

REPORT CARD FOR
KANSAS'
INFRASTRUCTURE

2018

G.P.A.



**“A modern, efficient highway system is essential.
...The obsolescence of the nation’s highways
presents an appalling problem of waste, danger
and death. ...A network of modern roads is as
necessary to defense as it is to our national
economy and personal safety.”**

–Dwight D. Eisenhower

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EXECUTIVE SUMMARY

Kansas is the heartland of the United States with its rolling prairies in the Great Plains setting. Despite – in fact, maybe even because – much of Kansas is situated in a rural setting, infrastructure is of vital importance for all communities.

The 2018 Kansas' Infrastructure Report Card is meant to help Kansans understand the state of our infrastructure. When compared with the 2013 Kansas Infrastructure Report Card, some areas of infrastructure improved due to increased funding and others improved, despite lack of funding, through creative use of available resources. Unfortunately, progress is not uniform, and the Report Card finds that other areas are slipping because of the lack of funding for proper maintenance. Lately, challenging budget cycles have meant the legislature has resorted to diverting funding for infrastructure to other areas.

Would you be upset if one of the following happened?

- Your glass of water is cloudy;
- You are ankle deep in water outside your door because the water from the 100-year storm could not drain away fast enough;
- The bridge between you and your grandma is closed indefinitely and you have to drive an extra 30 miles each time you visit;
- You have to drive in the passing lane because the travel lane is too rough with numerous pot holes;
- Blackout periods occur on a hot day; or
- Your loved one's life is on the line and your local airport cannot serve an air ambulance.

Although some of these examples are extreme, these things can happen where investment in infrastructure does not occur. As civil engineers, our job is to plan, design, construct, and maintain our infrastructure networks and

assist infrastructure owners with preservation interventions so our existing infrastructure can be improved.

In 2013, a panel of Professional Civil Engineers and American Society of Civil Engineers (ASCE) members throughout the state graded our infrastructure as a “C.” This past year, an expert team of more than 30 civil engineers was assembled to evaluate and study the major components of our infrastructure. In 2018, the grade improved slightly to a “C.”

Recent investments in Kansas' infrastructure, including levees, bridges, and dams, are yielding results. Looking ahead, we cannot let challenging budget cycles inhibit progress on infrastructure. Also of concern: The Kansas Report Card Committee was unable to grade schools in the 2018 Report Card due to the lack of recent data on public school facilities. However, ASCE applauds the Kansas State Legislature for recently passing legislation that increases funding for public schools. Meanwhile, freight traffic is expected to increase and funding for our roadways and shortline railroads are currently insufficient. Further neglect could jeopardize Kansas City's position as an intermodal hub.

This document allows us the opportunity to share the current state of Kansas' infrastructure with the public. The Report Card provides a snapshot for residents and policymakers to engage in conversation about where we are and where we want to be. We hope that this information provides the insight needed to start that conversation and ignite action.

GRADING CRITERIA

Infrastructure is graded based on eight criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. ASCE grades on the following scale and defines these grades as:



EXCEPTIONAL, **Fit for the Future**

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



GOOD, **Adequate for Now**

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable, with minimal capacity issues and minimal risk.



MEDIOCRE, **Requires Attention**

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



POOR, **At Risk**

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of serious concern with strong risk of failure.



FAILING / CRITICAL, **Unfit for Purpose**

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

RESULTS

Nine different categories of infrastructure for the State of Kansas were evaluated and graded. They are summarized in the following table:

SUBJECT	2018 Grade
Aviation	C-
Bridges	C
Dams	C-
Drinking Water	C
Energy	C
Levees	C
Rail	C
Roads	C-
Stormwater	C-
Overall Grade	C



RECOMMENDATIONS

- Continue to implement the recommendations of the updated Kansas Statewide Aviation System Plan. The plan will help meet the State's airport objectives under the NPIAS guidelines.
- Explore additional revenue and funding sources to provide steady long-term funding for airport improvement grants.
- Support additional funding and the continued reauthorization of the FAA and KAIP grant programs.
- Explore updated technological advances for long term paving materials to reduce operational and maintenance costs.
- Engage the State's robust aerospace manufacturing industry to assist in continued support of Kansas airports.

EXECUTIVE SUMMARY

Aviation activity at Kansas airports supports almost 34,000 total jobs, generates over \$1.8 billion in payroll, and produces more than \$9 billion in annual economic output. With a wide variety of airport types, it is important that the state is involved in maintaining and supporting both regulatory and financial requirements. As the Kansas aviation system prepares for anticipated growths in passenger and freight traffic, the Kansas Department of Transportation has provided an additional \$2 to \$2.5 million per year to airports, through the T-WORKS statewide transportation program. While the additional funding is helpful, it is insufficient; between 2015 and 2017, development costs grew 11%, from \$454 to \$505 million. Meanwhile, Kansas continues to suffer from ongoing budget challenges, which has impacted both state funding and local match participation in priority projects. Without adequate agency and airport funding, Kansas citizens' health and safety will be at greater risks due to inadequate access to a properly operated and maintained airport system. Looking forward, state legislators should be focused on finding adequate funding solutions to leverage existing federal and local revenue sources.

BACKGROUND

The Kansas Department of Transportation (KDOT), Division of Aviation has largely been responsible for classifying the airports in the State of Kansas. In 2008, that classification included all airports in Kansas (140 at the time of reporting). Subsequent analysis performed by KDOT has only categorized and focused on those airports in the National Plan of Integrated Airport Systems (NPIAS) as defined by the Federal Aviation Administration (FAA). The FAA identifies 80 of the public-use airports in Kansas as significant to the NPIAS.

Further, KDOT classifies airports into five categories, according to their role in the Kansas Airport System. These categories and numbers (x) of each type of airport are classified in the Kansas Aviation System Plan as follows:

- Commercial Service Airports – Airports that accommodate scheduled commercial air service (7).
- Regional Airports – Airports that accommodate regional activities, connect the state and national economies, and serve all types of general aviation users (17).
- Business Airports – Airports that accommodate local business activities and general aviation users (33).

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- Community Airports – Airports that serve a supplemental role in local economies, primarily serving smaller business, recreational, and personal flying (22).
- Basic Airports – Airports that serve a limited role in the local economy, primarily serving recreational and personal flying (1).
- The Kansas airports in the NPIAS are eligible to fund improvements through FAA grants. The FAA classifies airports by the principal use of the airport as:
 - Primary Commercial Service Airports – Airports that enplane at least 10,000 passengers per year (5).
 - Non-Primary Commercial Service Airports – Airports that enplane at least 2,500 passengers, but less than 10,000 passengers per year (2).
 - General Aviation Airports – Airports that are not classified as Commercial Service Airports (73).

The public-use airports in Kansas generate over \$9 billion of annual economic activity, over \$1.8 billion of annual payroll, and almost 34,000 jobs. Kansas General Aviation airports account for over 11,000 jobs and almost \$575 million in payroll annually. Kansas Commercial Service airports account for 22,350 jobs and \$1.2 billion in payroll. The total economic output by Kansas aviation represents just under 6% of the 2016 State Gross Domestic Product.

The impact of Kansas City International Airport (MCI) in Kansas City, Missouri should not be understated due to the proximity of the airport to a high percentage of the state's residents. Please reference the Missouri Report Card for further information regarding MCI.

CAPACITY

With 80 airports in the FAA's supported NPIAS system, and a population of 2.9 million residents, the State has one federally funded airport for every 36,250 residents.

In comparison with the neighboring states of Colorado (one airport for every 100,000 residents) and Missouri (one airport for every 78,000 residents), the number of FAA funded airports available to Kansas citizens appears adequate.

However, capacity may also be defined by the availability of hangar and apron (ramp) space for based aircraft. The Kansas Aviation System Plan (KASP) indicates that 15 NPIAS airports are recommended to increase hangar storage capacity and five NPIAS airports are recommended to increase apron storage capacity based on projected aircraft numbers.

Lastly, the KASP provides important data on the Kansas population and land area within a 30-minute drive time of an airport capable of supporting air ambulance service. The benchmark set by the KASP is 90% of the Kansas population and 70% of the land area within that 30-minute goal. Currently, the existing airport facilities in Kansas serve 81.3% of the state's total population and 28.6% of its land area within this benchmark, thus falling short in terms of capacity for air ambulance service and thus, a detriment to the potential health care needs of Kansans.

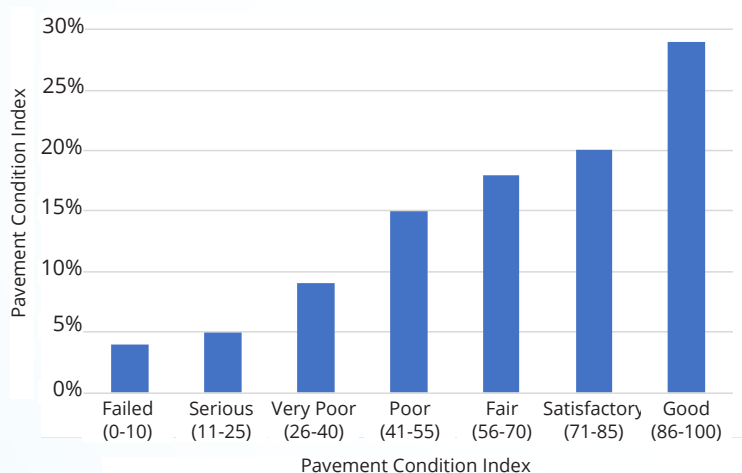




CONDITION

The Aviation Division of KDOT has continually supported airfield pavement management programs and calculating pavement condition indices (PCI) for the airports within its system (apart from Wichita – Dwight D. Eisenhower National, which is required to perform the program as a small hub airport). The 2015 state-wide pavement management report indicated pavement on 79 of 80 of the NPIAS airports examined as having a condition of fair or less than fair (PCI of 70 or less) on 51% of the pavement area, and a condition of satisfactory or good on the remaining 49% of the pavement.

State of Kansas Airfield Pavement Condition by Percentage of Area



As runway pavement makes up most of the airfield pavement inspected for the state-wide program, Runway PCI should be considered of paramount importance. Unfortunately, almost 50% of the runways available on NPIAS airports in the State of Kansas fall below a fair condition with a PCI of 70 and are considered less than satisfactory.

FUNDING

Funding for airport improvements in the State of Kansas comes from three funding sources: The FAA, KDOT, and local municipalities, which must match a certain percentage of all improvement projects. The FAA provides funding through various programs, including the Airport Improvement Program (AIP) and Passenger Facility Charges (PFCs). The AIP is funded through the Airport and Airway Trust Fund, supported by passenger ticket taxes, fuel taxes and other fees; and AIP grants can be used on most airfield

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capital improvements or repairs. However, AIP cannot be used on exclusive-use areas in terminals, revenue producing areas of terminals and non-aviation development. PFCs are capped, and set by an individual airport, at \$4.50 per enplaned passenger, per segment, and are directed to FAA-approved projects that enhance safety, security and capacity; reduce noise and provide opportunities for competition among air carriers.

KDOT provides funding through the State of Kansas Airport Improvement Program (KAIP) (not to be confused with the federal counterpart, the FAA Airport Improvement Program). The KAIP grants have steadily increased for airport improvement projects from \$3 million to \$5 million starting in 2013. The additional funding comes from the state T-WORKS transportation program. These grants are available to all public use airports, except those classified as “primary airports,” in the State of Kansas. These projects require varying levels of matching local funds, depending on project type, and airports are often capped at the number of participatory projects due to the large demand for funding. While the recent increase in funding is helpful, it does not meet the total need. With 138 total public use airports, \$5 million translates to just under \$40,000 per airport.

Current levels of funding are reported in the FAA’s National Plan of Integrated Airport Systems (NPIAS) reports for the state of Kansas. Funding as estimated by the FAA for future development costs was estimated in 2015 and again in 2017.

Year Estimated	Timeframe	Estimated Development Cost for all NPIAS Airports
2015	2015-2019	\$453,524,076
2017	2017-2021	\$505,203,269

Between 2015 and 2017, needs grew by approximately \$51 million, an 11% increase. This is further indication that

available funding is insufficient to meet Kansas’ growing needs. Of additional concern is the overall fiscal health of Kansas; The state is suffering from ongoing budget challenges; in the current fiscal year, the budget shortfall is estimated to be almost \$300 million. This has impacted both KDOT funding and local match participation throughout the state.

OPERATION AND MAINTENANCE

Each airport municipal owner is responsible for maintenance on a public use airport. With local budgets being cut statewide in Kansas, airport operations and maintenance activities at those airports without steady commercial service and available additional funding has greatly suffered.

FAA grant assurances for airport projects funded through the Airport Improvement Program (AIP) require airport sponsors to provide operations & maintenance throughout the 20-year life of an airfield pavement. These operations are often cut due to perceived higher priority municipal items, such as roadway maintenance and other localized economic development activities. With the KASP reporting a recommended \$68 million required for improvements to meet the NPIAS standards, future additional funding sources must be found for O&M activities.

PUBLIC SAFETY

The Kansas Airport System is anticipated to handle up to 1.5 million annual general aviation operations and over 100,000 annual commercial aviation operations by the year 2034. If the infrastructure at the state’s airports are not maintained, public safety can suffer based simply on the number of users anticipated to use Kansas airports.



Other safety aspects to consider include the availability of airports safely being able to support air ambulance services. With a reduced rural population, the availability of quality healthcare may often require air ambulance availability. Having the availability to those rural communities increases the overall public safety condition.

The KASP also includes goals for public safety that should be referenced. These goals include recommendations for airports to include clear approaches to each airport's primary runway, wildlife management plans to prevent aircraft – wildlife interactions, airport security plans, snow removal plans, automated weather reporting, etc. These items are crucial to maintaining the public safety of the airport infrastructure in the state of Kansas.



INNOVATION AND RESILIENCE

The Kansas Department of Transportation, with the support of the FAA has supported innovate projects that are helping with the resilience of the Kansas Airports System. KDOT's funding has included projects for a statewide pavement management program, statewide economic impact studies, and the Kansas Statewide Aviation System Plan. These programs help identify potential airfield issues early and often to the funding sources of many of the planned projects.

KDOT has also innovated using current technology by creating the Kansas Aviation Portal to provide the public

ample information on the status of each NPIAS airport through the internet. This helps with public education and resilience towards funding cuts when the economic benefits are presented in such a manner. Unfortunately, due to funding cutbacks, only NPIAS airports are now examined with all other public use airports being supported by KDOT aviation alone.

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RESOURCES

1. Kansas Statewide Aviation System Plan, Burns & McDonnell with assistance from CDM Smith, 2016.
2. Kansas Aviation Economic Impact Study Update, Burns & McDonnell with assistance from CDM Smith, 2017.
3. Statewide Airfield Pavement Management Report for the State of Kansas, Alfred Benesch & Co., with assistance from Burns & McDonnell and RDM International, Inc.
4. Federal Aviation Administration – National Plan of Integrated Airport Systems Report 2017-2021 and 2015-2019.
5. Kansas Department of Transportation, Division of Aviation.





RECOMMENDATIONS

- Provide more dedicated funds to assist counties and cities with their bridges without taking money away from state bridges. Educate and encourage localities to raise their own revenue sources and dedicate them to bridge improvements.
- Assemble state-wide best practices for building low cost, durable bridges on low volume roads.
- Increase the focus on durability in both new construction and in repairs, as this will have a dramatic effect upon the funding requirements to replace the entire system.
- Future federal programs may place an emphasis on funding P3 projects. Kansas must anticipate this new political climate and prepare unique projects to capture this funding, as well as prepare for fewer “conventional” federal funds.

EXECUTIVE SUMMARY

The Kansas Department of Transportation (KDOT), the Kansas Turnpike Authority, and localities have prioritized maintaining, repairing and replacing the 25,001 bridges in the state. Today, Kansas ranks first in the nation for the highest percentage of “good” condition National Highway System (NHS) bridges and has the third fewest in “poor” condition. The inventory of structurally deficient bridges in Kansas has been cut nearly in half over the past two decades; by 2017, 8.4% of bridges in the state were structurally deficient, compared with 8.9% nationally. The 10-year KDOT T-WORKS program, which as of 2015 had repaired or replaced nearly 600 bridges, has been especially successful at improving the overall condition of the state’s bridges. However, locally-owned bridges require attention and almost 1,500 non-NHS bridges are in “poor” condition. In addition, over the last five years, the legislature has diverted \$2.4 billion from T-WORKS to balance the budget.

BACKGROUND

Kansas ranks fifth in the nation for total number of bridges with approximately 5,000 state-owned, 19,500 locally-owned, and 400 Kansas Turnpike Authority (KTA)-owned structures, making up the 25,001 Kansas bridge inventory. Of the state-owned bridges, 2,816 are National Highway System (NHS) bridges. The vast majority of “local” bridges are owned by counties, with cities comprising nearly all of the rest. The average age of a Kansas bridge is 48 years. Over 20% of the bridges in Kansas exceed the modern 75-year design life.

CAPACITY AND CONDITION

Positive gains have been made in many statistical categories for Kansas bridges. In 2017, 2,115 out of the 25,001 bridges in the state, or 8.4% of the number of total bridges, were classified as structurally deficient. 8.9% of bridges are structurally deficient nationwide, meaning Kansas is doing better than average. The inventory of structurally deficient bridges in Kansas has been cut nearly in half over the past two decades. However, while progress has been made cutting down on the percentage of structurally deficient bridges, it is still sixth in the country for the overall number of structurally deficient bridges in part because of the large fleet. A structurally deficient bridge is not unsafe, but it does require significant maintenance, rehabilitation, or replacement and is inspected more frequently.

BRIDGES

When bridges are inspected, the structures and their associated elements are classified as “good,” “fair,” or “poor.” For NHS bridges, Kansas ranks first in the country with the highest percent of “good” bridges and has the third fewest “poor” bridges. However, nearly a quarter of the bridges in Kansas are load posted, meaning there are weight restrictions on the bridge. Nearly all of these posted bridges are owned by local counties on low volume roads.

Due to a lack of an adequate funding stream in many Kansas counties, when bridges can no longer safely carry the statutory minimum allowable load of three tons, they are simply closed without being repaired or rebuilt, requiring local citizens to detour around the structure. Municipalities, which had historically dedicated funding to new bridge construction, are increasingly diverting those funds to maintenance and repair. This indicates that fewer funds are available for new structures in areas of economic growth and development, and that an already aging bridge system is getting older.

OPERATIONS AND MAINTENANCE

Agencies have made concerted efforts, especially on the state level, to maintain the aging system of bridges. There is an increased focus on the local bridge system through programs like the Kansas Local Bridge Improvement Program, Kansas Local Bridge Rating Program, Kansas Local Bridge Evaluation Program, and Federal Fund Exchange Program. The number of structurally deficient NHS bridges has been reducing nearly every year for the past two decades. But for every two bridges that are no longer structurally deficient, one bridge is removed entirely from the bridge inventory of Kansas. This indicates bridges are closed rather than replaced, in order to invest money to maintain bridges elsewhere.

FUNDING

Funding for bridge maintenance and replacement in Kansas comes from several sources including federal and

state fuel taxes, state and local sales taxes, and vehicle registration taxes. The Kansas Turnpike Authority raises revenue through tolls and has adequately maintained its system of bridges. While fuel taxes are a dedicated funding stream, tax rates have not changed for nearly two decades and have shown to be less effective in an era of increasing construction costs and ever increasingly fuel-efficient vehicles.

T-WORKS, the 10-year \$7.8 billion transportation plan that began in 2011, was designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. The KDOT program is funded with fuel taxes and a one-cent state sales tax increase. As of 2015, the T-WORKS program had repaired or replaced nearly 600 bridges and had contributed to the decreasing structural deficient percentage and the number of bridges rated in “good” condition. \$10 million was set aside specifically to reduce the number of locally-maintained structurally deficient bridges.

KDOT’s funding has been used effectively on the state bridge system but is notably affected by how the state economy is doing. In the last five years, approximately \$2.4 billion in funds that were earmarked for infrastructure were instead used to balance the state budget. The reduction in available funding for infrastructure will adversely impact the transportation system and slow or even reverse the progress made so far in improving bridges across the state. Of additional concern is that few Kansas counties have dedicated funding mechanisms to replace their aging bridge population, a fact that is especially shocking when one considers that counties own 73% of all bridges in Kansas.



FUTURE NEED

Determining future funding needs can be challenging because of the many variables (current condition, maintenance practices, deterioration rates, etc.) involved. According to FHWA, the state has identified needed repairs on 10,578 bridges, which total an estimated \$2.7 billion in needs.

A relatively simple way to predict the average annual cost is to calculate an average bridge service life and determine the square footage of bridges that would need to be replaced annually to maintain the system at that level. The following table represents this data for Kansas for a range of assumptions of average service life.

Assumed Average Service Life	% Replaced Annually	Area Replaced Annually	Annual Replacement Cost (Millions)
50	2.00%	1,763,677	\$171.1
60	1.67%	1,469,731	\$142.6
70	1.43%	1,259,769	\$122.2
80	1.25%	1,102,298	\$106.9
90	1.11%	979,821	\$95.0
100	1.00%	881,839	\$85.5
110	0.91%	801,671	\$77.8
120	0.83%	734,866	\$71.3

Based on 88,183,863 sq. ft. of bridge deck and average estimated replacement cost at \$97 per square foot (2016).

The average service life of bridges in the U.S. is estimated at about 70 years. From the table above, for a 70-year service life, an estimated \$122 Million per year investment for bridge replacement is required for Kansas to maintain its system of bridges. To compare, only \$76 million was spent on bridge replacement for fiscal year 2015-2016.

PUBLIC SAFETY

Kansas follows the federally mandated two-year inspection for typical highway bridges. Critical structures are programmed for more frequent and/or specialty inspections, such as scour critical and fracture critical inspections. Structurally deficient bridges are not unsafe; structurally unsafe bridges are closed until repaired or removed. However, public safety is a never-ending pursuit. Bridge inspections record whether or not key components of a structure meet modern standards, including guard rails, safety barriers, and shoulder widths. These standards, by nature, are always increasing in demand, and the ability of the system to keep up is a function of funding and age of the bridges. As a lack of funds continues to force agencies to divert monies from improvements to maintenance and repair, Kansas will increasingly fall behind in its ability to provide bridges that meet modern safety standards.

RESILIENCE

New and more resilient materials are being developed to improve the service life of bridges. High performance steel, high performance concrete, and composite materials provide greater strength, toughness and resilience to deterioration. Furthermore, KDOT employs research from local universities to improve bridge performance. One example is a study that optimized the concrete mix used in bridge decks for minimal cracking and long-term protection of the reinforcement.

INNOVATION

KDOT is constantly pursuing efforts to improve bridge performance using state universities to perform research and testing on innovative bridge materials and construction methods. In an effort to explore innovative major project delivery methods, the state is constructing its first project using the Design-Build method in Kansas City.

BRIDGES

Counties are finding innovative ways to develop cost effective, highly durable bridge replacement programs. Examples include Sedgwick and Reno County, who have dedicated funding mechanisms for bridge construction, and utilize a combination of private and public “in-house” resources to construct new, short span, highly durable bridges on low volume roads.

KEY TERMS

NHS – The National Highway System (NHS) includes the Interstate Highway System as well as other roads important to the nation’s economy, defense, and mobility. NHS bridges in Kansas are typically found on the interstate system and major state highways.

Posted – When a bridge is not able to safely carry the loads allowed by state statute, it is posted for its reduced capacity. The intent is to post at a level which will be safe and not shorten the life of the existing structure. If a bridge cannot carry a minimum 3-ton load, it is closed.

Structurally Deficient - Bridges that require significant maintenance, rehabilitation, or replacement. These bridges must be inspected at least every year since critical load-carrying elements were found to be in poor condition due to deterioration or damage.

REFERENCES

1. US DOT FHWA NBI <https://www.fhwa.dot.gov/bridge/nbi.cfm>
2. Kansas Bridge Facts <http://www.ksdot.org/ksbridges/bridge/bridgeFacts.asp>
3. KDOT Performance Measures <https://kdotapp.ksdot.org/perfmeasures/>
4. Bridge Inspection https://www.nde-ed.org/AboutNDT/SelectedApplications/Bridge_Inspection/Bridge_Inspection.htm
5. KDOT Highway Projects Fiscal Years 2016-2016 https://www.ksdot.org/Assets/wwwksdotorg/Headquarters/PDF_Files/pressrelease2014/FY%2015-16%20Program.pdf
6. Kansas Local Bridge Improvement Program https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burLocalProj/Bridge/KLBI_Prog_Guide.pdf
7. Kansas Local Bridge Evaluation Program <http://klbep.ksdot.org/about.html>
8. National Bridge Inventory: Kansas <https://www.artbabridgereport.org/state-profile/KS.html>





RECOMMENDATIONS

- **As of August 2017, an estimated 28 dams that are considered to be of high or significant hazard potential have no state oversight of their current condition.** A minor change to a 2013 law could correct this situation. Modified legislation is needed to require permitting and regulatory authority of all High Hazard Potential (HHP) and Significant Hazard Potential (SHP) dams in Kansas.
- Emergency Action Plans (EAPs) should be required for all HHP and SHP dams.
- Increased funding and staffing is recommended to be more consistent with national averages.

EXECUTIVE SUMMARY

Kansas' estimated 6,400 dams meet a variety of needs, including agricultural, recreational, storm water management, water supply, and commercial. Most dams in the state are relatively small, of earth construction, and privately owned. 457 Kansas dams are classified as High Hazard Potential (HHP) or Significant Hazard Potential (SHP), meaning failure of the structure could result in significant loss of life or property. HHP dams are required to have an Emergency Action Plan (EAP) to maximize safety of downstream residents in the event of a dam failure or dam emergency. 86% of HHP dams in Kansas have an EAP; this is above the national average of 77% and a big improvement over the 62% of Kansas HHP dams that had an EAP in 2013. Additionally, the percentage of inspections of HHP dams has improved dramatically since 2010. However, increased funding and staffing is recommended to bring Kansas more in line with national averages. Meanwhile, 28 dams that are rated high or significant hazard potential have no state oversight of their current condition. A minor change to a 2013 law could correct this situation.

INTRODUCTION

Kansas's estimated 6,400 dams meet a variety of needs including agricultural, recreational, storm water management, water supply, and commercial. The majority of dams in the state are relatively small, of earth construction, and privately owned.

Dams are categorized nationally to indicate the consequences that could result if the dam were to fail and release large amounts of water downstream. Nationally, dams that are classified are: High Hazard Potential (HHP) if their failure could result in significant loss of life and property; Significant Hazard Potential (SHP) if their failure could result in significant loss of property; and the remainder are Low Hazard Potential (LHP). There are also dams with an undetermined hazard classification.

CONDITION AND CAPACITY

As of August 2017, Kansas had an estimated 457 dams classified as High Hazard Potential (HHP) or Significant Hazard Potential (SHP), with the former meaning there is the potential for significant loss of life and property if one of these dams were to fail and the latter meaning there is a potential for significant loss of property. Another estimated 5,864 were considered as Low Hazard Potential (LHP).

DAMS

HHP and SHP dams, should they fail, pose the most risk to the citizens and economy of the state; because of this, their conditions are of major importance. Depending on regulatory jurisdiction, condition is either assessed by the Kansas Department of Agriculture, Division of Water Resources (DWR) or the Army Corps of Engineers. The DWR appears to be doing a very good job of regulating an estimated 339 of the State's HHP/SHP dams. As of August 2017, the conditions of the 399 DWR state regulated HHP/SHP dams are as follows: 28% are rated Satisfactory (acceptable for all anticipated loading conditions); 46% are rated Fair (acceptable for normal loading conditions); 11% are rated Poor (remedial action required); and 1% are rated Unsatisfactory (emergency action required). Of the 30 federally-owned and regulated dams in Kansas, 33% are Satisfactory, 54% are Fair, and 13% are Poor, according to the Army Corps' National Inventory of Dams.

While most dams in the state are inspected regularly, 60 of the 339 regulated HP/SHP dams, or 18%, were not rated as of August 2017. Due to 2013 legislative exemptions, another estimated 28 of the 457 total Kansas HHP/SHP dams, or 6%, were unregulated, and their future physical condition unknown to the state. The conditions of these unrated and/or unregulated 88 dams, representing 19% of the 457 total HHP/SHP dams in Kansas, raise safety concerns.

An Emergency Action Plan (EAP) is often required to establish emergency contact information and operations to maximize safety of downstream residents in the event of a dam failure or dam emergency. 237 of Kansas' HHP dams, or 86%, and 91 of Kansas' SHP dams, or 51%, that require an EAP have one as of August 2017. The 2016 National Inventory of Dams indicated that there were an additional estimated 128 HHP/SHP dams in Kansas that should have an EAP, many of which are likely not under DWR or other regulation.

Beyond HHP/SHP dams, the condition of 5,990 of an estimated 6,400 dams in the state, or 94%, are not known to the state as of August 2017. However, many of these are small agricultural dams and their failure would be of little consequence.

OPERATION AND MAINTENANCE

Regular maintenance and repair of all dams in Kansas is the responsibility of the individual dam owners.

Many dams were built with corrugated metal pipe or concrete principal spillways to handle the majority of flows through the dam. The anticipated life of corrugated metal is approximately 25 to 30 years, after which the pipes begin to corrode and develop holes. Water can escape through the holes and erode the dam from the inside, potentially causing a sudden failure. The anticipated life of concrete is often 50 to 75 years. Kansas has an estimated 3,124 dams that are over 45 to 50 years old and are therefore expected to be a maintenance concern.





FUNDING AND FUTURE NEEDS

Funding for dams is needed to mitigate the impacts of deterioration, meet changing technical standards, and better protect increasingly large downstream populations. Unfortunately, many dam owners, particularly private dam owners, struggle to identify funds to complete necessary rehabilitation and mitigation projects.

As of August 2017, the condition and need for future repairs, of an estimated 88 (60 unrated, 28 unregulated) of the 457 HHP/SHP dams, or 19% was not known. These dams likely require improvements and maintenance to perform safely under normal and adverse conditions. It is recommended that this situation be corrected by increasing funding and staffing levels to be consistent with national averages and removing legislative exemptions for all HHP/SHP dams.

The DWR requires dam owners to provide regular independent engineering inspections of the estimated 399 dams under their jurisdiction. This policy allows the DWR to regulate dams with a smaller budget and staff than the

national average. However, the actual rating of the dams is performed by the DWR staff after reviewing the independent engineering reports and visiting the dam sites as needed. If requested, DWR staff is also available to offer assistance to owners of non-regulatory dams in the form of on-site evaluations and general engineering recommendations, but the engineering and construction for any needed improvements are the responsibility of the dam owner.



DAMS

PUBLIC SAFETY AND RESILIENCE

A staff of 5.38 equivalent full time employees, in the Kansas Department of Agriculture's Division of Water Resources (DWR), regulates 399 out of the estimated 457 HHP/SHP dams. Federal and other agencies regulate another estimated 30 HHP/SHP dams. As of August 2017, this left an estimated 28 or 6% of HHP/SHP dams as unregulated.

This situation has occurred in Kansas because of legislation signed into law in 2013, that exempts dams from regulation by the DWR, regardless of hazard potential, if they: are less than 6 six feet high, regardless of storage capacity; and all dams less than 25 feet high, if the storage capacity at the top of the emergency spillway elevation is less than 50 acre-feet regardless of proximity to people and property.



RESOURCES

1. ASCE – 2013 Report Card for America's Infrastructure (2013).
2. Association of State Dam Safety Officials – Performance Report for the State of Kansas (2015).
3. National Inventory of Dams Website, 2016 Inventory
4. Personal Communication & Meetings – Terry Medley, PE, Program Manager & Kimberly A. Hunninghake, PE, Dam Safety Team Leader, Kansas Department of Agriculture, Division of Water Resources (DWR), June-August 2017
5. Personal Communication – Mark B Ogden, PE, Association of State Dam Safety Officials, July 2017



RECOMMENDATIONS

- Develop methods to increase recharge of aquifers in Kansas.
- Promote programs which reduce sedimentation of Kansas' rivers and reservoirs.
- Encourage Kansas drinking water communities to develop and/or improve their local pipe replacement plans and include full cost of service in their rate structures.
- Develop dedicated revenue sources for nutrient, sediment, and contaminant removal.
- Require public water systems to develop an asset management program to participate in Kansas funding and SRF programs.

EXECUTIVE SUMMARY

While drinking water treatment in Kansas has met most federal and state standards, evolving regulations often challenge utilities and municipalities to meet new water quality standards. Smaller communities, which can't spread treatment costs over many customers, are at the highest risk for noncompliance. As aquifer levels decrease in Kansas, drinking water capacity will also become a larger issue. Regional solutions and interconnections between water supply systems will help ensure the longevity of water supply in Kansas. The Environmental Protection Agency estimates that \$4.2 billion in drinking water improvements are needed in Kansas over the next 20 years. In 2017, the Drinking Water State Revolving Loan Fund provided Kansas communities close to \$14 million of assistance for 20 projects. Robust planning efforts and increased funding are necessary for Kansas to maintain its water supply and ensure safe drinking water is delivered to customers through reliable drinking water distribution systems.

BACKGROUND

At the close of calendar year 2015, Kansas had a total of 998 public water supply systems including: 877 community systems, 41 non-transient non-community systems, and 80 transient non-community systems. The majority of these public water supply systems meet federal and state regulations for drinking water quality.

The Kansas Water Authority 2015 Annual Report to the Governor and Legislature was used along with information about 2017 Drinking Water, Water Pollution Control, and Public Water Supply State Revolving Loan Funds to assess funding, future need, and resilience. The Kansas Department of Health and Environment 2015 Annual Compliance Report and Kansas Source Water Assessments were used to assess condition and public safety. The Kansas Water Plan was used to assess capacity.

CAPACITY

The United States Geological Survey (USGS) reported that 95% of the total Kansas population was served by public water supply from 1990 to 2012, with the remaining 5% obtaining water from private wells or other sources. Of that public water supply, surface water supply accounted for 52-61% of the total annual withdrawal for public supply.

DRINKING WATER

In 2017, a total of 2,543 water rights were reported via the Kansas water use reporting website to comply with requirements outlined in the Kansas Water Appropriation Act. According to the accumulated reports, irrigation accounts for about 84% of water use followed by municipal use at 11% and industrial use at 3%. Although the state population continues to rise, water use has decreased over time thanks to efficiency improvements and installation of water flow meters, which “generally provide more precise measurements than previous methods.”

From 1990 to 2012, the average per capita water use was 274 gallons per day in the western region of Kansas while the average per capita use in eastern Kansas was 98 gallons per day. Increases in outdoor crop watering because of arid conditions in western Kansas are the primary cause of this large discrepancy. In general, larger amounts of water are needed in drier areas and in drier times of the year due to increased need for outdoor watering.

To improve the availability of drinking water and to reduce public health risks, KDHE offers 50% matching funds for any preliminary engineering studies that evaluate regional solutions for public water supply needs. This Public Water Supply Grant Program operates through the State Revolving Fund

to encourage projects that interconnect in a regional manner to efficiently use drinking water supply and treatment infrastructure to create the most public benefit. In 2017, the City of Howard was awarded funding through this program. Projects involving interconnection are also given priority when ranking a project for the Project Priority List, a system created to simplify funding awards. For 2017, three projects involving interconnections were on the Project Priority List.

CONDITION

Improving the condition of drinking water distribution networks are a significant need for communities in Kansas. The United States Environmental Protection Agency estimates 240,000 water main breaks per year in drinking water distribution systems. In most cases, water main breaks occur because the pipe has reached the end of its useful life, not because of extreme temperature conditions. In Wichita, KS, the second-most populated area of the state outside of Kansas City, some of the drinking water service pipe was installed in the late 1800s and early 1900s. As a result of this aging infrastructure, Wichita experiences about 50 water main breaks each month. The City budgets about \$5.4 million each year to allow for proactive replacement of deteriorating water distribution system.

Protecting water supply sources is also a need for Kansas. The Kansas Water Office reported 1.5 million tons of eroded sediment within the Tuttle Creek Watershed. This sediment load accounts for 43% of total sediment entering the Tuttle Creek Reservoir, a surface water body used for drinking water supply.





In 2016, seven streambank sites were completed, and 18 new projects were started with an estimated completion date for 2017. It is estimated the streambank stabilization projects implemented to date will prevent nearly a million tons of sediment from entering the associated downstream reservoirs each year. Streambank stabilization efforts can help preserve reservoir water storage space and improve drinking water quality.



FUNDING

For 2018, KDHE has identified over \$92.7 million in high-priority water quality and asset management projects that could be funded. The primary funding sources for those projects, aside from user fees, is the Drinking Water State Revolving Loan Fund (SRF), but the funds associated with Water Pollution Control are also used. In 2017, the Drinking Water State Revolving Loan Fund provided close to \$14 million of assistance for 20 projects. Of those funds, \$8.4 million was used for 10 projects focused on drinking water transmission and distribution.

Communities in Kansas collect user fees based on meter size and monthly usage. Typically, maintenance funds for

rehabilitation and repair of drinking water infrastructure are overlooked and are not considered in the established rate structure.

A short-term goal of the SRF funds is to replace deteriorating drinking water infrastructure. In 2017, Edgerton, Kensington, Jetmore, Baldwin City, Cowley County Rural Water District # 7, Sumner County Rural Water District # 4, Liberal, Bonner Springs, Eudora, and Lyon County Rural Water District # 1 all received loans to replace infrastructure that has reached the end of its useful life.

FUTURE NEED

The EPA Drinking Water Infrastructure Needs Survey and Assessment identified \$4.2 billion in drinking water funding needs over the next 20 years for the state of Kansas. The largest need is for transmission and distribution piping infrastructure replacements. Transmission and distribution projects require \$3.1 billion while the remaining \$1.1 billion

is needed for source, treatment, and storage projects. 58% of this total funding need is related to systems serving a population of 10,000 or fewer.

For these smaller communities serving fewer than 10,000 people, nitrates will continue to pose a significant treatment challenge. Nitrates in surface water sources are largely attributed to agricultural fertilizers and animal waste. Other naturally occurring contaminants like arsenic, uranium, and selenium, are expensive to remove from water sources. The cost of treating drinking water can be spread over a large number of customers to make treatment affordable. For smaller communities, the financial burden is frequently too large to implement effective treatment technologies.

DRINKING WATER

PUBLIC SAFETY

According to the Kansas Department of Health and Environment (KDHE), overall compliance with drinking water regulations by Kansas public water suppliers in 2015 was about 89%. This is a significant decrease from 97% reported in 2011 but is likely the result of reporting inaccuracies in earlier years. Of the 984 total public water supply systems, 48 systems were cited for 65 major monitoring violations with respect to the total coliform rule (TCR) while 59 were cited for 79 minor monitoring violations.

RESILIENCE

In 2004, KDHE assessed 763 public water supply systems and found that 46% of groundwater systems and 49% of surface water systems had a moderate to high susceptibility to contamination. Potential for failure within Kansas water supply systems is high. Improving existing distribution networks, including the creation of multi-system interconnections, can enhance public safety, and create more resilient water supply.

INNOVATION

EPA “Green Project Reserve” funds are focused on green infrastructure, water and energy efficient and environmentally innovative projects. At the national level, 10% of the capitalization grant is allocated toward these projects. Kansas is collaborating with eligible municipalities to ensure that the 10% minimum is met, with an ultimate goal of utilizing 20%. In 2015, the City of Wichita, Kansas completed the Equus Bed Aquifer Storage and Recovery (ASR) Project which was later nominated as the Global Water Intelligence Water Project of the Year for the 2015 Global Water Summit. City leaders in Wichita sought to protect the aquifer and diversify their water sources by restoring the 900,000-acre Equus Beds Aquifer. The innovative solution involved diverting water from the Little Arkansas River during high flow periods and recharging it

to the Equus Beds Aquifer after treatment. Projects like ASR in Wichita protects water as a valuable resource and provides flexibility during periods of drought.

RESOURCES

1. Missouri Budget and Legislative Priorities, Fiscal Year 2017. (<https://archive.org/details/2017MOBudgetLegPriorities>)
2. MDNR 2015 - 20th Annual Compliance Report of Missouri Public Drinking Water (<http://dnr.mo.gov/pubs/docs/pub2662.pdf>)
3. MDNR Drinking Water SRF Intended Use Plan, Fiscal Year 2017 (<http://dnr.mo.gov/env/wpp/srf/docs/dwiup-fy17.pdf>)
4. MDNR Drinking Water SRF Annual Report 2016 (<http://dnr.mo.gov/env/wpp/srf/docs/2016-dw-annual-report.pdf>)
5. Annual Allotment of Federal Funds for States, Tribes, and Territories (<https://www.epa.gov/drinkingwatersrf/annual-allotment-federal-funds-states-tribes-and-territories>)
6. EPA News Release: EPA Selects 12 Projects to Apply for WIFIA Loans (7/19/2017)
7. EPA Drinking Water Infrastructure Needs Survey and Assessment – Fifth Report to Congress (<https://www.epa.gov/sites/production/files/2015-07/documents/epa816r13006.pdf>)
8. Construction Manager at Risk in Missouri - HB 2376 (<http://www.house.mo.gov/billtracking/bills161/billpdf/intro/HB2376I.PDF>)
9. Water Use of Missouri – Missouri State Water Plan Series Volume IV, Missouri Department of Natural Resources (<https://dnr.mo.gov/pubs/WR48.pdf>)



RECOMMENDATIONS

- Provide a clear statewide energy policy including potential sources of energy generation, goals for make-up of the future generation sources, and the transmission systems required.
- Provide for maintenance and retrofitting of existing facilities, specifically the aging generation and transmission infrastructure.
- Continue to develop the wind energy generation projects and associated transmission lines to support future portfolio requirements and efficient marketplaces.
- Remove any unnecessary permitting hurdles that delay needed projects.
- Create proper incentives to catalyze the generation and transmission investments.

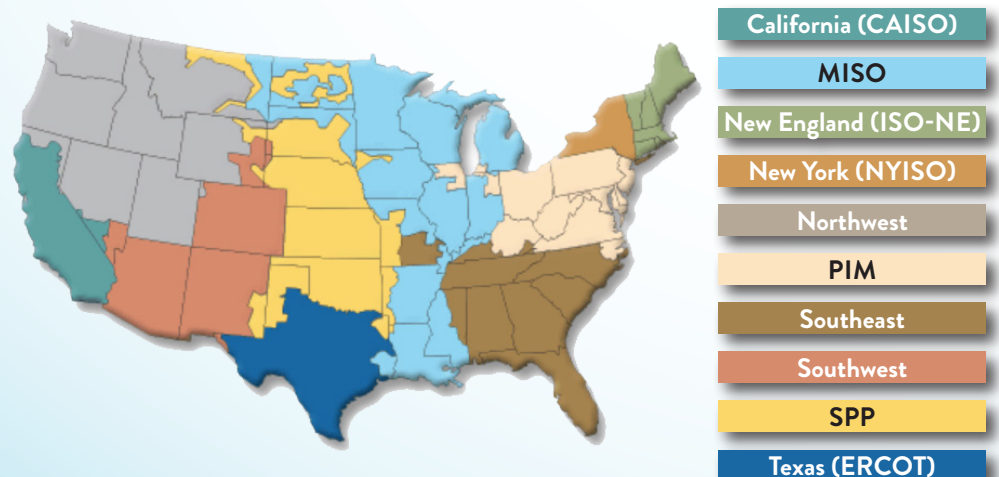
EXECUTIVE SUMMARY

Kansas is a state with abundant fuel types, relying on coal, nuclear, gas, and wind generation to power the state. Recent developments in renewable energy have seen wind energy production increase to 39% of overall energy production in Kansas, from only 1% several years ago. Aging infrastructure and government regulation continue to be major drivers for large expenditures at both power plants and in the transmission and distribution systems. Energy prices in Kansas are currently very affordable, ranking just below the national average, and the state also exports roughly 40% of its energy to other states. Looking ahead, Kansas' diverse inventory of energy infrastructure will need to expand and upgrade, due to new demand, current age, and environmental standards. Wind energy is growing but could stall due to expiring incentives.

BACKGROUND

Energy and transmission infrastructure in North America is divided into several networks. These networks separate the infrastructure into geographical regions which are then managed by Independent System Operators (ISO). The ISOs are responsible for supplying the country with efficient and reliable energy. Kansas is part of the Southwest Power Pool (SPP) network.

Electric Power Markets: National Overview



The nation's energy is primarily generated from four different types of fuel: coal, gas/oil, nuclear, and renewables. The dominant fuel type varies by region, but in general natural gas and coal are the more common fuels in the

ENERGY

SPP system. Kansas relies mostly on coal for its generation but has decreased its reliance on coal impressively in the past decade.

CONDITION AND CAPACITY

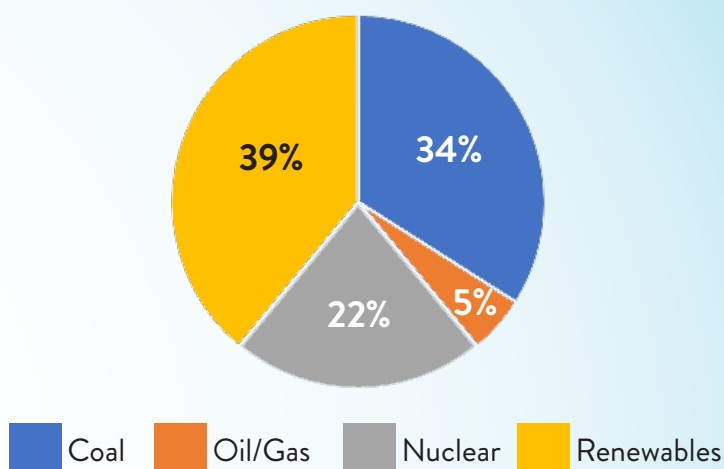
Kansas is a state with abundant fuel types and relies mainly on coal, nuclear, gas, and wind generation means. Kansas is a substantial contributor to wind generation, ranking fifth in the nation for installed capacity, as well as having one of the largest natural gas fields (Anadarko Shelf, Hugoton Gas Area) in the United States, ranking in the top ten for crude oil production. Ethanol production is also a Kansas energy resource. Kansas' corn production creates a source for ethanol in the state, however ethanol does not significantly contribute to energy generation.

From August of 2016 to August of 2017, Kansas experienced a 19.6% drop in electricity generated from coal. During this same period, it experienced a 7.3% increase in wind generated electricity, while natural gas and nuclear generated electricity remained steady.

Kansas' current energy generation portfolio is diverse, with renewables filling 39% of the spectrum and coal representing only 34%. The remainder comes mainly from nuclear means, via the Wolf Creek Plant. The Wolf Creek Plant recently renewed its licensing until 2045 and is forecasted to be a key contributor for the foreseeable future.

The state delivers energy through a transmission network that is aging and needs to grow to meet new renewable sources. Wind energy is growing but could stall due to expiring incentives. Gas production has become an important part of the Kansas economy, but its potential is tied to environmental regulations that may delay projects.

Utility Scale Net Electricity Generation



OPERATIONS AND MAINTENANCE

Nationwide, miles of aging transmission systems are exceeding their design life, and environmental events associated with wind and ice storms will likely impact the reliability of these systems. To maintain, expand, and improve these transmission systems, projects must overcome land acquisition obstacles, which can drastically affect the outcome of necessary projects.

FUNDING AND FUTURE NEED

All power generation facilities and transmission systems require maintenance and replacement, especially those more than 30 to 50 years old, which is the typical design life for most electrical infrastructure. New design codes and environmental policies impact how power producers assess the upgrade or replacement potential of existing infrastructure. For instance, nationally, 73% of coal-fired plants and 70% of transmission systems are beyond 30 years old. Utilities have staff dedicated to making decisions about routine maintenance to ensure

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reliability of the source. However routine asset maintenance differs in magnitude from large capital improvement projects driven by new codes, environmental regulations, or strategic transmission needs. Prioritizing this work will require incentives to ensure that capital investments align with the strategic energy needs of the nation. Consistency in environmental regulations, incentives to act, and faster access to land rights for transmission projects could deliver power providers better means by which to plan future capital projects, maintenance, and upgrades.

Currently, the SPP network is experiencing planning uncertainties related to fuel cost variability, wind tax credits, government environmental regulations, decaying infrastructure, and land acquisition restrictions. These challenges make it difficult to anticipate and plan where to focus. Furthermore, generation and transmission reliability are a priority, but necessary projects are challenged by hesitancy to invest. Power generation and delivery investment are both needed to upkeep the aging infrastructure, access renewable sources, assure reliability, and create a more efficient energy marketplace.

In the SPP region the anticipated growth during the next decade is forecasted to be roughly 1.23% per year. As of 2014, the SPP generation portfolio consisted of the following breakdown: gas/oil (42%), coal (34%), Hydro/Wind/Nuclear (18%), Dual Fuel (4%). Kansas power customers' current energy costs are in the lower half of the nation's range. This is principally linked to Kansas' use of coal generation. Tightening rules from the EPA will create the need for large capital

improvements at plants leading to higher prices for users, needing to pay for these projects. EPA regulations requirements for limitation guidelines on the effluent that is discharged from the plants will require that plants make large capital improvement projects to continue running. Additionally, guidelines on coal combustion residual (CCR) ponds require that these ponds be closed or rebuilt. These requirements may lead to more coal plant retirements.

Utilities can create a more reliable business model through more efficient transmission systems. Transmission infrastructure is critical to a reliable energy distribution network for a day-ahead marketplace. With the

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establishment of a day-ahead marketplace, utilities and their clients could potentially benefit from these efficiencies as well as improve reliable energy delivery. Financial incentives, improvements to permitting speed, and land access would help accelerate these projects.

Power companies have reported an investment shortfall of \$20.8 billion in transmission infrastructure in 2016. Given current trends, a national energy infrastructure investment shortfall of \$107 billion is expected by 2020. This lack of investment is expected to reduce GDP by \$126 billion and cost 529,000 jobs by the year 2020.

Here in Kansas, power customers are currently benefiting from reliable and cheap energy. As discussed, the state relies on power from multiple sources. This infrastructure will need to expand and upgrade due to new demand, current age, and environmental standards. Wind energy is growing but could stall due to expiring incentives. The state delivers energy through a transmission network that is aging and needs to grow to meet the new renewable sources. Gas production has become an important part of the Kansas economy, but its potential is tied to environmental regulations, which may delay projects. The power generation and delivery market is facing investment needs driven by new demand, environmental regulations, deteriorating infrastructure, expiring incentives, land acquisition restrictions, and a lack of proper enticements to invest. Finding permitting and regulatory balance, coupled with investment solutions, will require action by government, power providers, and power users.

RESILIENCE AND INNOVATION

Renewable energy in Kansas is moving forward, but its future appears to be closely tied to the economic benefits of credits and other incentives associated with wind. Without these incentives, many speculate that this market becomes less viable for prospective investors and power producers.

Wind production continues to have high potential in Kansas, and recent reports show that Kansas ranked third in the nation for wind energy as a share of total electricity generation and fifth in the nation for installed wind capacity. Kansas' new

renewable standard, adopted in 2009, will require utilities in the state to provide one-fifth of their energy via renewable means by 2020. The state also exports roughly 40% of its energy to other states. Continued investment in wind generation and transmission is needed to meet and exceed these goals. This will be challenged by the potential expiration of existing wind incentives, which are currently extended through 2019.

Gas is abundant in Kansas and is beginning to establish a marketplace that has proved reliable in the near term. This marketplace is tied to innovative methods of drilling and a strong demand. Infrastructure projects associated with gas delivery have proven to be difficult to permit due to environmental challengers, delaying the potential economic benefits of gas exports and the associated jobs. Gas is being used around the country for new power generation and to replace decommissioned coal plants, due to its decreased emissions.

RESOURCES

1. <https://www.spp.org/about-us/fast-facts/>
2. <http://www.spp.org/about-us/strategic-plan>
3. <https://www.eia.gov/state/?sid=KS>
4. <https://www.eia.gov/state/data.php?sid=KS>
5. <https://www.awea.org/state-fact-sheets>
6. <http://awea.files.cms-plus.com/FileDownloads/pdfs/Kansas.pdf>
7. <http://www.eei.org/issuesandpolicy/transmission/Pages/default.aspx>



RECOMMENDATIONS

Leadership is required on state and federal levels to coordinate levee maintenance and repairs, and to identify reaches that need improvement to hold back major floods. Innovative methods of communication and synchronization of activities between districts on each river are needed.

With appropriation for WRRDA, there is hope for increased funding for levee inspections in Kansas. Funding the National Levee Safety Initiative under WRRDA would allow the Kansas state program to:

- Complete the National Levee Inventory for both federal and nonfederal levees.
- Complete levee mapping as outlined in the National Flood Insurance Program reform bill and implement FEMA's new levee mapping and analysis program.

EXECUTIVE SUMMARY

The National Levee Database (NLD), a compilation of levees participating in U.S. Army Corps of Engineers (USACE) programs, lists Kansas as having a total of 225 levees with a total length of 1,412 miles. More than half of these levees are shared with the State of Missouri. The total number of levee inspections in Kansas has increased significantly since 2013, and levees that have been inspected are in fair to good condition. Along the Missouri River and its tributaries, the Kansas Hazard Mitigation Team has improved coordination of flood hazard identification and mitigation efforts with the State of Missouri and the USACE. However, one in four levees across the state have not been inspected, and could be deficient, according to the NLD. Funding of the National Levee Safety Initiative could help close the gap on levee inspections.

BACKGROUND

The NLD, a compilation of levees participating in USACE programs, lists Kansas as having a total of 225 levees with a total length of 1,412 miles. More than half these levees are shared with the State of Missouri. 40% of Kansas levees were built by the USACE. All but five of these levees are owned and operated by local levee districts.

The Missouri River flood of 2011 spurred the USACE, levee districts, and cities to improve levees, sewers, and pump stations. Levees with observed problems during the flood have been reviewed regarding underseepage and slope stability. Cities have constructed permanent systems to remove runoff water behind levees during long-term floods (duration greater than one month).

CONDITION AND CAPACITY

The NLD rated 79% of levees as acceptable or minimally acceptable, based on the number of levee miles. Only two levees were found to be in unacceptable condition, covering 1.6 levee miles. However, data were not available for 68 levees, 30% of the total number of levees in Kansas.

The USACE has developed a program called the Rehabilitation and Inspection Program (RIP) to ensure that flood control works continue to provide reliable protection to the public. In Kansas, 165 levees covering 1,240 levee miles (88% of total) are registered as active in RIP. By comparison, Missouri has 69% of its levee miles in RIP.

LEVEES

The NLD contains many more levees in 2017 compared with what was reported in the 2013 Kansas report card. This is due to improved documentation of existing levees rather than the construction of new levees. The NLD has 1,113 levee miles undergoing routine inspection in 2017, compared with 395 levee miles reported in 2013. In 2017, 79% of the levees were routinely inspected, the same frequency as reported in 2013. A total of 157 levees have undergone routine or periodic inspections in 2017. Sixty-eight levees covering 299 levee miles were not inspected.

At the 2018 Kansas Dam Safety Conference, held March 6, 2018, the USACE reported 169 levee systems in the State of Kansas, 88 of which were not under their jurisdiction (52%). The USACE inspected 75% of these levees, based on levee miles, including 1,806 levee structures. The average age of the levees was 58 years. Only 12 levees have received accreditation under the National Flood Insurance Protection (NFIP) program, however.

FUNDING

The 2014 Water Resources Reform and Development Act (WRRDA) created a new National Levee Safety Initiative (NLSI) which requires the USACE and the Federal Emergency Management Agency (FEMA) to reconvene the national committee on levee safety, develop a national levee inventory and implement a multifaceted safety initiative. WRRDA authorized \$395 million to support the initiative; however, the money has been not yet been appropriated and the program has not been identified in the Presidential Budget Request as a priority.

KDA-DWR. The Kansas Department of Agriculture – Division of Water Resources (KDA-DWR) lists floodplain mapping as a major concern. Online access to floodplain maps has been or is being developed for major rivers and creeks. Improved floodplain mapping and dissemination of information can be the first step towards future coordination of levee construction and inspection.

Interstate River Compacts. Kansas is a party to four interstate river compacts that allocate water in major interstate rivers. These include the Blue River, Republican River, and Arkansas Rivers. Kansas also participates in the Missouri River Basin Association of States and Tribes. Created from 1943 to 1971, the interstate river compacts focus mainly on water supply and operation of dams for flood control. Coordination of levee construction and inspection is not specifically listed in their charters.



Photo by News Press Now, article February 19, 2018



RESILIENCE AND INNOVATION

The Kansas Hazard Mitigation Team (KHMT). KHMT, under joint leadership of the state's Department of Agriculture's Division of Water Resources and the Kansas Division of Emergency Management, is the long-standing entity managing participation in state-level hazard mitigation. The KHMT is working with the State Risk Management Team in Missouri on a pilot program to develop a prototype inundation map to convey flood risks to communities between Parkville, Missouri, and Leavenworth, Kansas. The pilot program is funded by the USACE Silver Jackets program. The KHMT is also assessing repeated flooding in Manhattan Kansas, along the Big Blue River and Wildcat Creek. In 2011, the KHMT selected as the 2011 State Silver Jackets Team of the Year.

RESOURCES:

1. ASCE – 2017 Infrastructure Report Card.
2. USACE National Levee Database; <http://nld.usace.army.mil> (accessed August 2017).
3. Levee Owner's Manual for Non-Federal Flood Control Works; USACE, March 2006.
4. 2013 Report Card for Kansas' Infrastructure; ASCE.
5. Silver Jackets Program; <http://silverjackets.nfrmp.us>.



LEVEES





RECOMMENDATIONS

- Identify and address critical bottlenecks and high volume to capacity corridors, identify economic impact.
- Apply for and receive federal funding for short-term investments identified in the Statewide Rail Plan.
- Identify funding sources for long-term investments identified in the Statewide Rail Plan.
- Continue to identify improvements to passenger rail as an alternate for intercity travel, and apply for federal funding for these investments.
- Continue to identify ways to align with the National Rail Plan for intermodal and multimodal systems for the efficient movement of people and goods.

EXECUTIVE SUMMARY

Railroads in Kansas consist of 4,700 miles of track and move 340 million tons of freight through the state. While the 2,800 miles of track owned by the major rail companies is typically well maintained, the short line tracks that carry lower traffic volumes have not had adequate funding in place for necessary maintenance and upgrades. Also of concern is decreased on-time performance on the Amtrak Southwest Chief line, although recent investments from the T-WORKS statewide transportation program and a TIGER grant have started to reverse this trend. Rail traffic is forecasted to increase and will cause increased delays in moving both goods and passengers. It is estimated that the railroad industry provides \$5 billion in economic benefit to Kansas. To maintain this benefit and help improve the state's rail infrastructure, adequate funding must be found to increase rail capacity and help to align the state with the National Rail Plan.

CAPACITY AND CONDITION

Railroads in Kansas consist of 4,700 miles of track and move 340 million tons of freight through the state. There are three Class I railroads operating in Kansas: BNSF, Kansas City Southern, and Union Pacific. Class I railroads are major rail companies. The 2,800 miles of track owned by the major rail companies are typically well maintained. However, the short line tracks that carry lower traffic volumes that have not had adequate funding in place to provide the necessary maintenance and upgrades. Rail traffic is forecasted to increase and will cause increased delays in moving both goods and passengers.

Amtrak operates the Southwest Chief along BNSF track through Kansas. The on-time performance (OTP) of the entire route is shown in the table below. Overall the Southwest Chief route has seen an OTP decrease of approximately 23% between 2010 and 2016. However, a significant increase in year 2016 over 2015 can be attributed to the recent infrastructure upgrades made under the TIGER grants issued to the State of Kansas and the City of La Junta, Colorado in 2014 and 2015, respectively. Despite a reduction of on-time performance, total ridership in the state increased approximately 14% from 2010 through 2016. In 2014, spurred by a \$12.5 million TIGER grant to the state, KDOT, Amtrak, BNSF, and local municipalities in SE Colorado collectively allocated \$22 million toward much needed infrastructure upgrades along the Southwest Chief route.

RAIL

Service	2010	2011	2012	2013	2014	2015	2016
Southwest Chief	79.1%	73.3%	75.3%	60.5%	44.8%	34.6%	55.9%
Change Year over Year	-6.1%	-5.8%	2.0%	-14.8%	-15.7%	-10.2%	21.3%

Source: Amtrak Monthly Performance Reports for September 2010 - 2016

KDOT has actively pursued grants from the Federal Railroad Administration (FRA). Kansas has teamed with Oklahoma to study a new passenger rail route, and has joined the Midwest Regional Rail Initiative, which is a consortium of Amtrak, FRA, and nine Midwestern states, which advocates for passenger rail in the Midwestern states. In June 2017 Amtrak, BNSF, KS policy makers and other stakeholders conducted a well-publicized inspection trip from Oklahoma City to Newton, KS in an effort to move toward expanding passenger rail between Texas and Kansas.

FUNDING

The railroad industry has traditionally operated and financed under private ownership. Public funding assistance programs also exist to help meet needs to upgrade capacity, enhance intermodal transport, improve safety, preserve short lines, alleviate clearance restrictions, expand passenger service and partner in economic development initiatives. These arrangements typically include reduced interest rate loans or grants under matching funds between the government, local and private parties involved.

State programs include the Kansas Highway-Rail Crossing Improvement Program, Kansas Highway-Rail Crossing Improvement Program, and Community Development Block Grant Program. These programs assist where infrastructure needs are greatest and produce the largest benefit. Due to state budgetary challenges in recent years funding for many of these programs have seen major cutbacks and their future is not certain.

Federal programs include those under the Passenger Rail Improvement and Investment Act (PRIIA), USDOT

Budget Appropriations, Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program, Safe, Accountable, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), FHWA Funding Programs, Transportation Infrastructure Finance and Innovation Act (TIFIA), Grant Anticipation Revenue Vehicle (GARVEE), IRS Tax Exempt Private Activity Bonds (PAB), and IRS Railroad Track Maintenance Credit Program that support railroad infrastructure investment. Many of these programs require annual appropriations and recurring reauthorization based on on-going legislative activity.

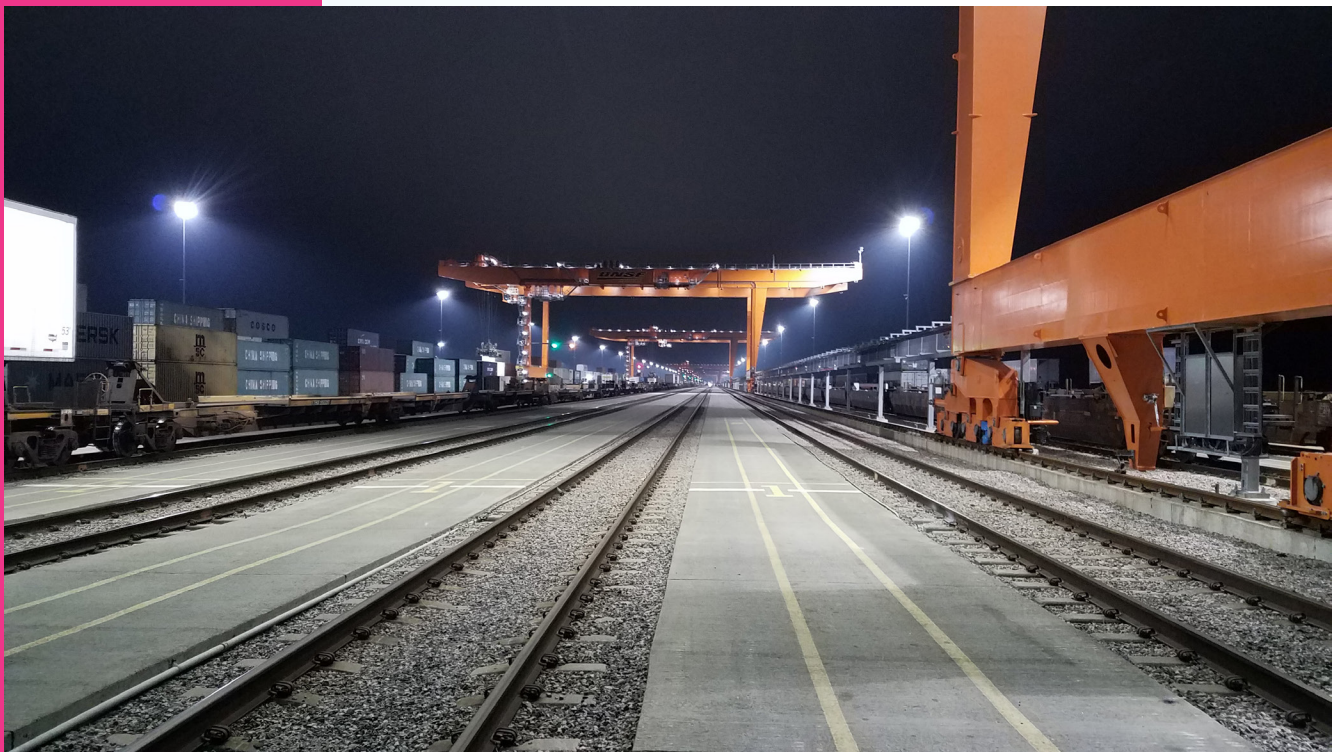
Short line rail has seen moderate investment under Kansas' 10-year transportation program, T-WORKS. As of 2017, \$19.0 million in short line rail projects have been completed. \$73.65 million identified short line projects remain with no scheduled bid date and three years remaining in the program.





FUTURE NEED

The Center for Transportation Analysis FAF (Freight Analysis Framework) model forecasts in/outbound rail freight traffic will increase by 27% (by tonnage) between 2015 and 2045. Similarly, the 2011 Statewide Rail Plan predicts an in/outbound rail freight increase of 30%, and an overall freight traffic increase of 36% between 2007 and 2030. Class I carriers have identified several projects aimed at meeting acceptable levels of service with the projected increases in demand.



PUBLIC SAFETY

Some ongoing initiatives with positive impacts to Kansas rail safety include Federally mandated Positive Train Control (PTC) implementation, KDOT's rail-highway crossing safety improvement program, and educational outreach by Kansas Operation Lifesaver.

Kansas Operation Lifesaver is a not-for-profit organization focused on pedestrian and driver awareness and relies on financial contributions from railroad companies, government agencies and other private donors.

RAIL

KDOT implements rail-highway crossing safety improvements through a combination of targeted federal and state transportation funds.

Positive Train Control (PTC) is a federally mandated safety measure that can prevent train to train collisions, derailments, accidental movement of a train through a switch left in the wrong position and other cause of accidents that may arise from human error. The three Class I railroads operating in Kansas are working to meet statutory deadlines for PTC implementation. As of March 2018 BNSF, KCS, and UP have collectively implemented PTC across 74.5% of their mandated national route miles.

RESOURCES

1. CDM Smith. (2017). Kansas Statewide Rail Plan. Topeka: Kansas Department of Transportation, Kansas Turnpike Authority
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RECOMMENDATIONS

- Identify additional revenue sources to restore T-WORKS funding promises and invest in future highway programs.
- Pass legislation or a statewide ballot measure that would prevent funding being diverted from the Highway Trust Fund to support other state budget items.
- Increase the state gas tax and consider tying the rate to inflation such that the tax does not need to be revisited by successive legislatures.
- Study alternative methods of revenue that assess taxes according to the vehicle's impact on the state highway system.

EXECUTIVE SUMMARY

Historically, Kansas has been home to a highway system in great condition. Today, the Kansas Department of Transportation (KDOT) is prioritizing preservation projects as part of the Transportation Works for Kansas (T-WORKS) statewide transportation program. However, many much-needed modernization and expansion projects across the state have been delayed, and preservation dollars have slowed, as funding from the T-WORKS program has been diverted to shore up the State of Kansas budget. Lawmakers should continue to work towards fulfilling T-WORKS funding promises, which will save money in the long run; every \$1 of deferred maintenance on roads and bridges has been found to cost an additional \$4 to \$5 in needed future repairs. When it comes to safety on our roads, the state continues to see an increase in seat belt use. However, a recent increase in fatal crashes is of concern and the increase in distracted driving will require even more emphasis on education and enforcement in the coming years.

BACKGROUND

Kansas has over 140,000 miles of public roadways, with drivers traveling nearly 86 million miles on roads every day. The two agencies responsible for the major highways and interstates in Kansas are the KDOT and the Kansas Turnpike Authority (KTA). KDOT's roadway network consists of only 10,300 miles (7.4%) of the state's total public road miles, but nearly 51% of the daily miles traveled are on these roads. KTA's roadway network consists of 236 miles (less than 0.2%) of the state's total public roadway miles with nearly 5.8% of the daily miles travelled on these roads. Although KTA's roads represent an extremely small percentage of the major highway system, they are important because they lie in the heart of Kansas and connect in all directions to major interstates maintained by KDOT. Because of the lack of consistent and available data on the local road network maintained by the cities and counties, this section of the Report Card only addresses routes owned and maintained by KDOT, with a brief summary of routes owned and maintained by KTA.

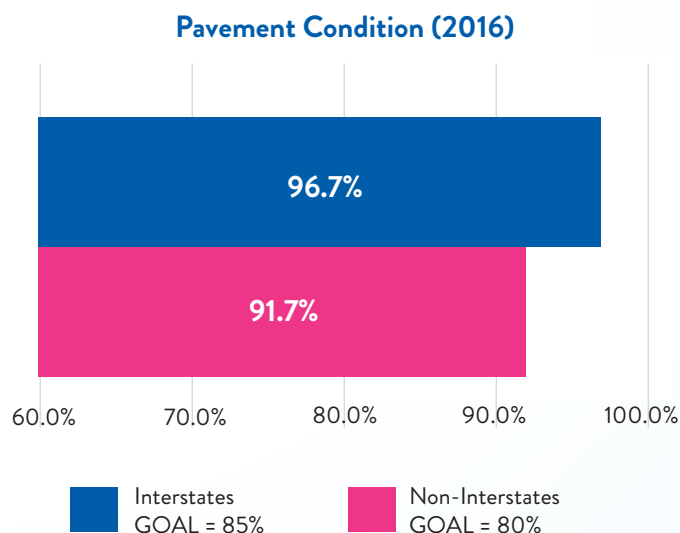
CAPACITY AND CONDITION

KDOT sets a high threshold for pavement condition based on pavement health. Pavement health is monitored based on the following pavement factors:

ROADS

- Pavement roughness (surface quality)
- Joint distress and cracking (structural quality)
- Faulting and rutting (structural quality)

The state highway system exceeds the pavement condition goals and has consistently seen 80% of roads being in good or very good condition since 1997. From 2000 to 2016 there was an increase of 14% in vehicle miles traveled (VMT), from 28.2 billion VMT to 32.1 billion VMT. KDOT's investment in preservation projects helps create a safe and smooth ride for Kansas road users through maintaining the pavement condition at or above the set thresholds.



Kansas Turnpike Authority

KTA owns and maintains 236 miles of tollway throughout the state:

- I-70 from Topeka to Kansas City
- I-470 around Topeka
- I-335 from Topeka to Emporia
- I-35 from Emporia to the Kansas/Oklahoma border

The KTA and KDOT formalized a working partnership in 2013. Legislation was passed that gave the agencies the ability to work more closely together to deliver transportation solutions more efficiently. The KTA has seen an increase in traffic of 5.8% from 2015 to 2016 and an 8.1% increase in revenue from 2015 to 2016.

The KTA follows a pavement resurfacing schedule to meet customers' expectations. The KTA annually assesses the pavement condition based on the same factors as KDOT. The pavement condition for fiscal year 2016 was 94.6% with the KTA setting a minimum acceptable condition level as 90%.

The KTA 2015 Long-Term Needs Study (LTNS) includes 11% modernization and 50% enhancement projects. The modernization projects include open road tolling at mainline plazas which will allow vehicles to drive through toll plazas at highway speeds. The KTA also wanted more interoperability with other tolling facilities, such as the Oklahoma Turnpike.

FUNDING AND FUTURE NEED

T-WORKS, the 10-year transportation plan that began in 2011, was designed to create jobs, preserve highway infrastructure, and provide multimodal economic development opportunities across the state. Over its 10-year lifespan, T-WORKS was projected to spend \$7.8 billion on preservation, modernization, and expansion projects. The additional funding is made possible from a combination of revenue sources, with an increase in funds directly from a 1 cent sales tax. While the program's additional funding is helpful, T-WORKS only represents 47% of the total needs identified, approximately \$16.6 billion. Of further concern is that due to transfers from the State Highway Trust Fund to fund other portions of the



State of Kansas budget, T-WORKS is now projected to spend \$7.2 billion. Currently \$3.6 billion has been spent towards that \$7.2 billion goal. As part of the T-WORKS program, a minimum of \$8 million was to be spent in each of the 105 counties in Kansas. As of April 2018, 102 of the 105 counties have achieved that goal. From FY 2013 thru 2017, just over \$1 billion has been spent on Modernization and Expansion Projects.

While T-WORKS is scheduled to end in 2020, many of the projects that were previously a part of that program have been shifted out past 2020. It is anticipated that KDOT will spend a flat \$173 million per FY year from 2020 to 2022. This clearly illustrates that the available funds are insufficient to address even the basic preservation needs, and that modernization and expansion projects have been shelved for the foreseeable future due to the focus on spending all available funds on preservation. Additional revenue sources are needed, both from an increase in the state gas tax and with additional federal funds. Additionally, prevention of further sweeps from the State Highway Trust Fund to the State general fund should be a priority. \$2.4 billion has been transferred from the state highway fund to the state general fund between FY2011 and FY2017.

Kansas Turnpike Authority

KTA is funded solely from user fees and does not receive any federal or state funding. Capital improvements are primarily funded through bonds. Economic conditions have improved and customer usage has increased on the Turnpike since the 2010 LTNS. These trends have enabled KTA to undertake new initiatives for enhancing and modernizing the Turnpike's service capabilities. The updated LTNS completed in 2015 established five goals for projects:

- Improve safety and efficiency
- Modernize the turnpike system
- Be good partners to deliver Kansas transportation solutions
- Maintain and preserve the Turnpike system
- Enhance customer experience

OPERATION AND MAINTENANCE

From FY 2013 thru 2017, KDOT spent \$1.125 billion on preservation. Preservation funding increased from 2013-2015 but sharply decreased in 2016 and 2017. Priorities have changed for the focus of the remainder of

ROADS

the T-WORKS program, to primarily preservation work. The Kansas State legislature passed a bill in 2017 increasing the bonding authority of KDOT, allowing additional funds to be spent on preservation projects in FY 2018 and 2019. KDOT is projected to spend \$433.5 million on preservation in those years.

PUBLIC SAFETY

In 2009, KDOT set a goal to reduce the five-year average of traffic fatalities and disabling injuries by half by 2029. Current performance measures indicate an overall decreasing trend in fatalities and disabling injuries since 2009. At the same time the seat belt usage has been increasing. KDOT's has set a goal of 86% seat belt usage by 2016, which was achieved in 2016 with a seat belt usage rate of 87%.

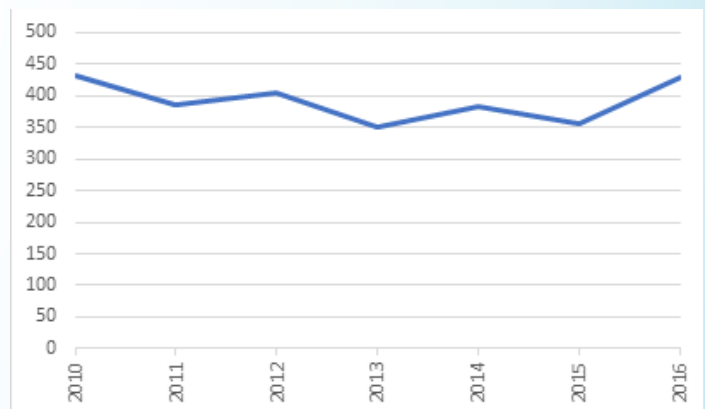
While the state made progress toward reducing traffic fatalities from 2009 to 2015, deaths increased 22% in 2016 year-over-year. The increase in traffic fatalities mirrors a national trend. In 2016, there were 1.34 deaths per 100 million vehicle miles traveled in the state, compared to 1.13 deaths per 100 million vehicle miles traveled in 2015. The national fatality rate per 100 million vehicle miles travelled in 2016 was 1.16, meaning Kansas was above the national average. The increase in crash fatalities is not widely understood, but may be in part to increased distracted driving, a healthy economy and low gas prices. Vehicle crashes have many causes and KDOT focuses on the 4E's of traffic safety to reduce crashes: engineering, education, enforcement, and emergency medical services through the Strategic Highway Safety Plan (SHSP) (KDOT, 2015)

The results of traffic accident data tracking and research help KDOT develop safety improvements and steer investments. KDOT works with many organizations and programs throughout the state to support safety initiatives including:

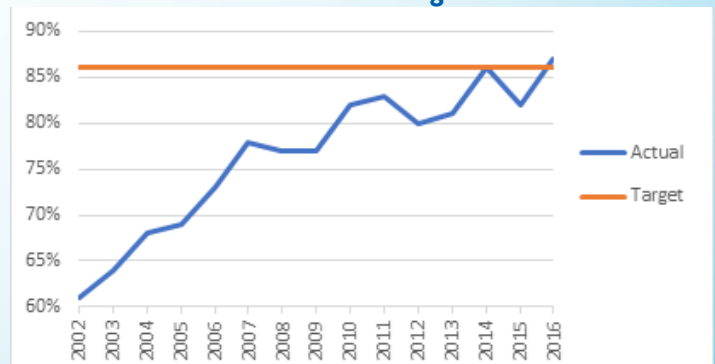
- Occupant protection (child passenger safety, seat belt use)
- Drunk driving and impaired driving prevention
- Motorcycle safety
- Work zone safety (smart work zones, zipper merge)
- Pedestrian and bicycle safety

KDOT's emphasis on the many factors relating to road safety seeks to improve the public's quality of life by reducing traffic accidents. Their efforts to make roads safer also include maintaining the state highway system pavement in good condition.

Annual Fatalities in Kansas



Seat Belt Usage





Kansas Turnpike Authority

The KTA uses historical crash data to assess safety conditions of the Turnpike system and help develop safety improvements to reduce accident frequency and severity. From 2010 to 2015, the total accident rate decreased by 25%. The fatal accident rate from 2010 to 2015 for the KTA was 0.62 per 100 million vehicle miles of travel compared to KDOT's rate of 1.03 for 2015.



RESILIENCE

Resilience is the ability of Kansas's state highway system to endure natural and human-made events and return to normal service following these incidents. KDOT takes an all-hazards approach to mitigate risks to the road system and respond to emergency incidents. Programs and procedures have been developed to maintain safety and mobility in an emergency, including:

- Kansas 511: road condition information (e.g. weather, accident reports, construction detours)
- Intelligent Transportation Systems (ITS) including WICHway and KC Scout: AMBER alert, detour information, incident management, emergency notification

ROADS

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RECOMMENDATIONS

Cities, counties and other government entities responsible for managing stormwater infrastructure and other stormwater issues should consider the following recommendations to continue improving their Stormwater Management Programs.

- Provide dedicated, long term, funding sources in sufficient amounts to adequately address current maintenance issues and enable governmental agencies to implement proactive maintenance practices. A long-term approach is the only way to address maintaining a community's infrastructure.
- Provide a sufficient amount of "emergency funds" to give communities the ability to handle the increasing drainage infrastructure failures that will continue as the systems age.
- Continued stormwater infrastructure inventories and condition assessments to identify and prioritize needs.
- Implement a watershed-based approach to address regional stormwater management issues that go across city, county and state boundaries.

EXECUTIVE SUMMARY

Interest in stormwater infrastructure has greatly increased over the last 10 years, primarily due to growing regulation and oversight by the Environmental Protection Agency (EPA). Despite new awareness, there is no central source of information to use when assessing the effectiveness or even presence of stormwater management programs. Instead, we rely on indicators of stormwater programs, such as participation in voluntary FEMA incentive programs, applications for environmental programs, and in some cases, the presence of a stormwater utility. To complement the fragmented data on the existence and condition of stormwater infrastructure programs, ASCE also developed and distributed a survey to stormwater communities, the results of which indicated stormwater infrastructure across the state was fair to poor. Approximately 58% of cities surveyed have a stormwater utility funding source that averages \$5.88 per Equivalent Residential Unit (ERU) per month. It is encouraging that cities are taking advantage of dedicated funding sources, but the levels of funding are not sufficient to sustain a reasonable level of life cycle maintenance. Cities reported that their maintenance and infrastructure replacement programs are primarily reactive since available funding resources are minimal.

BACKGROUND

Stormwater management in Kansas focuses both on quantity and quality management. Quantity management generally includes traditional engineered infrastructure, such as drainage pipes, concrete-lined open channels, and detention ponds, for the collection of stormwater runoff for protection of lives and properties. Quality management focuses on the integrity of the receiving water bodies. Stormwater systems in Kansas discharge into over 30,278 miles of stream.

Kansas's stormwater management needs include operation and maintenance of existing systems, system improvements designed to safely convey stormwater, and alleviating impairments to receiving streams. A survey of 64 cities and counties in Kansas was developed and distributed to gather input about the condition of stormwater infrastructure throughout the various parts of the state.

Of the state's population, 71% resides within 64 cities located throughout the state which were chosen to be surveyed concerning the condition of their stormwater infrastructure and stormwater management program. The selected cities either have a National Pollutant Discharge Elimination

STORMWATER

System (NPDES) Permit, participate in the Federal Environmental Management Agency (FEMA) National Flood Insurance Program (NFIP) Community Rating System (CRS), or have a stormwater utility funding source or may have all three. NPDES permits, NFIP CRS, and stormwater utilities are all indicators that the municipality has some form of stormwater management program and are more fully explained later in this chapter.

Over 25% of the communities responded to the survey and represented a good distribution of city sizes and locations across the state. Future surveys will continue to have improved questions and include additional cities or counties that may want to give their input.

CONDITION

Kansas spans a land area of approximately 82,000 square miles and has an average annual precipitation of 36.5 inches per year. The annual precipitation varies from 14 inches in the southwest to more than 45 inches in the eastern part of the state. Since the state is located in the center of the United States and far from any large bodies of water or lakes, oceans or major waterways, or heavy coastal rainfall areas, its communities consider other kinds of issues and priorities than the challenges faced by coastal and Great Lakes states.

In Kansas, 90% of the state's 553 cities have a population of less than 5,000, which represents about 18% of the state's population. Kansas is the 15th largest state in land area but only the 34th largest by population, which is 2.9 million. In lower population density areas with smaller towns and a smaller tax base, managing stormwater is given a lower priority. For example, a higher priority may be given to providing drinking water and sanitary sewage treatment. So, most of the stormwater infrastructure in Kansas is located in the higher density communities surveyed for this report.

There is no central source of information to use when assessing the effectiveness or even presence of stormwater

management programs. Instead, we rely on indicators of stormwater programs, such as participation in voluntary FEMA incentive programs, applications for environmental programs, and in some cases, the presence of a stormwater utility. Similar to a water or sewer utility, a stormwater utility oversees control of stormwater runoff through construction and maintenance of stormwater infrastructure and water quality treatment systems. The utility can charge a rate to users to provide such a service. Thus, the establishment and presence of a stormwater utility can help enormously with funding stormwater management needs. A review of two independent studies of communities using stormwater utilities throughout the United States showed that 37 communities in Kansas currently have a stormwater utility as a dedicated funding source for Stormwater Management.

Another way of determining the presence of a stormwater management program is through NPDES permits. The NPDES permit program regulates discharges from storm sewer systems and other "point sources" into nearby bodies of water. In recent years, NPDES requirements have brought greater attention to the nation's stormwater management needs. Kansas has 42 cities identified as either NPDES Phase 1 & 2 communities regulated by the state. These cities are required to address water quality issues identified by the state's NPDES regulations and to provide the necessary staff and funding needed. The state has identified approximately 83% of streams in Kansas as impaired and assigned Total Daily Maximum Loads (TMDL) on pollutants. Permitted cities are required to address these impaired stream pollutant loads for streams in their jurisdictions.

C-



Specific water quality and environmental concerns are required to be addressed by NPDES Phase I & II communities through a general permit issued by the Kansas Department of Health and Environment. Since these requirements are an unfunded government mandate, the cost of compliance must compete with the already inadequate funding for maintaining stormwater infrastructure. However, one of the positive requirements of the general permit is to map the cities drainage system. Of the cities responding, 80% have inventoried their systems and use GIS mapping for their inventory system. This mapping requirement has given rise to many innovative products for mapping, asset management, and pipe repair technologies, which are necessary to meet the challenges of maintaining and improving stormwater infrastructure in the State of Kansas.

Another indication of the presence of a stormwater management program is the NFIP CRS. NFIP CRS is a voluntary FEMA program that encourages communities to follow higher levels of floodplain management activities by issuing discounts for flood insurance to cities that exceed minimum National Flood Insurance Program requirements. Kansas has 32 communities that participate in the FEMA NFIP CRS. The CRS also requires that stormwater systems be managed to reduce erosion and keep the stormwater systems operational, and thus, is a good indication that funding and priority is being given to stormwater infrastructure.



STORMWATER

Four cities utilize combined sewer collection systems, which are pipes and tunnels designed to collect surface runoff in addition to wastewater. City drainage systems with combined sanitary and stormwater sewers grapple with even more stormwater issues and regulations to consider because their systems are prone to combined sewer overflow (CSO) incidents, which can cause environmental and public health issues.

Cities responding to the survey indicated that overall condition of their stormwater infrastructure was fair to poor with the average rating being “2.2” on a 4-point scale with 4 being “excellent.” A “2.2” rating was considered equivalent to a “C-” rating. Cities also indicated that their maintenance and infrastructure replacement programs are primarily reactive since available funding resources are minimal.

CAPACITY

The cities surveyed described their drainage system capacity as adequate for the level of service provided by each community except for those that had areas that were developed many years ago and were prone to flooding. The older systems used standards that would not be acceptable today.

FUNDING AND FUTURE NEED

64 communities were surveyed concerning their stormwater infrastructure and management practices. The cities responding to the survey expressed an inability to address current and/or future capital improvement needs, to provide adequate flood mitigation and protection, and difficulty maintaining their deteriorating stormwater infrastructure due to inadequate funding. The majority of the cities responding also stated that current funding was not meeting the identified needs required for maintenance upkeep and replacement, much less providing a proactive maintenance program.

Primary funding sources for Stormwater Management

Programs come from stormwater utility user fees and/or property taxes. Approximately 58% of cities surveyed have a stormwater utility funding source that averages \$5.88 per Equivalent Residential Unit (ERU) per month. It is encouraging that cities are taking advantage of dedicated funding sources, but the levels of funding are not sufficient to sustain a reasonable level of life cycle maintenance. This means that the delayed maintenance of stormwater infrastructure will require more future funding than the public can provide and will economically restrict the cities from adequately responding to major failures and providing a nominal level of service.

Several cities reported funding maintenance needs so large that they were far beyond what the cities could reasonably provide or even estimate. For example, one city had estimated a \$60 million Capital Improvement Program project backlog. Another city reported \$63 million of known flood control issues. A third survey respondent estimated \$133 million was needed for corrugated metal pipe replacement, even though that city has spent \$78 million over the last 25 years addressing flood control issues. In terms of county-wide needs, one respondent reported a \$200 million investment gap in order to meet their current needs.

Beyond ASCE’s survey, another source of information about stormwater funding needs is the Environmental Protection Agency (EPA) Clean Watersheds Needs Survey, last released in 2012. The Clean Watersheds Needs Survey asks states to total the capital cost to prevent or control combined-sewer overflow (CSO) events. CSOs occur when the capacity of a sewer system is exceeded during a wet-weather event, and stormwater and untreated wastewater overflows, untreated, into nearby bodies of water. Kansas reported a \$547 million in necessary capital costs to prevent CSOs in 2012.



PUBLIC SAFETY AND RESILIENCE

Public health is threatened when contaminated water enters into the areas drainage system and waterways. Flows from sanitary sewage overflows, industrial pollutants, and even runoff from residential and construction sites can contaminate stormwater. Drainage infrastructure failures can also cause flooding threatening property and lives. The delayed maintenance of existing drainage systems will cause the cost of repair to continue to rise and will eventually increase the failure of existing systems.

DEFINITIONS / KEY TERMS

Combined Sewer – A system of pipes and tunnels designed to collect both surface runoff and sanitary sewage. This type of gravity sewer design is no longer used in building new communities (because current design separates sanitary sewers from runoff), but many older cities continue to operate combined sewers

Combined Sewer Overflow (CSO) – An event that occurs when wet weather flows exceed the capacity of a combined sewer system. The discharges contain human and industrial waste, and can cause beach closings, restrictions on shellfish consumption and contamination of drinking water sources

Equivalent Residential Unit (ERU) – A unit of measure equivalent to the impervious area of the average residential property. It is used to equate non-residential or multi-family residential impervious area to an equivalent number of single-family residences.

NPDES – The National Pollutant Discharge Elimination System (NPDES) permit program addresses water pollution by regulating point sources that discharge pollutants to waters of the United States. Created in 1972 by the Clean Water Act, the EPA has authorized state governments to perform many permitting, administrative, and enforcement aspects of the NPDES permit program. The program regulates some stormwater discharges from three potential sources: municipal separate storm sewer systems (MS4s), construction activities, and industrial activities. (1)

Stormwater – Stormwater is surface water that originates during precipitation events and snow/ice melt. Stormwater can soak into the soil (infiltrate), be held on the surface and evaporate, or runoff and end up in nearby streams, rivers, or other water bodies (surface water).

STORMWATER

Stormwater Management – Is the integrated management of stormwater issues including Floodplain Management and Planning, Stormwater Infrastructure Maintenance, Flood Control and Mitigation, Water Quality Management, Water Quantity Management, Erosion and Sediment Control, Management of Stormwater Utilities and other Funding Issues, and Stormwater Engineering.

Stormwater Quality Standards – Are provisions of federal, state and local governments approved by EPA that describe the desired condition of a waterbody or the level of protection or mandate how the desired condition will be expressed or established for such waters in the future.

Stormwater Quantity Management – Managing the quantity flow of surface waters resulting from rainfall and snow melt events to reduce and control flooding to protect property and lives. Managing stormwater quantity becomes even more important as cities continue to grow causing watersheds to become increasingly impervious, increasing the speed and volume of stormwater runoff, which can cause even more problems downstream. Stormwater Quantity Management is an essential part of keeping communities safe.

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A huge thank you to the Government and Public Relations Committee for bringing this Report Card and its Release together. Sheryl Gallagher, PE, D.GE, M.ASCE-Chair, Ernie Longoria, PE, PTOE, M.ASCE, Tom Jacobs, PE, CFM, M.ASCE, Alysén Abel, PE, M.ASCE, Jennifer Taylor, PE, ENV SP, M. ASCE , Tony Kulesa, PE, M.ASCE, Mariah Schroeder, EIT, ENV SP, A.M.ASCE, Bryce Coulter, EIT, S.M. ASCE, and Mike Winckler, PE, M.ASCE.

The Authors for their efforts in researching, writing and grading the infrastructure categories.

Shockey Consulting Services, ShockeyConsulting.com, for their expertise in graphic design and editing.

The Kansas City and Kansas Sections and Wichita Branch of ASCE and ASCE Society for their support in promoting and funding this effort.

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KANSAS' INFRASTRUCTURE 2018 REPORT CARD

