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Oklahoma Bridges & Highways

Oklahoma's State Highway Transportation Infrastructure

The state-owned highway system in Oklahoma is comprised of the state numbered route highways, the US numbered route highways and the interstate highway system. The state system of highways encompasses 12,254 centerline miles as measured in one direction along the dividing stripe of two lane facilities and in one direction along the general median of multi-lane facilities. Transportation on our highways is also facilitated by over 6,800 bridge structures that span major rivers and lakes, named and unnamed perennial streams and creeks, other roads and highways and railroads. On the average, passenger vehicles, buses and trucks traveled more than 73.4 million vehicle miles each day (daily vehicle miles traveled or (DVMT) in 2017 on the state owned highway system.

While improvements are occurring, Oklahoma's highway system bridge and pavement problems are readily recognized and are a direct result of many years of "deferred maintenance" due to a lack of state funding. From 1985 to 2005 transportation investment was quite simply flat. As a result the condition of the infrastructure experienced a consistent, downward spiral and decline that will take many years of committed, focused and dedicated resources to correct. Prior to 2005 the problem was quickly becoming overwhelming with no viable solution.

At that time highway pavements were deteriorating at a rate beyond the available funding to repair, let alone to reconstruct, and more than 1,500 of our highway bridges were structurally deficient or functionally obsolete. 137 of those bridge structures across Oklahoma were posted as unable to carry a legally loaded truck.

Understanding that a world class transportation system is the cornerstone of a vibrant economy, a leading factor in growing and attracting new business, the Oklahoma Legislature clearly decided that investing in transportation infrastructure should be a priority of state government. In 2005 these policy makers set about the important work of reversing the trend of the previous 20 years and several pieces of landmark transportation legislation were subsequently crafted and passed. These transportation funding initiatives have introduced new state resources targeted for the construction, care and maintenance of our transportation infrastructure.

If these trends are sustained and enhanced, these growing revenue streams represent the true turning point for the future of Oklahoma's transportation assets. Today, the Department is afforded the opportunity to develop an investment strategy and direct a multi-faceted plan that wisely and transparently dedicates the available state transportation resources in a balanced manner. This strategy represents the beginning of a monumental effort to return Oklahoma's bridges and highways to a safe system in a state of good repair and safety and keep it that way for our citizens in the future.

Please enjoy the progress shared in this update, understand the challenges that lie ahead and most importantly, accept our deepest appreciation for your interest in and support for Oklahoma's transportation system.

Oklahoma Bridges

Condition and Needs Summary

Oklahoma's bridge problem is well recognized. Of the over 6,800 bridges on the state highway system, 713 are either too narrow to support today's traffic or have structural deficiencies, or both. Over the last several decades, Oklahoma consistently ranked at or near the bottom of the list of states with the nation's worst bridge conditions. Crumbling transportation infrastructure and deficient bridges have a detrimental impact on Oklahoma commerce, job creation and economic growth and can even endanger our citizens.

The Oklahoma Department of Transportation has accelerated bridge replacement efforts through a focused and concerted effort made possible by additional state funding provided by the Legislature. This effort has allowed the Department to replace or rehabilitate 1,467 bridges since January 2006. Even with this progress and our best efforts to gain control of the bridge infrastructure deterioration curve, the conditional problems caused by 20 years of flat transportation funding continue. An evaluation of the most recent bridge inspection cycle and April 1, 2018 reporting reveals that an estimated 185 structurally deficient bridges were still identified. The current 2019-2026 Construction Work Plan includes the replacement or major rehabilitation of 686 bridges.

Since January 2006, the Department has replaced or rehabilitated:

1,467 BRIDGES

All identified structurally deficient bridges are included in either the 2019-2026 Construction Work Plan or the 2019-2022 Asset Preservation Plan. The Department has always envisioned the development of an aggressive bridge rehabilitation program formulated to effect badly needed improvements on marginal bridges, but never possessed the resources required to launch a meaningful initiative.



Proposed Bridge Replacements/ Major Rehabilitations in the 8 Year Construction Work Plan:

686 BRIDGES

The Department has instituted a bridge specific program designed to be flexible and reactive. This bridge rehabilitation program allows the Department to stretch our scarce regular maintenance dollars further. At the same time, the program has proven effective in slowing or stemming further deterioration or functional decline of the bridge infrastructure and enhances the ability to manage these transportation assets in a manner that maximizes their life cycle.





Annual Investment in Bridge Rehabilitation:

\$40 MILLION

While these efforts exemplify the wise investment of the available resources, today we must consider that a continuing long term annual bridge replacement commitment will be required to keep pace with the projected aging and deterioration rates of our current inventory.

In order to keep pace with Oklahoma's aging infrastructure, ODOT must replace or refurbish:

90 BRIDGES ANNUALLY

Before

Structurally Deficient:

Has key elements that need to be monitored and/ or repaired. The condition of these key elements are rated on a scale of 0 to 9 (with 9 being "excellent" and zero being "failed"). A structurally deficient bridge is one for which the deck (riding surface), the superstructure (supports immediately beneath the driving surface) or the substructure (foundation and supporting posts and piers), or for culvert type bridges, is rated at 4 or less.





Functionally Obsolete:

One that was built to standards that are not used today. These bridges do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or they may have unfavorable approach roadway geometry. These elements are considered in combination with the current traffic volumes.



528 Functionally Obsolete Bridges (as of 2017)

After

185 Structurally Deficient Bridges (as of 2017)



(44)

Tulsa Metro Area

- Structurally Deficient (185)
- Functionally Obsolete (528)
- Highways
- Urban Areas
 - Counties

CREEK



Structurally Deficient & Functionally Obsolete Bridges

State Highway System Bridges Only NOTE: The information provided is generated

from the National Bridge Inventory system. Therefore, some of the identified bridges are either under construction or have been recently constructed.

- Replacements / Major Rehabilitation (1,467)
- Highways
- 🔲 Urban Areas
 - Counties

CREEK

Tulsa Metro Area

Bridge Replacements/ Major Rehabilitation Projects

State Highway System Bridges Only NOTE: The information provided is generated from the National Bridge Inventory system. Therefore, some of the identified bridges are either

under construction or have been recently constructed.

Counties

Tulsa Metro Area

Bridge Replacements/ Major Rehabilitation Projects

State Highway System Bridges Only

NOTE: The information provided is generated from the National Bridge Inventory system. Therefore, some of the identified bridges are either under construction or have been recently constructed.

TULSA (44) CREEK

Tulsa Metro Area

All are in the 2019-2026

5

115

Construction Work Plan

- Structurally Deficient (185)
- Highways
- Urban Areas
 - Counties

Structurally Deficient Bridges as reported at the end of 2017

State Highway System Bridges Only NOTE: The information provided is generated

NOTE: The information provided is generated from the National Bridge Inventory system. Therefore, some of the identified bridges are either under construction or have been recently constructed.

Highways & Safety Condition and Needs Summary

Oklahoma's rural nature and historically agricultural and energy-based economy has witnessed the conversion of many farm-to-market roads and bridges into highways. While these roads were ideal for transporting livestock and crops to market 70 years ago, they are less than adequate when supporting today's heavier trucks, increased traffic demands and higher operating speeds. Approximately 4,390 miles of Oklahoma highways are two-lane facilities without paved shoulders.

Shoulders and roadway improvements to two-lane highways without paved shoulders in the 8-Year Construction Work Plan:

724 MILES

Surface, operational and capacity improvements to high-volume major highways in the 8 Year Construction Work Plan (estimated total investment): \$3.26 BILLION

4 year investment in highway freight mobility projects: \$512.09 MILLION

Annual investment in surface preservation: \$75 MILLION

Remaining inadequate highways with no improvements scheduled:

2,646 MILES

Traffic on our major highways has increased dramatically in the past two decades and freight traffic is expected to continue to compound for the foreseeable future. The daily vehicle miles traveled on facilities with more than two lanes in 2017 was 52.87 million miles (72% of total miles traveled). Improvements to these facilities are often our most expensive and resource consuming projects, but also yield high returns and have an immediate impact on regional traffic patterns. Over 466 miles of our 673 miles of interstate pavement have foreseeable supporting significant rehabilitation or reconstruction since 2003 and an additional 152 miles are included in the Federal Fiscal Year 2019 through 2026 8 Year Construction Work Plan (CWP).

In order to provide a safe, reliable and productive freight transportation system that will support the growing economy and population of the state, an increased focus on freight needs and opportunities is paramount. The first four years of the 2019 through 2026 CWP contains a little over 66 miles of improvements that are expected to have a significant impact on freight mobility.

Much like our bridges, our pavement surfaces require systematic preservation in order to maximize the life cycle of our highways. Until recently, it has been impossible for the Department to afford the consideration of such initiatives. As budgetary conditions improve we can invest in and develop a timely surface preservation program with a focus on extending the life of our pavements.

Based on an evaluation of pavement conditions and safety features such as existence of paved shoulders, recovery areas for errant vehicles, and the severity of hills and curves about 30% or approximately 3,646 of our 12,254 miles of highway rate as poor which includes 3,126 miles of two-lane highway. Even with the improvements scheduled in the current 8-Year Construction Work Plan over 2,646 miles of inadequate highway will remain undressed. To put this distance in the proper perspective, that is the equivalent of driving all the way across the United States from the Pacific Ocean in San Diego, California through Oklahoma City, Oklahoma to Washington D.C, with deteriorated pavement or sharp curves, no shoulders, steep hills, or high traffic volumes. The safety of our transportation system and the traveling public is paramount to our mission and always has our full attention, but many highway safety improvements that could prevent property damage, personal injuries and the tragic loss of life remain.

Two-Lane Highways Without Paved Shoulders

Freight Bottlenecks vs. Freight Mobility Projects

Steep Hills & Sharp Curves

Progress Summary

D erformance management, asset management, investment strategy, system analysis, and transparent reporting are primary terms often used in developing and managing business. Today, these primary terms are becoming more and more ingrained in government agencies and their operations. The intent is to better understand and measure the outcomes associated with the expenditure and investment of public funds. However, identifying the right measures to consistently and accurately collect the necessary data and then communicate the progress of government to the public in an understandable and meaningful manner can be quite difficult. Equally, when good measures are established and widely accepted, the nature of quantifying any gains or losses can be highly complex and difficult to concisely explain.

The Department of Transportation understands the needs of our transportation assets and monitors the effectiveness of our investment strategies on a daily basis. The data collection and analysis necessary to manage the transportation system is indeed extensive, complex, voluminous and sometimes inconsistent due to changing collection and reporting criterion. With thoughtful consideration of these complexities, the Department has selected important and meaningful measures for the purpose of providing a brief progress summary in the context of Oklahoma's bridges and highways. It is anticipated that in the coming years this progress summary will evolve to become a concise snapshot of the progress of the highway and bridge investment strategy.

Interstate System

The Interstate System in Oklahoma is the highest class of highway and is designed to be the critical transportation link that is the viaduct of national commerce which facilitates the movement of goods and services within the state, across the nation and abroad. While the 673 miles of interstate account for only 5.5% on the centerline miles of our state system, it carries 33.6% of daily miles traveled. Since 2003 more

than \$3.5 billion has been invested resurfacing, rehabilitating or reconstructing the non-toll interstate system including pavements, bridges, interchanges and necessary property acquisitions and utility relocations. These improvements represent the scheduled work accomplished as part of our Asset Preservation Plan and our Construction Work Plan.

Non-Interstate Highways

The needs of the state transportation infrastructure are constantly assessed and appropriate maintenance, rehabilitation and reconstruction activities are planned and implemented in a fully integrated and systematic manner. Regular maintenance extends the life-cycle of the transportation facilities and timely rehabilitation and reconstruction activities as encompassed in the Construction Work Plan and Asset Preservation Plan are necessary to leverage those maintenance resources so the efforts are restorative and preventative in nature. The timing of these investments is critical, as resources being directed to infrastructure and facilities that are beyond useful repair does not constitute effective maintenance and will not prevent the eventual, inevitable and costly failure of those elements.

In the context of the 2003 to current Asset Preservation and Construction Work Plan investment strategies, the Department has resurfaced, rehabilitated, constructed or reconstructed non-interstate highway pavements and bridges totaling an infrastructure investment value of more than \$6.5 billion including necessary property acquisitions and utility relocations.

Number of Bridges

On System Structurally Deficient Bridges

Structurally Deficient Bridges

The conditional issues that manifest in our bridge infrastructure are well known. Since the year 2000 Oklahoma has consistently ranked as one of the worst states on the national list of structurally deficient bridges. At the most recent peak as reported in December of 2004, 1,168 bridges or a full 17% of all highway system bridges were classified as structurally deficient. By comparison, that same year Texas ranked near the best in the nation with less than 2% of their more than 32,000 bridges classified as structurally deficient.

The Department has placed a priority and focused available resourcesonthischronicprobleminearnestsince 2003. With the passage of House Bill 1078 in 2005, which initiated the Rebuilding Oklahoma Access and Driver Safety (ROADS) fund, a more diverse funding pool has been brought to bear. This publication of the Update on Oklahoma Highways and Bridges showcases the culmination of a bold and visionary plan unveiled by Governor Mary Fallin that will virtually eliminate Oklahoma's bridge structural deficiencies.

Governor Fallin challenged the Department to prepare an aggressive investment strategy to alleviate the condition

of these bridges within an eight year window and then worked with the Legislature to ensure a funding solution was in place. As a result, our structurally deficient bridge numbers are expected to drop to less than 1% by the end of the decade. Oklahoma's focus and progress is evident with the December of 2017 annual bridge inspection reports revealing that the 706 structurally deficient bridges recorded in 2010 have been reduced to 185 marking a 73.7% reduction in structurally deficient bridges.

Innovation

The transportation industry has many ongoing technological innovations in infrastructure management and improvement, many of which the Department are utilizing and developing. These innovations include the integration of our major management systems, such as maintenance management, pavement management, bridge management and Geographic Information Systems (GIS), all of which exist under an asset management umbrella. Though implemented, the Department is constantly finding ways to adapt these systems to provide enhanced infrastructure management, structural inspection surveys and customer service, as well as to provide real time information to decision makers and the public.

The Department will continue to aggressively pursue and implement innovations to accelerate project delivery and provide savings to the traveling public. Oklahoma has led the nation in the implementation of cable barrier systems, saving lives by avoiding crossover fatalities. Accelerated Bridge Construction (ABS) will limit road closures and save significant detour miles and time for Oklahoma travellers.

Driving Oklahoma was initiated this year to begin the conversation on Connected and Autonomous Vehicles (CAV) and their impact on Oklahoma's future. The Department has taken the lead on Driving Oklahoma to educate and communicate the needs of Oklahoma's transportation system to accommodate CAVs. State legislators, local governments, commercial vendors and the Department are all sharing information to move this initiative forward.

The following list includes some of the accomplishments and innovations the Department has implemented:

GO-DOT Motorist Assist
Program

 I-235 Railroad Bridge Build On-Site in 2 Spans and Moved Into Place Using Self-Propelled Motor Transports

- ShakeCast Technology for Bridge Inspections Post-Earthquake
- SH-51 Cottonwood Creek Bridge Slide Replacement
- Traffic Operations Center (TOC)
- ODOT Snow Plow System
- Interactive Traffic Updates

Innovation

GO-DOT Motorist Assist Program

The pilot program GO-DOT debuted in August 2018 to quickly move stranded vehicles off targeted, high-traffic Oklahoma City metro area interstates and was made possible through a partnership with the Federal Highway Administration. The two 2017 Ford F-450 4x4 crew cab trucks are designed to safely move vehicles off the highway to the nearest safe location, but does not replace private towing or mechanic services. While assisting motorists who may have run out

of gas, have a mechanical failure or a flat tire, this service benefits all motorists by lessening the chance of secondary accidents that often are even more serious than the initial incident slowing or stopping traffic. The Department plans to expand the service to the Tulsa metro area in the near future.

I-235 Railroad Bridge Build On-Site in Two Spans and Moved Into Place Using Self-Propelled Motor Transports

In early 2018, a 45-foot-tall, 550 feet long, railroad truss bridge was moved into place over one weekend over I-235 near downtown Oklahoma City. Building the two spans – weighing in at 2 million pounds a piece – adjacent to the work zone and then moving them nearly a quarter of a mile down the interstate on self-propelled motor transports was unique to Oklahoma and this part of the country. This was the first time the Department used the ABC bridge moving technique on this scale and it came as part of the largest, single dollar amount contract awarded in Department history. This innovative technique saved many months of road closures and avoided significant delays by motorists.

ShakeCast Technology for Bridge Inspections Post-Earthquake

The Department began using ShakeCast in August 2017. ShakeCast is a computer application, originally created by the United States Geological Survey (USGS) that will automatically generate reports to help the Department's field divisions

quickly identify bridges requiring inspection following an earthquake. The report provides a list of state highway bridges near an earthquake's epicenter with categorization that will guide the inspection crews' routes. In generating its reports, ShakeCast compares state highway bridge data with the severity of the earthquake ground motions as provided by the USGS.

SH-51 / Cottonwood Creek Bridge Slide Replacement

The \$3.5 million project began in April 2013 to replace the SH-51 Bridge over Cottonwood Creek near Mannford in Creek County. The project utilized accelerated bridge construction techniques for the first time in Oklahoma. The new bridge was built alongside the existing structure, and upon completion the old bridge was removed so the new structure could slide into the existing alignment. This resulted in a total highway closure during September 2014 of only eleven days, instead of up to six months

had conventional construction methods been used. This also saved an estimated \$2 million in user costs that the lengthy forty-mile detour would have cost drivers.

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ODOT Snow Plow System

In late 2017 the Department started deploying a new ODOT Snow Plow Monitoring System that will be used to monitor and report road surface conditions, snow plow operations and material usage during winter storms. Data is collected via multiple

devices installed on Department snow plow trucks. Among the devices is a camera that will take pictures of the roadway conditions every 10 minutes while the plow is moving. These images will be made available to the public in the okroads.org website. There are 230 Snow Plow Systems installed across the state of Oklahoma. The data collected will be used as a tool to assist the Department in increasing the efficiency of snow removal operations and provide realtime road conditions to the public.

Traffic Operations Center (TOC)

The Department implemented a Traffic Operations Center (TOC) at the Central Office, located in Oklahoma City, to assist in monitoring traffic conditions and incidents in both OKC and Tulsa metros. The TOC is the interface for the States Intelligent Transportation System (ITS), which started in 1999. The TOC monitors the speeds of the highway system to detect slow down or incidents. Cameras are used by 911 dispatch, DPS dispatch, and the Department to verify incident severity and aid in determining the type of response vehicles needed to respond. This monitoring helps reduce response

time and clearing of the incidents from roadways, which in turn can reduce secondary accidents. Dynamic message signs help inform the motorist of delays, incidents, construction activities and weather conditions. Currently, ODOT has 400 cameras, primarily in the OKC and Tulsa metros, 75 Dynamic Message Board Signs, and 20 Road Weather Sensor stations. All the information is pushed out to the ODOT oktraffic.org website, along with current weather roadway conditions at okroads.org website, for motorist to have more information during their travels in the state.

OKROADS

ODOT's OKROADS.ORG started in 2015 to provide a public facing map of current road conditions during inclement weather. Road and weather conditions reported through the system will be displayed on this dynamic, color-coded map that will update as new conditions are reported. Users can click on a section of roadway to activate a pop-up with additional details of the last reported conditions for that section of roadway with date and time stamp. New for winter 2018-2019, users will be able to click on a camera icon at a chosen location to view the latest photo of the road condition from the snow plow operator's perspective.

ODOT Mobile APP

In 2018, the Department deployed its first mobile application for drivers with smart phones. The application is available on Apple's App Store. The ODOT app includes direct access to the Department website and four traveler information applications that include *oktraffic.org*, *okroads.org*, Traffic Map and Dynamic Message Sign (DMS) View.

Safety

W hile there are many indicators that provide insight into the safety of the transportation system, year to date fatalities is the most commonly referenced. Motor vehicle crashes are the number one cause of death and also disabling injuries for young Americans under the age of 21. In Oklahoma, the number of on highway fatalities for 2017 was 656. There are many variables that affect fatality trends and can be as simple as winter weather or as complex as increasing motorcycle usage and driver behaviors such as distracted driving. These issues are the most difficult to impact, and while year-to-date fatalities should be regarded as an important indicator, they cannot necessarily reflect the totality of the highway system safety health.

Even when effective countermeasures can be deployed for specific crash types, the results may take years to materialize. For example, in 2001 the Department began an initiative to test cable median barrier on divided highways. Based on the outcome of this test, over 725 miles of cable median barrier have been installed on our divided highways. This has resulted in a dramatic reduction in the number of fatalities caused by cross-over type crashes, reduced from 39 in 2007 to 7 in SFY 2018. Unfortunately, few available countermeasures meet with such definitive success.

Motorcycle Safety

From 2004-2008 Oklahoma experienced an average of 78 motorcycle fatalities annually, which increased to an average of 92 annually from 2009-2013 with a peak of 106 in 2009. In 2017, motorcycle fatalities were 88. Increased motorcycle rider education may have played a role in the stabilization of the increasing fatality trend.

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