considered the effects of the project on adjacent low-income and minority communities.

According to the Environmental Protection Agency (EPA)'s EJSCREEN tool, the areas around the I-44/US-75 interchange have high concentrations of minority and low-income populations (**Figure 10**). Poverty ranges from 18% to 36% of the population in the vicinity. Median incomes in the poorest areas are under $35,000/year (according to the 2019 American Community Survey 5-year data). The area also contains high percentages of minority populations, ranging from 26 to 42%. Census Tract 49 which covers the north half of the project area has been designated a **Federal Opportunity Zone**. Improving safety and freight access and reliability to this economically distressed area will enhance opportunities for new development.

Public outreach efforts included several methods to inform and engage low-income and minority populations in project input opportunities. All three public meetings (held in 2017, 2020, and 2021) included targeted outreach to local minority churches, community centers offering

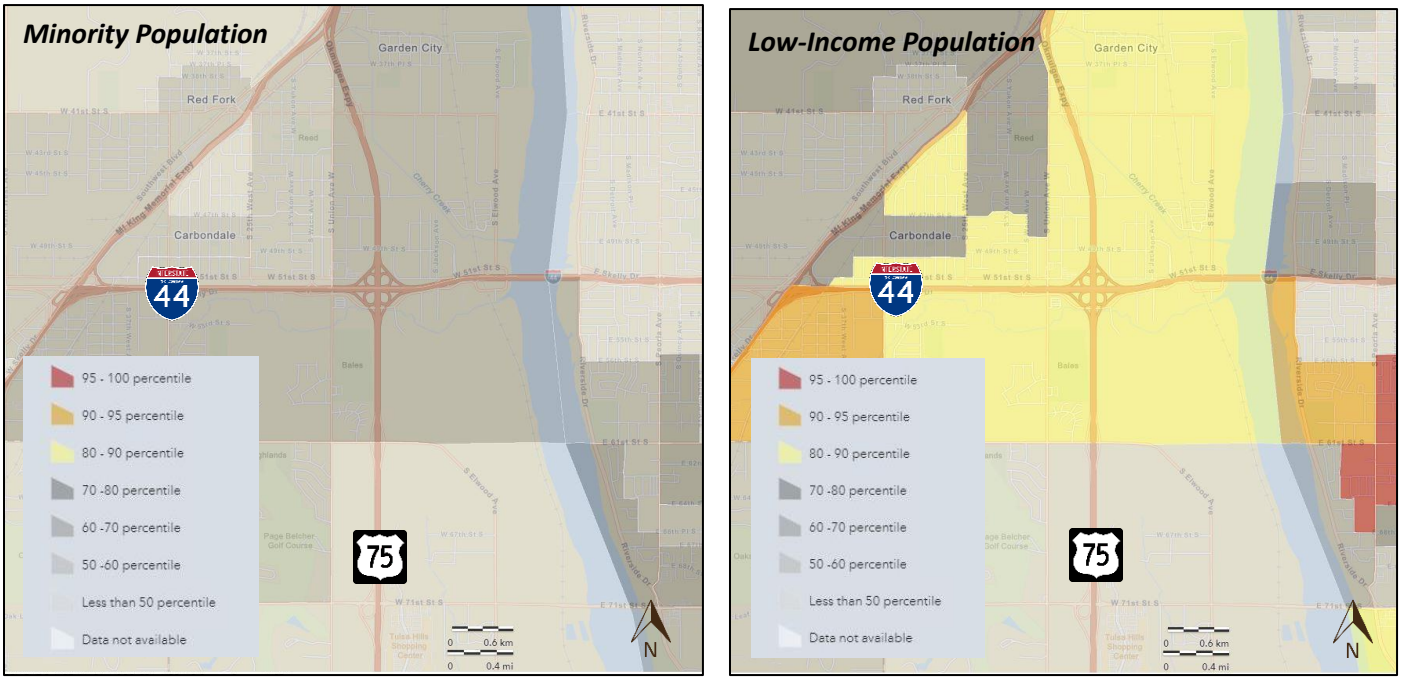


Figure 10: EPA EJSCREEN Minority and Low-Income Population Maps

services to low-income populations, and the Tulsa Housing Authority which operates the Parkview Terrace Apartments, a low-income housing complex at US-75 and 61st Street within the project area. Project information was also sent to all addresses within the study area via hand delivered flyers (in 2017) or by USPS Every Day Direct Mail (in 2020 and 2021 due to COVID-19). This ensured that every dwelling unit (including apartments and rental homes) received notification of public meetings. Handout materials at the first two public meetings were provided in Spanish, Chinese, and Vietnamese in addition to English.

The design of the project considered the needs of non-vehicular modes, which are often utilized by low-income individuals that may not have access to a private automobile. The project includes sidewalks along local streets and a new pedestrian bridge over the Tulsa Union Railroad. More information about these modal elements is included in Section 4.1.3 below.

4.1.3 Quality of Life

The I-44/US-75 Interchange Project emphasizes increased pedestrian mobility in the area including improvements to several sidewalk gaps identified in the Go Plan, Tulsa's regional bicycle and pedestrian masterplan. Based on coordination with regional partners, the I-44/US-75 Interchange Project includes the following active transportation improvements to eliminate barriers to opportunity for the surrounding community.

- New bridges on US-75 bridge over 49th Street will be constructed to allow for safe and efficient pedestrian crossing underneath the highway. An offset shelf will be incorporated into the design of 49th Street for the City of Tulsa to install sidewalks at a later time.

- Along 51st Street, new sidewalk will connect the recently constructed sidewalk corridor on Union Avenue east to Tulsa River Parks' 26 miles of multi-use trail, including a new pedestrian bridge over the Tulsa-Sapulpa Union Railway (**Figure 11**). The new sidewalk removes a barrier for local residents to access this significant community asset. Today if a person on the west side of US-75 wants to access River Parks, they must drive approximately one mile due to lack of sidewalk access.

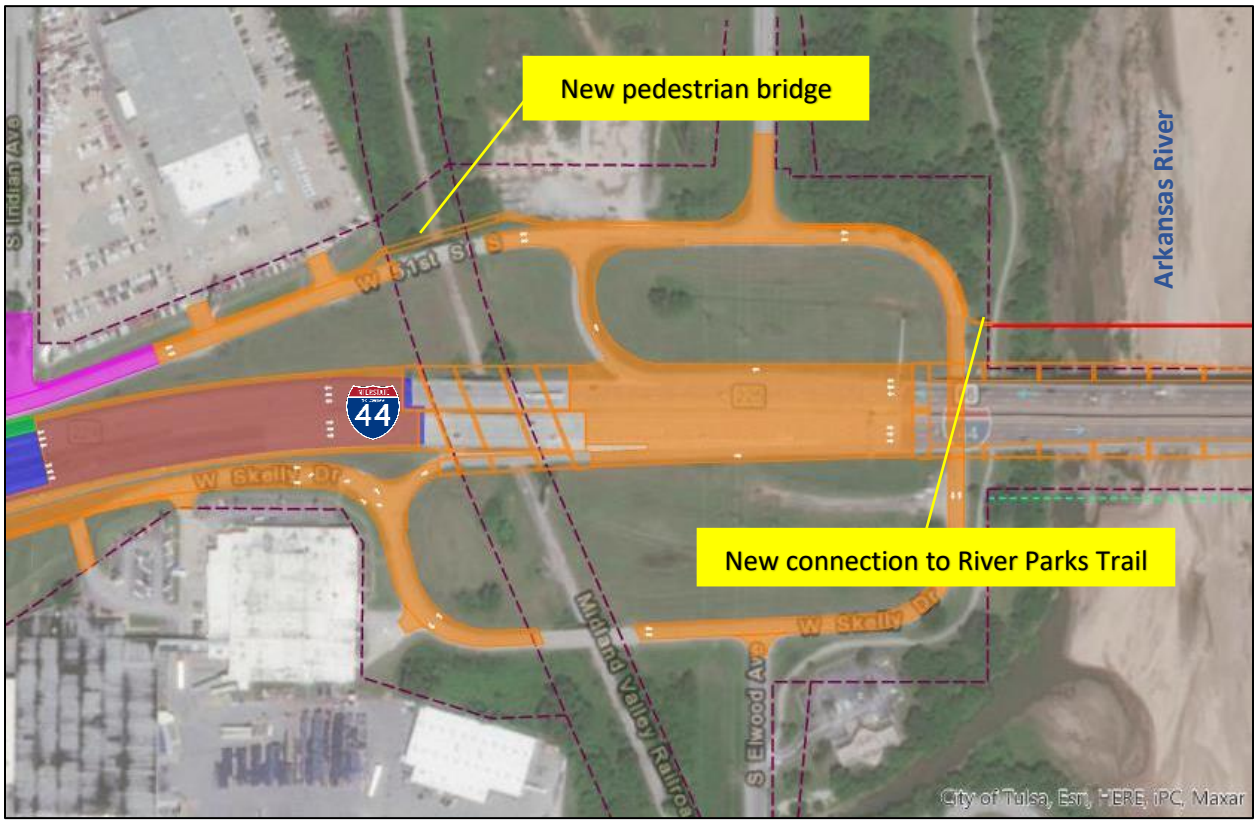


Figure 11: New Pedestrian Connections

- A new sidewalk corridor along Skelly Avenue connects to an established sidewalk corridor west of the I-44/ US-75 interchange and continues east under the Mooser Creek Bridge to the US-75 access road. This new sidewalk corridor will provide residents safe and direct access to Turkey Mountain.
- A new sidewalk on Skelly Drive along the south side of I-44. The sidewalk will serve as a connection to the low-income residents on the west side of US-75 and provide safe and direct access to the Herman and Kate Kaiser YMCA and Turkey Mountain, both of which are located on the east side of US-75. The YMCA has been in its current location since 1923 and the additional sidewalks will provide pedestrian access to an amenity that was cut off with the construction of US-75.
- Along the northbound US-75 frontage road, a new sidewalk will be installed to allow pedestrian access from 61st Street to Skelly Avenue.

- Bike lanes and sidewalks will be added to 61st Street, which crosses over US-75. Bicycle and pedestrian travel have increased in 2020 and the new bike lane and sidewalk will provide a safe and efficient connection for low-income residents at Parkland Terrace and other areas to access Turkey Mountain and the YMCA, removing a barrier to these community assets. These new accommodations will also connect to new bike lanes and sidewalks recently constructed by the City of Tulsa on Union Avenue. On Union Avenue, pedestrians and cyclists can connect to the improvements on 51st Street north of I-44.

As mentioned, non-vehicular modes are often used by low-income populations. Providing more non-vehicular mobility increases transportation equity for this underserved group. More modal choice will enhance access for residents to jobs, shopping, and recreation. An improved interchange will enhance safe and efficient access to goods and job opportunities.

The I-44/US-75 Interchange Project also includes a physical-barrier mitigating connection of 51st Street under US-75. US-75 has been a barrier between the neighborhoods of Carbondale and Winnetka Heights since it was constructed. Carbondale and Winnetka Heights are low-income areas with large African American communities. The new 51st Street connection offers redress to the bifurcation of these neighborhoods (**Figure 12**). The 51st Street connection will also include new ADA-compliant sidewalk, which will improve walking, biking, and rolling access for the disabled.

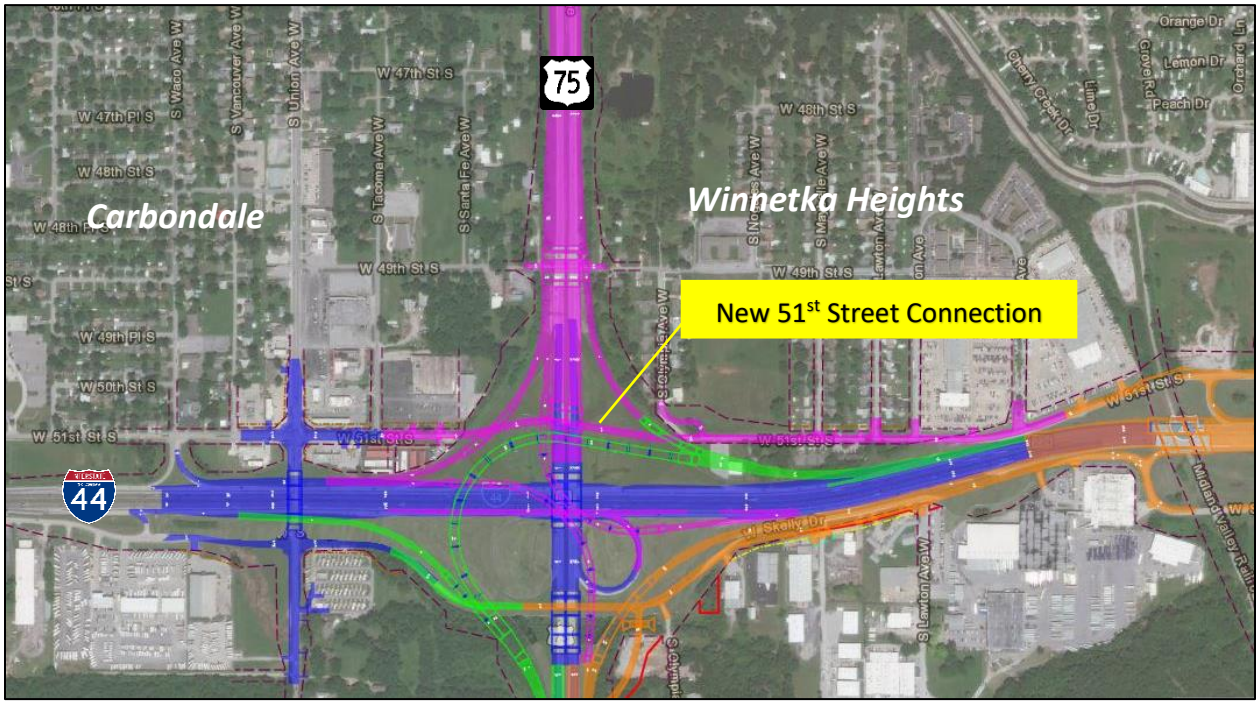


Figure 12: New 51st Street Connection between Carbondale and Winnetka Heights

I-44 and US-75 is a critical link in the Tulsa intercity transportation network. In a network with limited river crossings, I-44 carries local and regional traffic to work, school, and other important destinations. The I-44/US-75 Interchange Project supports racial equity by providing additional

capacity and improved mobility for Tulsa residents and removes barriers to opportunities for the surrounding community and Opportunity Zone.

Highways can inhibit connections and cut off neighborhoods from parks, schools, and other community destinations. When I-44 and US-75 were built, neighborhoods on the west side of US-75 lost access to the Arkansas River, and neighborhoods on the north and south sides of I-44 were cut off from each other. As discussed above, the neighborhoods surrounding the I-44/US-75 Interchange Project have a high minority concentration and a high concentration of low to moderate-income households. These income statistics further enhance the need for the project to reconnect neighborhoods to amenities including the Herman and Kate Kaiser YMCA just south of the interchange off Skelly Drive, Turkey Mountain (**Figure 13**), and the 26 miles of River Parks' multi-use trails that connect gathering areas, playgrounds, fountains, and sculptures along the banks of the Arkansas River.

Figure 13: Turkey Mountain

The I-44/US-75 Interchange Project has been intentionally designed to have no direct effect on Turkey Mountain and the connecting trail system. The project will provide improved accessibility to Turkey Mountain, especially for the underserved population who reside in this area. The pedestrian and bicycle improvements will improve active, low-cost transportation access to vital community resources for these previously cut-off communities. Improved access to I-44 and US-75 and reduced congestion along the corridor will also offer these neighborhoods better access to the job centers and services in Tulsa.

As discussed above in Section 4.1.2, the I-44/US-75 Interchange Project will provide improved freight access within a federal Opportunity Zone, providing enhanced opportunity for economic development in this underserved area. The I-44/US-75 interchange and connections to the local road system will be designed to accommodate freight vehicles. More information on planned economic development and job creation is discussed in Section 4.1.4.

4.1.4 Economic Competitiveness

The I-44/US-75 Interchange Project will enhance the metropolitan Tulsa regional economy, the second-largest metro area in Oklahoma, and a fast-growing center of employment within the state and region. In 2018, Tulsa-area employment grew 39 percent faster than the state and 47

percent faster than U.S. employment. Tulsa's real gross product grew 6.9 percent, while Oklahoma and the U.S. grew at 4.4 percent and 2.9 percent, respectively.[1]

Projected increases in area population support the need for the project. **Table 3** summarizes forecasted population growth trends for the region and study area, which are in the 25 to 30-percent range between 2010 and 2040. To accommodate the anticipated population growth and commuter traffic, improvements must be made along the I-44 and US-75 corridors.

Table 3: Forecasted Population Growth Trends

	2010	2040	% INCREASE
Tulsa MSA	937,478	1,195,66	27.5%
Tulsa County	605,127	754,740	24.7%

Source: Oklahoma Department of Commerce

The project is expected to generate wide-ranging benefits for current and future passenger and freight traffic. The benefits of improved safety, more efficient and faster movement of goods and people, and reduced congestion will accumulate over the project design life for residents, businesses, government entities, and organizations located in the Tulsa metro region and the State of Oklahoma.

The I-44/US-75 Corridor Improvements will eliminate 350,000 hours of vehicle delay

Economic competitiveness benefits flow from the Project's **improved travel times and travel time reliability**. Travel time reliability increases the efficiency of movement of goods and people and is an important element in business travel and freight movement, especially with demand for efficient "just in time" freight delivery and truck driver "hours of service" rules. The I-44/US-75 Interchange Project will reduce delay and improve reliability for trucks and the movement of time-sensitive goods and remove a key regional bottleneck in the freight supply chain. The project will eliminate approximately 350,000 hours of excess vehicle delay over the life of the project; of that, about 35,000 hours will be truck vehicle hours. By reducing congestion on this key freight corridor, the Project will expand access to markets and contribute to the region and the nation's economic competitiveness.

Increasing job opportunities and improving business performance are particularly important for regional economic well-being, as Oklahoma has historically lagged other states in measures of economic well-being such as per capita and median household income. Based on an Impact Analysis for Planning (IMPLAN) model, the I-44/US-75 Interchange Project is projected to generate 1,468 direct jobs in the highway construction industry including well-paying, union jobs

[1] Tulsa Regional Chamber of Commerce, https://www.tulsasfuture.com/data-and-research-tools/economic-profile

The I-44/US-75 Corridor Improvements will create

1,468 jobs

and a total of 2,283 jobs including indirect employment. Additionally, the project will reduce delay and improve mobility for over 500,000 jobs in the Tulsa Transportation Management Area.

There are also substantial national economic benefits, particularly related to the significant volumes of interstate truck freight moving along I-44, a major national crossroad of commerce. The project will reduce congestion, expand access to markets, and contribute to the region and the nation's economic competitiveness. Oklahoma freight flows are primarily through the state (rather than internal origin or destination) and therefore improvements on this segment will benefit goods movements nationwide. In addition, the Project benefits waterborne interstate commerce, as it provides improved access to the Tulsa Port of Catoosa, a major inland waterway and multimodal port.

Freight and Goods Movement & the Routes Initiative

I-44 is part of the National Highway Freight Network (NHFN) and the corridor plays a key role in the Oklahoma Freight Network. Consistent with Rural Opportunities to Use Transportation for Economic Success (ROUTES), the I-44/US-75 Interchange Project will strengthen the ability of rural communities to access national and international trade markets. While Tulsa is a freight generator, I-44 and US-75 both provide connections to rural areas to the west and south. As discussed in the BCA Freight Rating section, improvements to this section of the NHFN deliver greater safety and travel time reliability that supports economic development throughout the region. Freight flows as illustrated by the Office of Freight Management and Operations, Freight Analysis Framework, Version 4.3 area available at I-44 US-75 RAISE.

The economic outcomes generated by the project components improve the connectivity between home and workplaces and between production and consumption sites. At the same time, they increase the competitiveness of the United States by increasing efficiency in the movement of goods along the I-44 corridor. Shippers will also benefit and save time as well. It is estimated that 14 percent of the traffic on I-44 in the study corridor is composed of trucks.

As **Figure 14** indicates, Tulsa is home to several significant freight-generating businesses including QuikTrip, XPO Logistics, Amazon, and Macy's. Several of these freight-generating

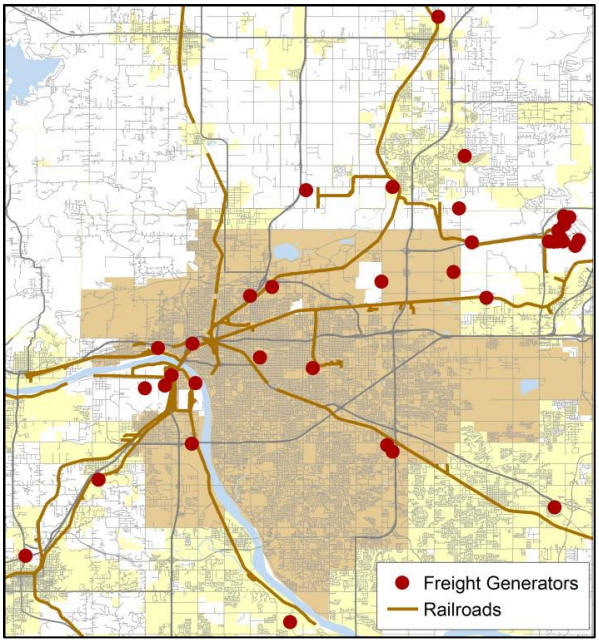


Figure 14: Major Freight Generators and Rail Lines

businesses are located adjacent to or within just a few miles of the I-44 and US-75 corridors. Improved and streamlined I-44 and US-75 corridors helps these regionally and nationally significant freight-generating businesses efficiently ship goods. For many more, the corridors are a significant route to and from the south and west. As the figure also indicates, many of these generators are along rail lines, and in some cases, intermodal freight transfers occur between rail and truck. The Tulsa Port of Catoosa, located to the northeast, supports barge, rail, and truck freight modes. The I-44/US-75 Interchange Project supports local, regional, and national freight movements to and from the Port and provides more reliable road infrastructure for the transportation of equipment that is manufactured at the industrial complex.

The project would result in improved travel times for both passenger vehicles and freight. Results of the BCA suggest a benefit of **$54.4 million in travel time savings** over the life of the Project, improving long-term efficiency, reliability, and costs of the movement of workers and goods.

Estimated Travel Time Savings:

$54.4 Million

The economic outcomes generated by the project improve the connectivity between home and workplaces and between production and consumption sites. At the same time, they increase the competitiveness of the United States by increasing efficiency in the movement of goods. In addition to the monetized travel time savings, the higher speeds and increased reliability along the corridors provided by the project imply that trucks spend less time on the road and can reach their destinations faster. The delivery times will lead to inventory cost savings, which are important to improve connectivity between production and consumption sites and to increase the fluidity of the movement of goods.

4.1.5 State of Good Repair

This portion of I-44 is one of the oldest sections of interstate in Oklahoma and has not been upgraded since it was constructed in the Eisenhower years. The pavement has deteriorated over time and is currently rated Fair to Poor by ODOT. The project will reconstruct approximately three (3) miles of pavement and will widen or replace eleven (11) existing bridges, many of which have insufficient vertical clearances and exhibit evidence of damage by vehicle impact (**Figure 15**). The project will also construct ten (10) new bridges to accommodate the new interchange configuration.

Lifecycle Costs

ODOT has projected that operations and maintenance (O&M) costs for the I-44/US-75 Interchange Project will total $8.5 million through 2060. Projected no-build O&M costs to 2060 are $52.0 million, including $26.4 million for projected maintenance and rehabilitation costs for I-44 and US-75 corridor improvements, $25.1 million in bridge rehabilitation costs, and $0.6

Figure 15: (L) I-44 over Elwood Avenue, Insufficient Clearance and Vehicle Damage, (R) Poor Pavement Condition on I-44

million in projected bridge damage repair costs. In addition to cost savings, replacing aging infrastructure sends strong signals to businesses that the region is doing well and can provide a good environment for business investment and expansion.

The I-44/US-75 Interchange Project will improve the condition and resiliency of the roadways and bridges. While lane miles will remain relatively similar, new bridge infrastructure will reduce costs for non-routine maintenance, bridge repair and rehabilitation, and bridge damage.

The Project will provide a reconstructed roadway with new pavement designed to withstand the large volumes of passenger and freight traffic that utilize the corridors. The Project will also provide consistent width shoulders that meet today's design standards. Compared to the costs of maintaining the current roads and bridges, the Project is estimated to result in a **savings of $10.5 million in agency cost** (discounted at 7%) over the next 30 years.

Estimated Lifecycle Maintenance Savings of the Project:

$10.5 Million

ODOT submitted its Transportation Asset Management Plan (TAMP) to FHWA on June 30, 2019, and FHWA approved it on August 29, 2019. ODOT's dedication to asset management and its adherence to the TAMP will ensure adequate resources to maintain the I-44/US-75 Interchange Project for the next 30 years.

4.2 Secondary Selection Criteria

4.2.1 Partnership

ODOT is the project sponsor and is coordinating the project with FHWA, INCOG, OTA, the City of Tulsa, and Tulsa County. These agencies, and the public they represent, recognize that the I-44 and US-75 Corridor Improvement Projects will reduce congestion and improve access throughout the area as a result of extensive outreach, coordination, and public engagement efforts by ODOT since 2002.

I-44/US-75 Interchange Project Partners

ODOT and the City of Tulsa have worked closely throughout project development to coordinate on local street improvements, sidewalk and trail improvements, and drainage and utility design. Because the project will make changes to the local street and trail network, the City's input was critical to the design of the project.

The Oklahoma Congressional Delegation, City of Tulsa, INCOG, Tulsa Chamber of Commerce, State Chamber of Oklahoma, and the Oklahoma Trucking Association have all provided support letters for the I-44/US-75 Interchange Project. All letters of support are available at I-44_US-75 RAISE.

4.2.2 Innovation

Innovative Technology

ODOT will deploy Intelligent Transportation Systems (ITS) to ensure work zones on I-44 and US-75 are safe and that drivers are informed about travel times during the project. Radar, cameras, Dynamic Message Signs (DMS), and probe data will be used to monitor travel speed, congestion and incident management. These assets will help reduce congestion during construction while improving safety and efficiency of movement through the work zone. Once construction is complete, ITS will remain to provide the information needed for ODOT and the public to travel safely and efficiently. There are currently seven DMS boards and two cameras in the area that provide ODOT opportunities to monitor traffic and provide vital travel information to the public.

Innovative Project Delivery

ODOT will make use of No Excuses Bonuses on the I-44 and US-75 Corridor Improvement Projects, including a substantial completion incentive of five percent to 10 percent of the contract with internal milestones included for key project elements. The internal milestones will also have

incentives associated to encourage contractor innovation in early completion of major project components including stages that open portions of the corridor to traffic.

ODOT will also make use of the e-Construction and Project Bundling innovations outlined in the Every Day Counts Initiative. RAISE funding will help allow the I-44 and US-75 Corridor Improvement Projects to be bundled into one construction contract to achieve overall project savings. E-Construction methods will include mobile inspection and video monitoring and reporting of construction progress.

ODOT will incorporate stipulations that the contractor can make use of embedded strain gauges to serve as maturity meters in newly placed concrete. Current wireless technology allows for smart-phone connection or remote logger with cloud connections to track strength of concrete. The readings from these meters would be utilized by the contractor and ODOT to make critical real-time decisions during concrete curing. This allows for removal of concrete forms and opening to traffic earlier than conventional time constrained specifications.

ODOT commits to providing 3D computer models of the project as part of the contracting process. This technology will allow contractors to utilize the most recent GPS controlled equipment with Automated Machine Guidance in the construction process. Using and following the 3D model will minimize the potential for human error in establishing grades and elevations while improving efficiency in earthmoving during the construction process. These efficiencies improve quality while reducing the overall cost of construction.

Innovative Financing

In 2018, the Oklahoma State Legislature enacted House Bill 1010, which raised the state's motor fuel taxes on gasoline and diesel by three and six cents per gallon, respectively. According to the Oklahoma Tax Commission, the increased gasoline tax was estimated to generate $52.0 million annually and the increased diesel tax was estimated to generate $53.0 annually. A combined 95.5 percent of these revenues are credited to the Rebuilding Oklahoma Access and Driver Safety (ROADS) Fund created by Title 69, Section 1521, Oklahoma Statutes.[2]

House Bill 1014 of 2018 reduced general-purpose tax revenue to ODOT by the amounts attributable to the House Bill 1010 tax increases and redirected certain Oklahoma Vehicle License and Registration Act from the General Revenue Fund to the ROADS Fund. The net impact of House Bills 1010 and 1014 was to increase state revenue to ODOT generated from the ownership or operation of a motor vehicle by $194.0 million per year and to reduce transfers of general-purpose state revenue to ODOT by the same amount.[3]

[2] From the HB 1010 fiscal impact statement. http://www.oklegislature.gov/BillInfo.aspx?Bill=HB1010&Session=172X

[3] From the HB 1014 fiscal impact statement: http://webserver1.lsb.state.ok.us/cf_pdf/2017-18%20SUPPORT%20DOCUMENTS/impact%20statements/fiscal/senate/HB1014XX%20ENR%20FI.PDF

Increased state revenue improves ODOT's ability to meet the needs of the I-44 and US-75 corridors and achieve all the performance upgrades of the project including reducing highway congestion and bottlenecks, and improving safety, equity, accessibility, and reliability.

5.0 ENVIRONMENTAL RISK

5.1 Project Schedule

As shown in **Figure 16**, ODOT has been proceeding with improvements within this critical corridor for years and remains committed to completing these final projects to update one of the last original interstate pavement sections in Tulsa.

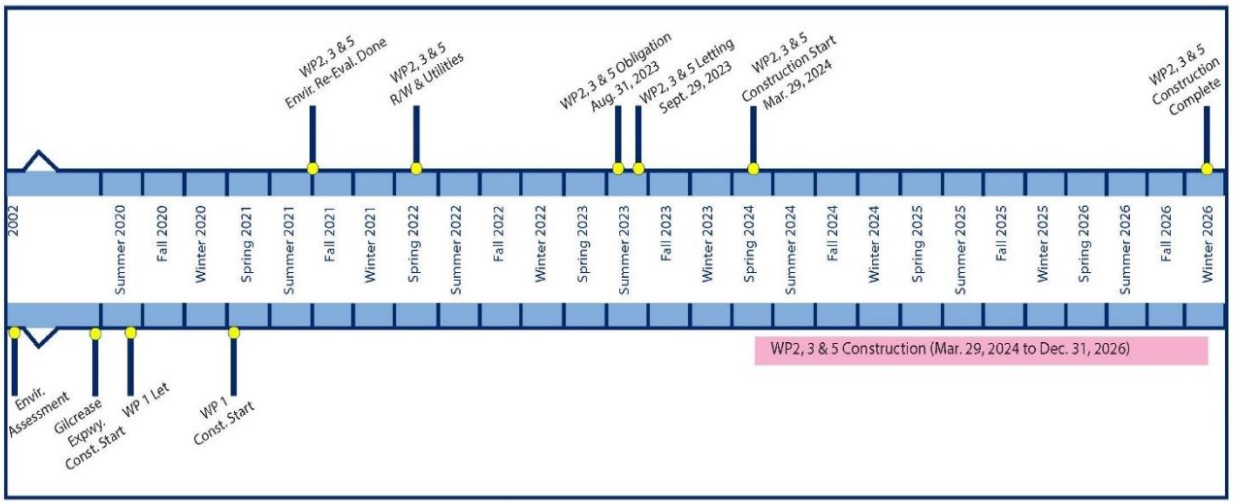


Figure 16: Project Schedule

ODOT opened bids on WP 1 in August 2020 and WP 1 will be completed in Winter 2022. The re-evaluation of the original Environmental Assessment (EA) of the corridor is ongoing and will be completed by Fall of 2021. WP 2, 3, and 5 right-of-way acquisition and utility relocations are programmed in the 8 Year CWP to commence in 2022, but advance acquisitions began in the fall of 2020. ODOT is nearing the completion of the appraisal phase and right-of-way acquisition will follow. With RAISE funding, the obligation of funds for assumed letting and construction of the I-44/US-75 Interchange Project (WP 2, 3, and 5) will occur on August 31, 2023, with assumed letting scheduled for September 29, 2023. Construction is anticipated to start on March 29, 2024 and be completed on December 31, 2026.

5.2 Required Approvals and Permits

5.2.1 NEPA Approval

The NEPA clearance process for the I-44/US-75 Interchange Project is ongoing. An Environmental Assessment completed in June 2002 for the US-75 corridor originally covered the work within this interchange and ODOT re-evaluated this EA to update and authorize construction of WP 1. A second re-evaluation of the 2002 EA is currently underway by ODOT to provide clearance for the projects in this application and is scheduled to be completed by Fall of 2021. All supporting

studies including a wetland delineation, biological assessment, cultural resources survey, initial site assessment for hazardous waste, a detailed noise study, and socioeconomic and environmental justice review have been completed. Consultation with the State Historic Preservation Officer and the U.S. Fish and Wildlife Service has been completed and these agencies have agreed with ODOT's finding of "No Adverse Effect" under Section 106 and "May Affect, Not Likely to Adversely Affect" under Section 7. Complete environmental studies as well as the WP1 reevaluation can be found at I-44 US-75 RAISE. The re-evaluation will be finalized after the disposition of comments from the public open house, completed at the end of June 2021.

Public Involvement

ODOT has completed an intensive program of public involvement for the I-44/US-75 Interchange Project. ODOT initially presented the project to the public in 2017 as part of the original preliminary engineering study (**Figure 17**). The 2017 meeting presented the concept for the ultimate interchange, modified somewhat from the 2002 EA to better accommodate new development in the area. More information on the 2017 public meeting can be found at 20171102 (oklahoma.gov). The project was then divided into five Work Packages for final design and construction.

Figure 17: I-44/US-75 Interchange Public Meeting, November 2017

After receiving the $45 million INFRA grant from the US Department of Transportation in 2018 to construct WP 1, ODOT presented WP 1 to the public at a public open house on January 30, 2020. The open house included details on the project design and the anticipated construction sequence and impacts. More information on the 2020 public open house can be found at: 20200130 (oklahoma.gov).

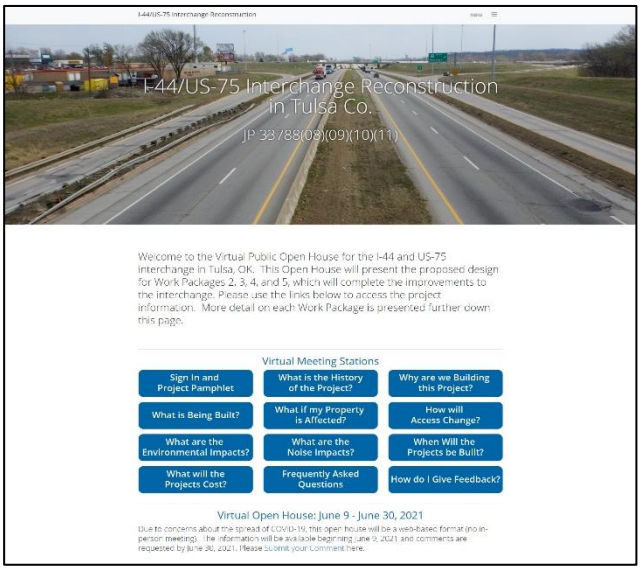


Figure 18: I-44/US-75 Virtual Public Open House

Due to ongoing concerns about the spread of COVID-19, ODOT hosted a virtual public open house for Work Packages 2, 3, 4, and 5 from June 9-30, 2021 (**Figure 18**). This open house presented the history of the project, the need for the project, and detailed design information. Information on right-of-way

acquisition and noise impacts was presented, along with the project cost and schedule. The public was able to submit feedback directly on the website or was given instructions to submit by mail or email. The virtual public open house received over 12,000 views over the three-week period.

Access Justification Report

ODOT prepared an Access Justification Report (AJR) for FHWA approval to modify access to I-44. The AJR included an operational and safety analysis in addition to discussion of access, connection, and design, per FHWA May 2017 Policy. ODOT received approval from FHWA on July 7, 2020. The AJR report and FHWA approval are included at I-44 US-75 RAISE.

Permitting

The I-44/US-75 Interchange Project includes span bridges and a box over Mooser Creek as well as widening and re-decking of the I-44 bridges over the Arkansas River. These in-water activities will require coordination with the U.S. Army Corps of Engineers (USACE) for securing Section 404 permits. Permitting for these projects is expected to fall under Nationwide Permit 14. USACE is familiar with ODOT's efforts and expectations within this corridor. Coordination with the USACE has already taken place with the efforts associated with WP 1, which was previously permitted under a Nationwide permit. Additionally, ODOT has agency liaisons in place at the USACE, which greatly accelerate and improve the consistency of permitting reviews.

5.2.2 State and Local Approvals

The I-44/US-75 Interchange Project is currently programmed in ODOT's 8 Year Construction Work Plan as well as the INCOG TIP. The Project will be moved up in these programs with the award of RAISE funding. The City of Tulsa has reviewed the project design at all phases to verify it meets local requirements for city streets, drainage, and lighting. As discussed in Section 4.2.1, the project has widespread community support.

5.2.3 Federal Transportation Requirements Affecting State and Local Planning

INCOG Regional Transportation Plan (RTP): The INCOG RTP, Connected 2045, includes the I-44 and US-75 Interchange Project, which aligns with the 2045 goals related to safety, infrastructure condition, congestion, freight movement and economic vitality, and environmental viability and resilience.

Statewide Transportation Improvement Program (STIP): The ODOT STIP incorporates the first four years of the ODOT 8 Year CWP. As such, WP 1 is already incorporated into the STIP and the right-of-way and utility relocation for WP 2, 3, and 5 are included for 2022.

Long Range Transportation Plan (LRTP): The ODOT LRTP 2020-2045 is a policy document that provides a strategic direction for the development of the Oklahoma multimodal transportation system. The I-44/US-75 Interchange Project aligns with ODOT's long range strategic direction.

The project is consistent with the goals set out in ODOT's 2018-2027 Transportation Asset Management Plan (TAMP) with the goal of maintaining and preserving Oklahoma's transportation network. Additionally, the application supports the mobility, connectivity,

accessibility, and economic vitality goals of the Oklahoma Freight Transportation Plan, 2018-2022.

5.3 Assessment of Project Risks and Mitigation Strategies

Potential risks and mitigation strategies to minimize the potential impact of those risks are summarized in **Table 4**. References to other sections of this application are included.

Table 4: Project Risk and Mitigation Strategies

Project Risk	Mitigation Strategies
Contamination from Industrial Use/Underground Storage Tanks	- ODOT has completed an Initial Site Assessment and subsequent GPR survey to identify potential contamination. One site will undergo additional sampling. All other sites have been closed. See Section 4.1.1. - ODOT has a well-defined, successful approach for addressing potential contamination and LUST sites. Locations where these issues may arise are identified and included within the construction plans as "Areas of Environmental Concern" to put the contractor and their employees on alert that the potential exists for encountering contamination.
Cost Increases or Schedule Delays	- ODOT has included the project in its 8 Year CWP and remains committed to adjusting as needed to meet all RAISE and statutory deadlines for funding obligation and expenditure. See Section 5.1.
Delay of WP1 Completion	- WP 1 is anticipated to be complete in early 2023. Letting for WP 2, 3, and 5 would occur in September 2023, providing more than sufficient buffer for any delay. As of the date of this application WP 1 is ahead of schedule. See Section 5.1.
Earthquakes	- Oklahoma's drilling practices have reduced the number of earthquakes in the state. All structures have seismic designs.
Inability to Secure Right-of-Way	- Relocation studies have been completed to determine an approximate cost. Estimates include contingency. No impacts to environmental justice populations or Section 4(f) properties were identified. ODOT has

	begun advanced right-of-way acquisition. See Sections 1.2 and 5.1
Inability to Secure Permits	- Impacts are not anticipated to exceed the thresholds of the Section 404 Nationwide permit. ODOT has a liaison in place at the USACE to accelerate and streamline approvals if needed. See Section 5.3.1.
Weather Related Delays	- ODOT works closely with contractors to renegotiate project time while still meeting project commitments.

6.0 BENEFIT COST ANALYSIS

6.1 Overview of Approach

A BCA has been conducted for WP 2, 3, and 5 in Tulsa County, Oklahoma. All values from that guidance are in 2019 dollars. All monetary values in the BCA, including costs, are expressed in constant 2019 dollars. The following general parameters and assumptions were used in the BCA:

- A real discount rate of 7 percent is applied to all costs and benefits except for carbon emissions reductions, which are discounted at 3 percent.
- A project life cycle of 25 years is assumed, which represents a mid-point between a recommended 20-year horizon of analysis for rehab and replace projects, vs. 30 years for new right-of-way and facilities. The I-44/US-75 Interchange Project comprises multiple individual elements reflecting a mix of old and rehabilitated infrastructure.
- No residual value is assumed at the close of the 25 years of operation.
- With RAISE funding, the project construction is assumed to commence in 2024 and end in late 2026, with operation commencing in 2027. Some advance right-of-way acquisition for interchange construction will occur in the years 2020 – 2024.
- The year 2019 was used as the base year for discounting; that is, 2019 is considered year zero for discounting.

BCA documentation including the spreadsheet and BCA Report provide additional details and data source information is included at I-44_US-75 RAISE.

6.2 Project Costs

The estimated capital cost of combined WP 2 ($75.1 million), WP 3 ($60.2 million), and WP 5 ($70.5 million) totals $205.8 million in 2019 dollars (including contingency). The I-44/US-75 Interchange Project will result in very little difference in lane mileage compared to the no-build and as such, no incremental difference in routine lane-related maintenance costs has been assumed. However, as seen in the cost summary, there are significant differences in non-routine maintenance, bridge repair, and rehabilitation costs, and bridge damage costs. Under the no-

build, $52 million has been and will be spent on non-routine roadway and bridge maintenance, compared with $8.5 million under the build (i.e., with the I-44/US-75 Interchange Project). Except for $9.1 million already spent for the existing infrastructure, the build costs represent significant life cycle cost savings which are included as benefits for BCA purposes. Major capital, maintenance, and bridge rehab and repair costs are summarized in **Table 5.**

Table 5: Build and No-Build Costs by Year (in $1,000s)

YEAR	NO-BUILD				BUILD		
	Maint. & Rehab Costs for I-44/ US-75	Bridge Rehab Costs	Bridge Damage repair	TOTAL	Capital Costs	Maintenance	TOTAL
2016	4,900	-	-	4,900	-		-
2017	-	2,500	-	2,500	-		-
2018	1,700	-	-	1,700	-		-
2019	-	-	-	-	-		-
2020	-	-	-	-	-		-
2021	-	2,400	-	2,400	-		-
2022	-	-	-	-	-		-
2023	-	-	-	-	-		-
2024	-	-	-	-	68,600		68,600
2025	-	-	-		68,600		68,600
2026	-	-	-	-	68,600	1,000	69,600
2030	6,600	2,000	100	8,700	-	-	-
2035	-	3,300	100	3,400	-	-	-
2040	6,600	4,900	100	11,600	-	-	-
2045	-	-	100	100	-	5,000	5,000
2050	6,600	10,000	100	16,700	-	2,500	2,500
2055	-	-	-	-	-	-	-
2060	-	-	-	-	-	-	-
TOTAL	**$26,400**	**$25,100**	**$600**	**$52,000**	**$205,800**	**$8,500**	**$214,300**

6.3 Description of Project Benefits Included in the BCA

Four primary categories of benefit have been captured by the BCA: reduced motor vehicle crashes, travel delay savings, logistics (freight) cost savings, and emissions cost reductions. Economic benefits such as enhanced productivity (over and above those embodied in travel time savings) are not included. However, the overall improvements in regional accessibility may generate such agglomeration benefits.

6.3.1 Crash Reductions

Because much of the I-44/US-75 Interchange Project involves reconfiguring the complex network of the US-75 and I-44 interchange and improving/reconnecting city arterials, a significant share of the benefits anticipated will be reduced vehicular collisions and improved pedestrian safety.

To estimate these likely impacts, a detailed data list of past collisions that occurred was collected within the WP 2, 3 and 5 influence area. Levels of severity were measured across a scale of one to five, including fatal crashes, injury crashes of three degrees of severity, and property-damage-only crashes.

Based on these data, combined with annual vehicle miles traveled (VMT) measured across the project, crash rates were calculated (crashes per million VMT) and applied to ODOT's estimates of project-wide VMT in the future, and a baseline of total anticipated crashes without the I-44/US-75 Interchange Project was calculated for the entire project horizon of 25 years. Next, the FHWA's Crash Modification Factor (CMF) database was used to obtain the most applicable Crash Reduction Factor (CRF). This search yielded a most relevant CMF of 55 percent (and thus a CRF of 45 percent). The selected CMF/CRF is obtained from research involving the safety effects of replacing cloverleaf interchanges with flyover ramps. The relevant CMF was then applied to the future stream of no-Build crashes (by category of severity) to obtain estimates of reduced annual crashes over the study period.

The I-44 and US-75 Corridor Improvement Projects will generate significant savings in the human costs of crashes. Over the 25 years, it is estimated that 15 lives will be saved, and another 77 serious injury-crashes will also be avoided.

6.3.2 Travel Delay Savings

The 2045 travel delay reductions are based on VISSIM traffic simulation model results. The model simulated the 2045 effects of the I-44/US-75 Interchange Project and also included traffic from the Gilcrease Expressway, which is currently under construction and will bring additional traffic to the I-44/US-75 interchange. The BCA analysis assumes that 75 percent of the total I-44 and US-75 corridor travel delay reductions can be attributed to WPs 2, 3 and 5. Given that the major delays within the corridor are associated with the ramps and existing C-D system at the I-44/US-75 interchange (weaving, lane balance, lack of merge distance), this 75 percent estimate is a conservative.

Delay savings for years before 2045 were reduced based on the anticipated compound annual growth rates (CAGR) in VMT projected for the corridor of about 1.5 percent per year. For the years after 2045, delay was correspondingly increased by the same CAGR. In 2030, approximately 933 hours of delay would be saved by the I-44 and US-75 Corridor Improvement Projects each workday, covering morning and evening peak periods combined. Delay savings increases to approximately 1,075 hours of delay per workday in 2045.

6.3.3 Air Emissions Reductions

To support the air emissions reduction analysis, INCOG ran the Environmental Protection Agency's Motor Vehicle Emission Simulator (MOVES3) model for years 2030 and 2045. Based on model runs, air emissions rates were derived per hour of travel delay for carbon dioxide (CO_2), nitrous oxide, sulfur oxide, and particulate matter 2.5. Based on air emission rates, combined with the travel delay reductions, annual emissions reductions were calculated, and monetized.

The I-44 and US-75 Corridor Improvement Projects will reduce over 8.6 tons of CO_2 through reduced congestion in 2045.

6.3.4 Shipper/Logistics Cost Savings

Shipper/logistics cost savings are based on Freight Analysis Framework (FAF) Tulsa region for 2020, truck travel delay savings, and data from the TREDIS-based Multimodal Benefit Cost Analysis (MBCA) tool. The FAF data were used to develop a commodity mix breakdown of the trucking data, and the commodity mixes were cross referenced to Standard Classification of Transportation Goods (SCTG) data. These values are then applied to the truck travel delay savings to derive ton hours saved by commodity type and SCTG category. Ton hours saved are then multiplied by the hourly value of shipper delay for each commodity (hourly values are obtained from the TREDIS-based MBCA model). Costs are summed across all commodity types to derive the annual savings.

6.4 BCA Results

Based on the assumptions, methodology, and other information presented above, the project yields a Benefit-Cost Ratio of 1.21 and a Net Present Value of $27.1 million. The results are summarized in **Table 6.**

Table 6: BCA Results

BENEFIT-COST	AMOUNT
Discounted Initial Capital Costs	$137.34
Discounted Life Cycle Cost Savings	-$10.46
Facilities Residual Value Undiscounted	$0.00
Discounted Present Value of Capital Costs	$126.88
Total Discounted Costs (millions $2019)	**$126.88**
Total Discounted Benefits - Total (millions $2019)	**$153.97**
Travel delay cost savings	$54.41
Accident reduction benefits	$92.25
Emissions reduction benefits	$2.23
Shipper/supply chain cost savings	$4.95
Benefit-Cost Ratio	**1.21**
Net Present Value	**$27.09**