



# 2023 REPORT CARD FOR WYOMING'S INFRASTRUCTURE

**WYOMING  
SECTION  
OF THE  
AMERICAN  
SOCIETY  
OF CIVIL  
ENGINEERS**

[infrastructurereportcard.org/wyoming](https://infrastructurereportcard.org/wyoming)



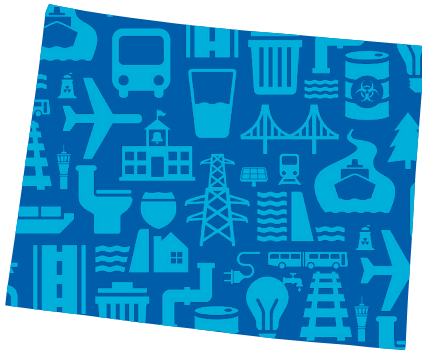


## About ASCE - Wyoming Section

The Wyoming Society of Civil Engineers is a professional society dating back to 1938. We are the local branch of the American Society of Civil Engineers. Members are civil engineers working in many different capacities, including designers, contractors, facility managers, town and state engineers, and in many different disciplines, including structural, geotechnical, hydraulic, environmental, survey engineering. We all share a common passion for designing, building and maintaining the structures and systems that allow our society to function. The WY Section board (comprising of four officers) meets monthly to coordinate the state's activities/annual conference as well as support the state's student ASCE chapter at the University of Wyoming.

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# 2023 WYOMING INFRASTRUCTURE REPORT CARD COMMITTEE

## AUTHORS/CONTRIBUTORS:

Dustin Woods, P.E., M. ASCE  
Ryan Kobbe, P.E., M. ASCE  
Katie Creasey, P.E., M. ASCE  
Martin Kidner, P.E., M. ASCE  
Lisa Johnson Mallon, P.E., M. ASCE

Tim Brugger, P.E., M. ASCE  
Molly Bennett, AM. ASCE  
Jeff Young, P.E., M. ASCE  
Collin Fossen, P.E., M. ASCE  
Jarad Koltiska, P.E., M. ASCE



GRAND TETONS, JACKSON, WY



# EXECUTIVE SUMMARY

GRAND TETONS, JACKSON, WY

Wyoming's 580,000 residents are spread across almost 100 million square miles of often harsh terrain. Population growth is slow, and the state relies on federal funding for almost 60% of their annual revenue. The 2021 Bipartisan Infrastructure Law will send significant additional funds to Wyoming for transportation and water systems but will only temporarily close structural funding gaps – not proportionate with identified needs. Even with federal support from formula and competitive money, many Wyoming communities struggle collecting funds needed to match.

Wyoming's infrastructure systems are struggling to support core operations on already-low fees that lose purchasing power as high inflation rates persist following the COVID-19 pandemic. A quarter of drinking water systems spend more than they bring in from ratepayers, a third of those systems don't charge by usage; and Wyoming's median wastewater treatment system bills only half the national average. The \$0.10 increase of state motor fuel taxes from 2013 has also lost significant ground from increasing vehicle efficiencies.

Wyoming can be a tough place to keep infrastructure high functioning. Corrosive soil throughout the state is shortening the lifespan of metal pipes delivering fresh water for resident consumption. The Equality State has experienced moderate to severe drought conditions every year since 1999 and is allocated only six million acre-feet of surface water per year of the 15 million acre-feet of surface water originating within the state. Drivers pay the gas tax on fill-ups within Wyoming, but the state loses out on registration and other fee revenue from the over 85% of commercial trucks neither beginning or ending their routes in the state. For the supply chain in the American West, Wyoming is a “bridge state” maintaining critical links from the Pacific Coast to the Midwest.

Wyoming has been described as a small town with a very long main street, reflecting the willingness of citizens to drive longer distances for community, work, recreation, and shopping. This is reflected in Wyoming's more than 14,000 vehicle miles traveled per capita in 2018, the highest in the nation. Engineering in the state is the most effective way to ensure the safety of motorists dying in crashes by greater numbers than any other state, 25.4 per 100,000 residents.



## METHODOLOGY

The 2023 Report Card for Wyoming’s Infrastructure was written by a committee of 10 engineers from Wyoming who volunteered their time to collect and analyze data, prepare and review their findings. The committee worked with staff from ASCE National and ASCE’s Committee on America’s Infrastructure to provide a snapshot of our infrastructure, as it relates to us in Wyoming and on a national basis.

The Report Card sections are graded based on the following eight criteria:

### CAPACITY

Does the infrastructure’s capacity meet current and future demands?

### CONDITION

What is the infrastructure’s existing and near-future physical condition?

### FUNDING

What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

### FUTURE NEED

What is the cost to improve the infrastructure? Will future funding prospects address the need?

### OPERATION AND MAINTENANCE

What is the owners’ ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations

### PUBLIC SAFETY

To what extent is the public’s safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

### RESILIENCE

What is the infrastructure system’s capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

### INNOVATION

What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

## GRADING SCALE



### **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 significant 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.

# 2023 REPORT CARD FOR WYOMING'S INFRASTRUCTURE

**GPA**

**C**



AVIATION

**B-**



BRIDGES

**C-**



DRINKING  
WATER

**C**



ROADS

**C**



WASTEWATER

**D+**





# RECOMMENDATIONS TO RAISE THE GRADE

**1. INCREASE RATES AND FEES, CHARGE FOR USAGE, AND MONITOR EQUITY IMPACTS**

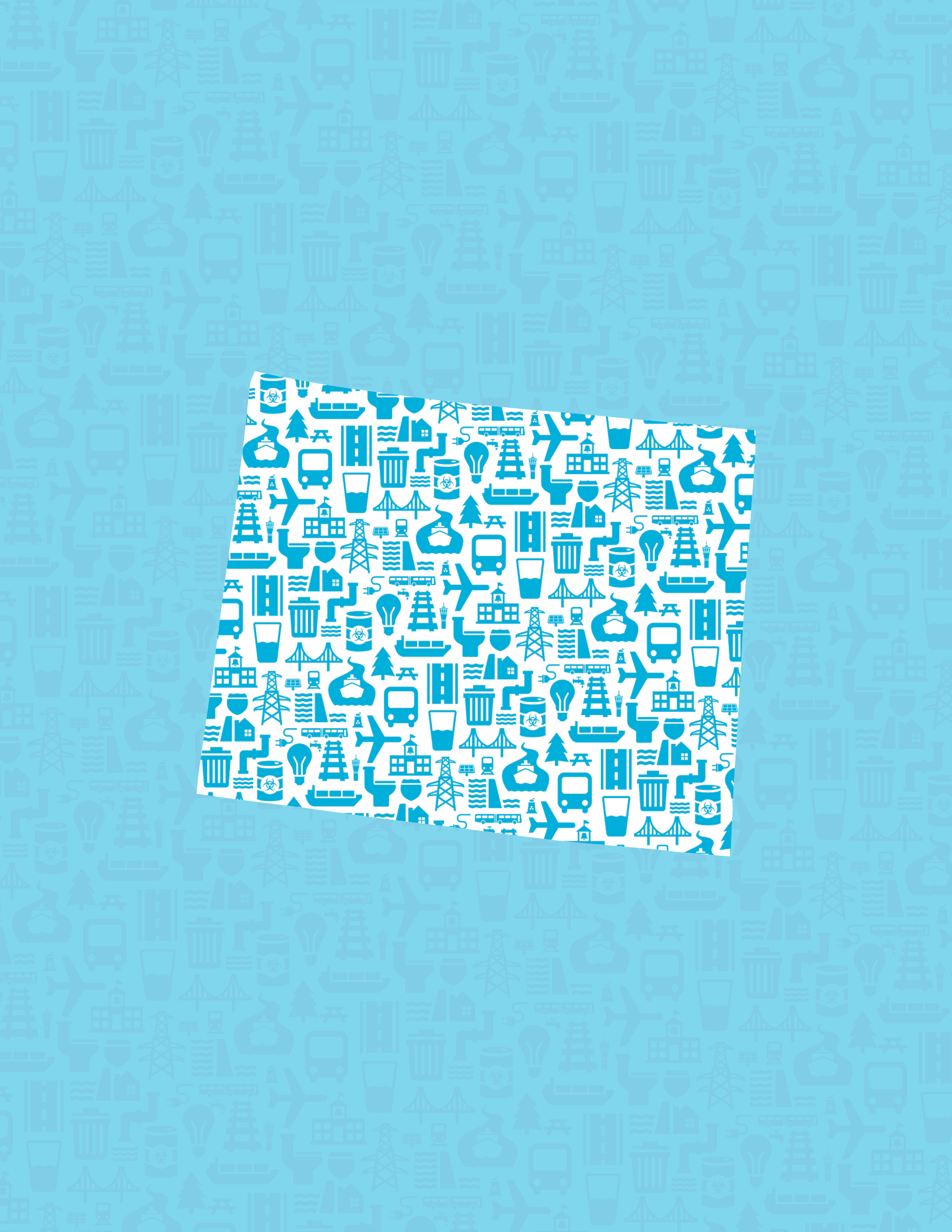
Wyoming’s drinking water and wastewater systems currently spend more on essential costs than they collect in revenue from users in all systems. That must change to provide safe water infrastructure. Increased asset management tracking and capital project planning would highlight even more significant needs. To ensure consistent service, Wyoming needs to increase elected Boards and Councils awareness and education of utility management tying infrastructure projects to board/council training. Wyoming needs to increase water rates, install and charge for usage rates, and proactively support residents or businesses for whom higher rates create unreasonable burdens. In addition, Wyoming systems must address water usage and look to future technology and equipment to reduce energy costs and water usage.

**2. CALCULATE FUTURE NEEDS INCORPORATING HARSH ENVIRONMENTS AND TOPOGRAPHY**

Corrosive soil conditions are degrading water pipes and make frequent replacements necessary. Drought conditions persisting for decades and high plains with unforgiving remoteness call for more resilient systems like extra water storage and stormwater collection for recharge.

**3. CAPITALIZE ON RECENT FEDERAL INFRASTRUCTURE INVESTMENTS**

Infrastructure owners should capitalize on the historic, short-lived opportunities for extra help from the 2021 Bipartisan Infrastructure Law.



YELLOWSTONE REGIONAL AIRPORT, CODY, WY



AVIATION





# EXECUTIVE SUMMARY

Wyoming relies on a network of 33 publicly owned airports to deliver transportation across nearly 98,000 square miles for emergency medical services, resident movement, the supply chain, and tourism. Aviation infrastructure supports an estimated \$2 billion in overall annual economic output. Wyoming Department of Transportation's (WYDOT) Aeronautics Division has focused on pavement management and maintenance: 90 percent of runways at general and commercial airports in the state are in acceptable condition. Available capital improvement funding is hampered by inflation on project inputs and labor. Beyond available funds, an additional \$45 million annually is needed to meet future needs in aeronautic investment. Status quo funding would reduce the average pavement condition from 81 in 2020 to 69 in 2025, on a scale of 100.



YELLOWSTONE REGIONAL AIRPORT, CODY, WY

## CONDITION & CAPACITY

There are 33 public general aviation and commercial service airports in Wyoming that appear in the National Plan of Integrated Airports System (NPIAS). These facilities include nine commercial service and 24 general aviation airports. Wyoming's State Aviation System Plan classifies airports as commercial, business, intermediate, and local as shown in Figure 1. Wyoming's commercial and general aviation airports contribute to an estimated \$2 billion in annual economic impact, supporting nearly 22,000 workers with an annual payroll of over \$941 million.

The Pavement Condition Index (PCI) methodology is widely used in civil engineering to indicate the overall general condition of pavements. The PCI provides a condition description that ranges from Excellent (100) to Failed (0). A PCI score of 70 or greater indicates that the pavement is in acceptable condition. Pavements with a PCI of less than 70 may require rehabilitation or reconstruction and are considered unacceptable. Nine out of every 10 paved airports in Wyoming have

an acceptable PCI. In 2020 the area-weighted PCI for all Wyoming airports was 81. Estimates indicate that by 2025, if all projects currently slated for construction were fully funded, the area-weighted PCI for all Wyoming airports could increase to 86 or fall to 69 if unfunded. Current funding levels need to be increased to keep the ratings where they currently are, let alone to increase the PCI rating.

Because of the high elevation and high summer average temperatures of many airports in Wyoming, runways are generally longer than in other areas of the United States. Thirty-five airports (87.5%) have a runway that is at least 5,000 feet long, and, of these, 25% have runways of 8,000 feet or greater. Wider runways are typically able to accommodate larger aircraft and provide a greater margin for safety in the event of loss of lateral control. Among Wyoming airports, 37.5%, 25.0%, and 22.5% of airports have primary runways that are 75 feet, 100 feet, and 150 feet wide, respectively. The remaining 15% of airports have primary runways with nonstandard widths.

**FIGURE 1: WYOMING AIRPORT SYSTEM - SOURCE: WYDOT, AERONAUTICS**





**NORTHEAST WYOMING REGIONAL AIRPORT, GILLETTE, WY**

Scheduled commercial airline service is very important to Wyoming's economy and to its residents, businesses, and visitors. The airlines and the associated commercial airline functions at nine airports are responsible for significant annual economic impact. Wyoming has been at the forefront, among all states, for its assistance to communities to maintain existing airline services and attract new service. As a result, Wyoming and its commercial airports have had measurable success as it relates to maintaining and improving scheduled commercial airline service. Annually more than 718,000 visitors arrive in Wyoming by air.

On an individual airport basis, between 2013 and 2019, six of the nine commercial airports had higher enplanements in 2019 than they did in 2013. The average annual rate of increase for enplanements at all Wyoming commercial airports between 2013 and 2019 was 4.5 percent. All enplanements in the United States for all commercial airports, between 2013 and 2019, increased at an average annual rate of 3.9 percent. Therefore, Wyoming's growth in enplaned passengers exceeded the national average. Between 2018 and 2019, among

all states, Wyoming experienced the highest rate of increase in annual commercial passenger enplanements. Wyoming increased from approximately 603,000 to nearly 688,000 total enplaned passengers, an increase of 14 percent for the one-year period. Wyoming's rate of increase was significantly above the national average (3.9 percent) for all commercial airports.

Overall passenger levels from 2019 to 2020 dropped significantly. In Wyoming, we saw a 42% decrease year over year. However, air travel began to rebound in 2021 compared to 2020, with some airports in the state setting new records for passenger enplanements. The rebound has continued into 2022 with the only thing holding back all nine commercial service airports from record highs being the ongoing pilot shortage. With that said, all commercial airports in Wyoming except Cheyenne are facing capacity restraints. This is being addressed by numerous terminal expansions across the State in Sheridan, Rock Springs, Cody, Casper, and Jackson.

## OPERATION AND MAINTENANCE

WYDOT's Aeronautics Division Planning and Programming is responsible for providing oversight of airport planning, environmental and land projects; administering the continuous system planning program; developing the Wyoming Aviation Capital Improvement Program; and leading the state's BlackCat Aviation grant and project database. Support and approval of WYDOT Aeronautics Division activities are governed by the Wyoming Aeronautics Commission. This Gubernatorial-appointed seven-member board is tasked with guiding the development of aviation in Wyoming and seeing to the appropriate use of public funds for aviation.

Each airport is operated by a local governmental entity. In Wyoming these local governments consist of Counties, Municipalities, and Joint Powers Boards. These entities serve as airport sponsors who are responsible for the day-to-day operation, maintenance, and development of their respective airport(s). They work hand-in-hand with WYDOT and the FAA each year to develop the Wyoming Aviation Capital Improvement Program.

Because of careful preservation and maintenance of airport pavement assets, Wyoming's airports have some of the best pavement conditions in the country.

WYDOT Aeronautics has a strong commitment to preventative pavement maintenance. Each airport receives crack/joint sealing, seal coat, and restriping of all markings on a 4-year rotation. Due, in part, to this strong state commitment to pavement management and maintenance, Wyoming's airport operators have been able to keep their pavement overall in acceptable condition even as the industry has experienced significant headwinds including the loss of purchasing power of available capital improvement funding.

Although the natural geology and landscape of Wyoming drive its economy, they also present a challenge to aviation. High altitude airports surrounded by rising, sometimes extreme, terrain are an impediment to aviation operations, requiring longer runways, frequent wintertime snow removal, and limits to instrument approaches that restrict airport access during poor weather conditions. The terrain also physically separates rural regions, making commercial air service and general aviation (GA) access a vital component of Wyoming's transportation system.



## FUNDING AND FUTURE NEED

Funding for airport improvements in Wyoming come primarily from three sources: The FAA, WYDOT, and local municipalities which are required to match a certain percentage of most improvement projects. The FAA provides funding through various programs, including the Airport Improvement Program (AIP) and Passenger Facility Charges (PFCs). From 2007-2016, more than \$115 million in state funds have been invested in Wyoming airports, as well as an estimated \$257 million in federal funds and \$39 million in local funds.

A Wyoming Department of Transportation Needs Summary Report released in November of 2020 found aeronautics needs are currently underfunded by approximately \$44.7 million annually. These needs include the Wyoming Aviation Capital Improvement Program, which is a compilation of all anticipated improvement projects for each public airport in Wyoming and is used to program airport improvement projects for state and federal grant funds. Sources for needs estimation include: airport planning efforts, such as Master Plans or Airport Layout Plans; the Federal Aviation Administration; and continuous input and communications with Wyoming airport sponsors.

In October 2018, Congress passed the FAA Reauthorization Act. The bill reauthorized the FAA for

five years, FY 2019-2023, at the cost of \$97 billion and represented the most extended funding authorization period for FAA programs since 1982. The AIP, which provides grants to airports for airport safety, capacity, security, and environmental projects, is funded at \$3.35 billion in mandatory funding for all five years. The AIP Congressional authorization levels will remain unchanged through the current period (2012-2023). Nevertheless, the cost of most infrastructure projects has climbed sharply. AIP entitlements remain unrealistically low at \$150,000 per general aviation and \$1 million per commercial airport per year.

More recently, Congress provided significant new funding to airports through the federal COVID-19 relief packages and the Infrastructure Investment and Jobs Act. Wyoming will receive enhanced funding through these bills, and funding can be put toward capacity enhancements, safety, and other projects. Wyoming's aviation industry will benefit from an estimated \$25 billion in increased airport infrastructure funding provided over 5 years. All told, airports in Wyoming received CARES, CRSSA, and ARPA grants that have effectively doubled their entitlements in the near term.





## PUBLIC SAFETY AND RESILIENCY

The Wyoming Priority Rating Model for Project Evaluation is used to evaluate projects requested by airport sponsors for State or Federal funding, using seven weighted categories. Safety is the most important project purpose and includes many different project types. These projects are seen as highly important as they are consistent with the Aeronautics Commission's overall mission to provide a safe and efficient aviation system. Safety projects are generally defined as improvements to existing infrastructure, facilities, and equipment, which support the daily functions of the airport, support the short-term and long-term operations of the airport,

## INNOVATION

Over the past several years, many small communities across the United States have experienced diminishing levels of air service, and some small communities have lost service altogether. Since 2016, at least 32 small communities have lost their commercial airline service; this statistic reflects pre-COVID air service conditions. In Wyoming, local, state, and federal partnerships have been instrumental in maintaining, and in some cases even improving, scheduled commercial airline service, while also addressing Wyoming's commercial airline fares.

The importance of commercial air service is emphasized by the Wyoming Legislature's commitment through the Air Service Enhancement Program (ASEP), which provides state funding for the promotion of commercial air service. Authorized by the Wyoming Legislature in 2004, the ASEP has been used by nine Wyoming airports to retain or attract air service. This legislation, unique to Wyoming, has successfully worked to bring reliable air transportation to the state. Since 2004, the ASEP has supported 81 routes at a cost of almost \$36 million in state support plus another \$24 million from local community support. These investments are made in the form of revenue guarantees to airlines to

and provide for the safety of airport personnel and airport users. Safety projects, such as public safety in wildfire control, rate high in the priority rating model that WYDOT aeronautics uses while evaluating requested projects. Safety related projects are numerous.

The ground transportation challenges in rural, geographically isolated areas throughout Wyoming drive the need for an advanced and reliable air medivac system. However, the ongoing revenue crisis facing Wyoming's state, county and municipal governments is threatening universally available ambulance service.

support new nonstop routes from Wyoming airports. The revenue guarantee essentially ensures the airline that an acceptable amount of revenue will be produced by the new route and if not, the State and local community will make up the difference up to an agreed-upon cap to support the route. If the route performs better than expected, then less of that guarantee money would be paid out. This program continues to put Wyoming at the national forefront in enhancing air service on a statewide basis. Additionally, two airports continue to use the federally authorized Essential Air Service (EAS) program, which provides financial support for air service in rural communities.

Despite these significant investments, Wyoming continues to experience significant passenger leakage to alternative commercial airports that are beyond the state. It is estimated that more than 55 percent of all commercial airline travelers associated with Wyoming use a commercial airport in another state for their airline travel. Fares are most likely the number one issue impacting Wyoming's passenger leakage.





## RECOMMENDATIONS TO RAISE THE GRADE

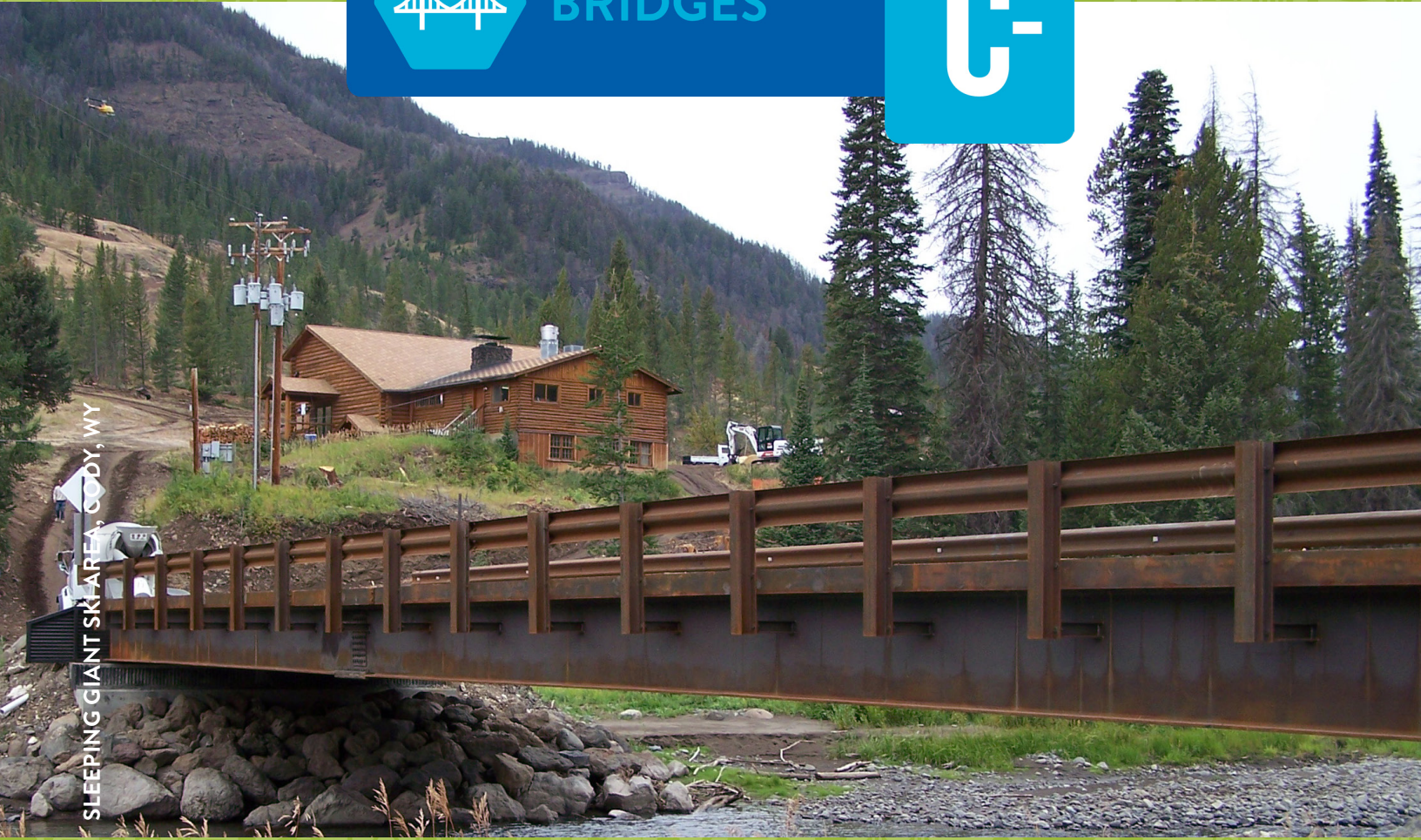
1. Continued funding through the Air Service Enhancement Program.
2. Investigate additional ways to slow passenger leakage.
3. Capitalize on opportunities to perform preventative maintenance before full rehabilitation is required.
4. Update airport condition assessments statewide, including pavement, terminal, and layout condition studies.
5. Increase AIP entitlement funding, index to inflation, for both primary and non-primary airports consistent with inflation over the past 10 years.
6. Eliminate the cap on Passenger Facility Charges so airports can charge what the need to complete terminal rehabilitation and capacity enhancements.

## SOURCES

- 2020 WYDOT Aviation Economic Impact Study Technical Report
- 2016 Wyoming State Aviation System Plan
- WYDOT Needs Summary Report, November 2020
- Federal Aviation Administration – National Plan of Integrated Airport Systems (NPIAS) Report 2021-2025
- Wyoming Department of Transportation Aeronautics Division - <http://www.dot.state.wy.us/home/aeronautics.html>
- Wyoming Department of Transportation, Aeronautics Division - Airport Pavement Management Program - <https://idea.appliedpavement.com/hosting/wyoming/index.html>



 **BRIDGES**





# EXECUTIVE SUMMARY

There are 3,114 vehicular bridges in Wyoming. Of these bridges, 230 – or 7.4% – are in poor condition, an improvement from the 291 bridges that were in poor condition in 2017. The Wyoming Department of Transportation instituted an effective asset management system which decreased the percentage of bridge decks in poor condition from a high of 14.8% in 2013 to 8.6% in 2021. As bridges age, degrade, or get struck by other objects, they can lose some of their capacity to safely carry designed legal loads. Wyoming is better than the national average, with 5.9% of all bridges in Wyoming being posted to some restriction, versus 9.2% nationally. Nearly one-half of Wyoming bridges are more than 50 years old and may pose greater maintenance challenges past their intended life.

## CONDITION & CAPACITY

There are 3,114 bridges in the State of Wyoming with an average age of 44 years old. Nearly 46% of bridges in the state are 50 years old or older – the design life of many bridges. One benefit of replacing bridges like these is that modern Load and Resistance Factor Design (LRFD) standards mean those new bridges are expected to last longer: 75 years.

Approximately two thirds (1,955) of the bridges in Wyoming are owned and maintained by the state; 833 are owned and maintained by cities, towns, and counties; 323 are owned and maintained by Federal agencies; the final 3 are owned and maintained by the railroads. The Wyoming Department of Transportation (WYDOT) is responsible for inspecting all bridge structures, excluding Federal and railroad-owned bridges every 24-months with few exceptions.

Bridge inspections for all public bridges is mandated by the Federal Highway Administration (FHWA) and must conform with the National Bridge Inspection Standards (NBIS). These national standards are used as the inspection grading criteria for every public bridge in the United States. Numeric scores range in value from 1 to 10 and a bridge condition is assigned based on the value of the score:

- Scores of 1 to 4 rate a bridge as “Poor”
- 5 to 6 are rated as “Fair”, and
- 7 to 9 are rated as “Good”.

Bridge Condition	Number of Bridges	Percentage of Inventory
Good	920	29.5%
Fair	1964	63.1%
Poor	230	7.4%

FHWA guidance states that poor bridges should make up less than 10-percent of all bridges, by bridge deck area, on the National Highway System (NHS). In 2022 Wyoming was under this criterion at 7.4%.

It is important to note that the term poor does not necessarily mean a bridge is unsafe for vehicular traffic and Wyoming would never keep an unsafe bridge open to the public. Rather it means that a condition rating of 4 or less was found for any of the following bridge elements:

- The bridge deck or driving surface
- The bridge superstructure which generally consists of elements that support the deck
- The bridge substructure which generally consists of elements that support the superstructure and distribute all bridge loads below ground

As bridges age, degrade, or even get struck by other objects, they can lose some of their capacity to safely carry designed legal loads. When a bridge can no longer carry a legal load, it must be posted as load restricted. There are 5 categories of load ratings that range from no restrictions to legal loads (normal structures) to more than 39.9-percent less than legal load carrying capacity and posted as such. In general, Wyoming is better than the national average in every category, with ultimately 5.9% of all bridges in Wyoming being posted to some restriction versus 9.2% nationally.

Load Rating Category	Number of Bridges Posted		Percentage of Bridges Posted	
	Wyoming	USA	Wyoming	USA
0	82	23767	2.63%	3.84%
1	22	7319	0.71%	1.18%
2	23	8005	0.74%	1.29%
3	18	8297	0.58%	1.34%
4	38	9382	1.22%	1.51%
5	2931	562852	94.12%	90.84%
Total Posted	183	56770	5.88%	9.16%

Data from: <https://infobridge.fhwa.dot.gov/BarStackChart>

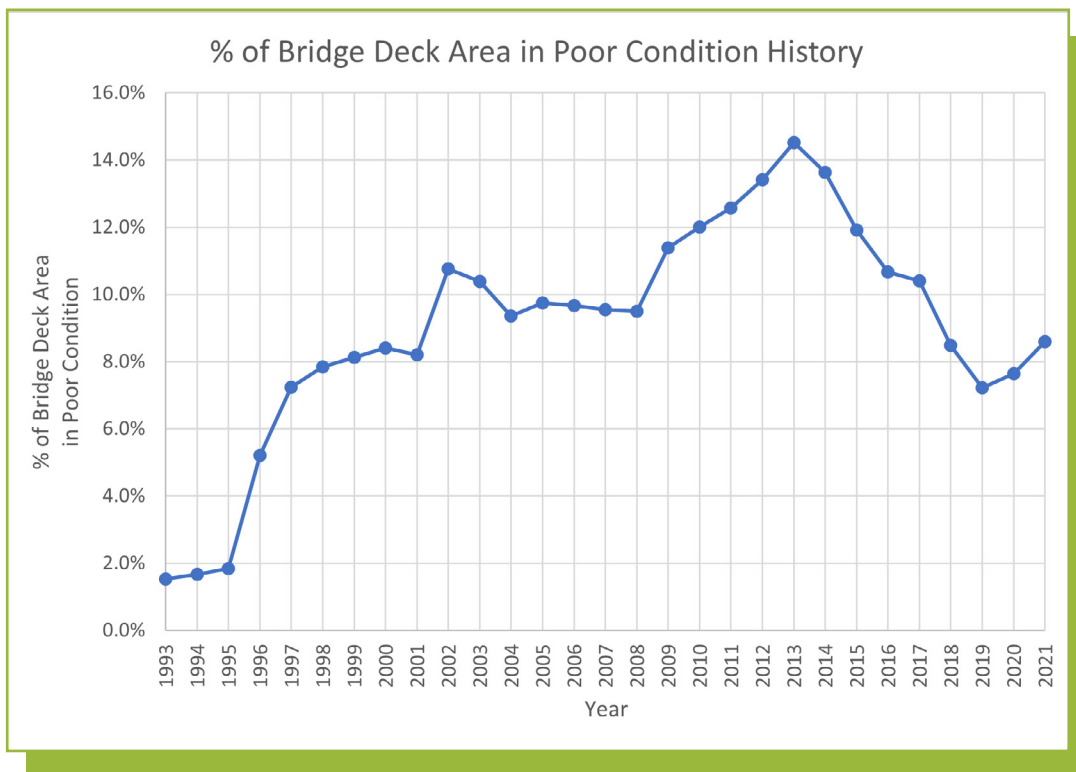


## OPERATIONS AND MAINTENANCE

While some of the bridges falling within the Poor category may need to be replaced, many of these bridges may only need resurfacing or deck rehabilitation to bring it into “Fair” or “Good” condition. To help the State of Wyoming with this task, Wyoming has developed a Transportation Asset Management Plan (TAMP) that predicts what structures may need to be replaced or rehabilitated in the next 10 years. Wyoming also uses a Bridge Management System that considers metrics from the NBIS criteria, anticipated traffic conditions, funding availability, and other items to ensure the most needed projects are funded.

These types of asset management are key contributors to Wyoming’s percentage of Poor deck areas decreasing from a high of 14.8% in 2013 to 8.6% in 2021.

**FIGURE 2: BRIDGE DECK AREA IN POOR CONDITION HISTORY**



## FUNDING & FUTURE NEED

The majority of Wyoming’s transportation infrastructure is funded by FHWA’s Federal Aid program (70%), followed by state funds (27%), and finally local funds (3%). In general, the Federal Aid funding requires a match ranging from 9.49 to 20.0%, depending on project type and location.

Because of this conundrum, WYDOT recently hired a consultant to complete an unfunded needs analysis for all the programs the agency manages, including transportation infrastructure. The consultant, in coordination with the WYDOT bridge engineers, developed multiple funding scenarios utilizing the Bridge Management System with criteria that:

- Replaces bridges past their design service life over the 20 years,
- Maintains 92-percent of all bridge deck area in “Good” or “Fair” condition, and
- Leaves no more than 10-percent of bridge deck area on the NHS in “Poor” condition.

Wyoming state government estimated 1,216 bridges within the FHWA system needed repairs in 2021 – compared to 1,248 in 2017 – at an estimated cost of \$529.4 million. That cost is surely higher in 2023 as inflation rates increase costs of input materials and labor.

As the system of bridges continues to age, more bridges move from “Good” to “Fair” and from “Fair” to “Poor”. An increased consistent funding stream is needed to keep up into the future. With the limited available funding for WYDOT’s bridge program in the last two decades, Wyoming should be commended for the gains they have made toward moving bridge deck area out of “Poor” condition ratings.



## RESILIENCE & PUBLIC SAFETY

Wyoming is one of the most beautiful states in the Nation; blessed with abundant natural resources including some of the longest wild game migrations in the world. The state is a leader in planning, designing,

and constructing major wildlife crossings aiding in these historic migrations while providing a safer passage for motorists.

## INNOVATION

Wyoming is constantly looking for innovation towards safe and economical transportation projects. The WYDOT has undertaken research projects for future use in bridges around the state such as:

- Accommodation of some of the longest wild game migrations in the world. Wyoming is a leader in planning, designing, and constructing major wildlife crossings aiding in these historic migrations while providing a safer passage for motorists.
- “Development of a Load and Resistance Factor Design (LRFD) for Driven Piles on Soft Rocks in Wyoming”.
- “Site Characterization and Site-Specific Seismic Ground Motions Analysis for Transportation Infrastructure in Wyoming”.

- “Structural Health Monitoring of Highway Bridges Subjected to Overweight Vehicles”.
- “Assessment and Evaluations of I-80 Truck Loads and Their Load Effects”.
- “Characterization of Soil and Rock for Transportation Infrastructure Using Seismic Methods in Wyoming”.

These types of research projects aid in higher optimization of design and construction, better utilizing state funds for public infrastructure projects.



BRIDGE OVER SOUTH FORK SHOSHONE RIVER, CODY, WY





## RECOMMENDATIONS TO RAISE THE GRADE

1. Support an increase in funding and spending flexibility from the FHWA in future Transportation Bills.
2. Raise the state gas and diesel tax to better fund non-Federal eligible projects.
3. Statutorily tie the gas and diesel tax rate to inflation rather than a dollar amount.
4. Support WYDOT's research to implement a Road User Charge (RUC) to dynamically fund highway projects in the future.
5. Continue to fund research for innovative bridge design, materials, and construction techniques.

## SOURCES

- 2020 Dye Management Group Transportation Needs Study
- ARTBA 2022 Wyoming Bridge Profile
- FHWA NBI Element Data
- FHWA LTBP InfoBridge
- WYDOT Research Center Active Research Projects





DRINKING  
WATER



GILLETTE LONG TERM WATER SUPPLY PROJECT, GILLETTE, WY





# EXECUTIVE SUMMARY

There are 772 public water systems in Wyoming. Nearly 90% of its residents are served by 321 community water systems operating year-round. The remaining 451 water systems include campgrounds, restaurants, hotels, and schools served by a private well or surface water source. The state has experienced moderate to severe drought conditions yearly since 1999 and is allocated only six million acre-feet of surface water per year of the 15 million acre-feet of surface water originating within the state. Corrosive soil materials cause metal pipes to degrade faster than anticipated, necessitating quicker replacements. A 2018 survey of Wyoming public water systems reported 23% are not sustaining themselves on user and service fees with 32% of respondents reporting that they do not bill their customers based on usage metering. The installation of usage meters and reevaluating rate structures to ensure solvency and financial stability could be high impact investments into these systems.

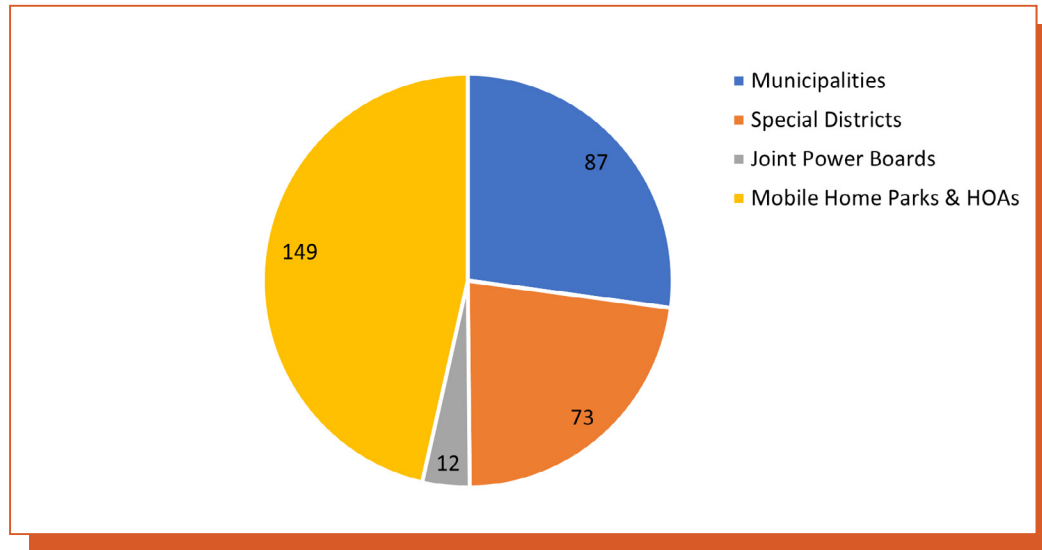


12" TRANSMISSION LINE, HOT SPRINGS STATE PARK, THERMOPOLIS, WY

## CAPACITY

The breakdown of the ownership of the 321 community water systems serving year-round residents is as follows:

### WYOMING WATER SYSTEM OWNERSHIP



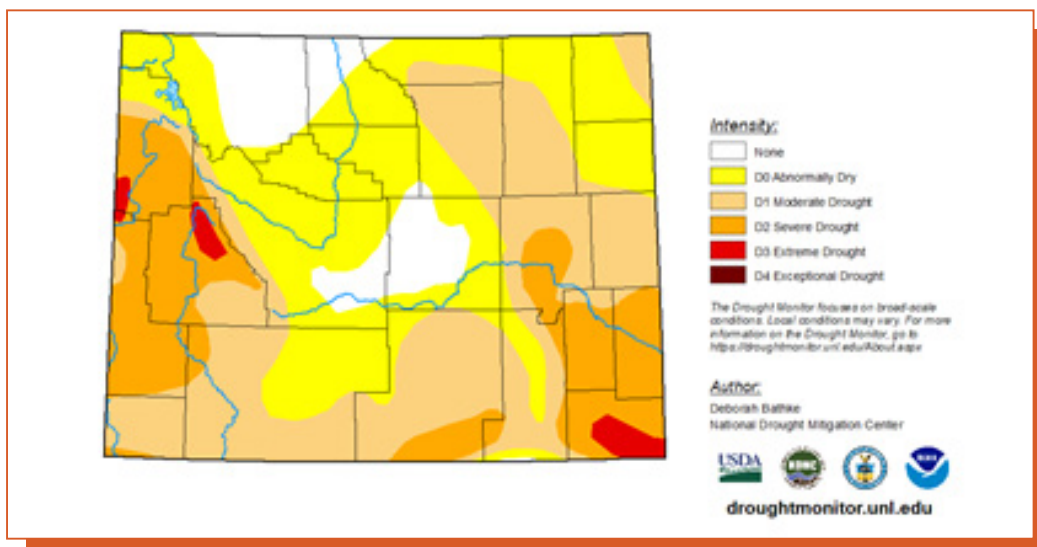
Approximately 71% of residents being served by community water systems rely on surface water sources including the Buffalo Bill Reservoir, Rob Roy Reservoir, Big Horn River, Wind River, Laramie River, and Green River. The community water systems serving the other 29% of residents source their water from groundwater. Residents that are not connected to a public water system are served by private water systems using surface or groundwater sources.

Between 2010 and 2020, the State of Wyoming's total population grew from more than 563,000 to

almost 577,000, or a 2.7% increase. This relatively low population change has generally ensured that the drinking water infrastructure within the state meets the current and anticipated capacity demands.

It is important to note that the State of Wyoming has been experiencing moderate to severe drought conditions every year since 1999. The figure below shows the State's current drought conditions as of August 23, 2022.

### U.S. DROUGHT MONITOR: WYOMING



Under interstate river contracts and court decrees, Wyoming is allocated approximately 6 million acre-feet of surface water per year of the 15 million acre-feet of surface water that originates within the state annually. Despite these drought conditions, the state usually uses about half of the allocated amount. Approximately 80 to 85% of water from either surface or groundwater sources in Wyoming is used to irrigate agriculture. While the state has enough water to meet the current and estimated future drinking water need, drought conditions continue to have a serious impact on drinking water infrastructure. Entities without raw water or irrigation

systems in place typically use drinking water to irrigate. Many studies completed on public water systems for the Wyoming Water Development Commission (WWDC) have indicated that this excess use places a large strain on the drinking water systems during periods of high water use and is a large cause for the need for increased storage capacity and high levels of general wear on the drinking water infrastructure. This wear results in more frequent maintenance and replacement needs.

## CONDITION

Data obtained from Wyoming Water Development Commission (WWDC) studies on individual drinking water systems throughout the State of Wyoming have indicated that the estimated average age of the pipes within the State’s public water systems ranges from between 25 to 50 years old. Most systems contain a mixture of cast iron, asbestos cement, High Density Polyethylene (HDPE), and Polyvinyl Chloride (PVC) pipes.

There are many areas in Wyoming with corrosive soil materials that are causing metal pipes to degrade faster than anticipated. Many older pipes that are being replaced had been severely degraded by the soil conditions, causing water to literally seep out of pores on the pipe surface. As these materials are being replaced with the more resilient plastic derived products, communities are seeing their estimated annual leakage reduce.

From a review of drinking water studies performed on individual systems with the assistance of the Wyoming Water Development Commission, it is evident that estimated average age of the pipes in the infrastructure, degraded conditions of the pipe material, and past poor operational procedures are a very large contributor to annual water loss due to leakage. This loss of drinking water through leaks equates to lost revenue for the water utility, broken pipes can lead to contaminant intrusion into drinking water, and the loss of water can exacerbate water supply issues in drought-prone areas.

The WWDC report also indicated that surveyed systems within Wyoming place an average of \$637,475 annually into emergency replacement funds to plan for future projects or emergency fixes and are averaging \$68,561 set aside for sinking fund contributions paying off loans from previous drinking water projects. Table 1 shows the average amount placed in emergency funds annually based on population served.

**TABLE 1: AVERAGE ANNUAL EMERGENCY FUND CONTRIBUTION BASED ON POPULATION**

Population	Average Annual Emergency Fund Contribution
0-99	\$5,968
100-999	\$116,547
1,000-4,999	\$303,418
5,000-9,999	\$1,531,565
10,000 and up	\$4,695,552

## FUNDING AND FUTURE NEED

Water infrastructure is funded with a combination of local, state, and federal funding and financing, as well as user fees. The average Wyoming community water system as a nearly \$500,000 loss on the annual operating budget – spending \$1.29 million and collecting only \$804,000. That’s according to the 2018 Public Water System Survey Report of 192 public water systems conducted by the WWDC. Across the state, that gap is \$88 million total – \$197 million budgeted compared to \$109 million.

Twenty-three percent of the systems that responded to the survey reported that their system is not sustaining itself on the user and service fees. Many rural communities are finding that their base user fees are not meeting the funding needs to operate the system, let alone to provide money to save for emergency repairs or replacement projects. Also of concern: 32% of responders reported that they do not bill their customers based on usage metering. Without being billed based on usage, customers have no financial incentive to monitor their water use or fix a leaking fixture. Additionally, utilities who do not charge for usage are more prone to financial challenges.

In addition to user and service charges, the following are the typical funding sources available to drinking water systems within the State of Wyoming:

- Wyoming Water Development Commission (WWDC);
- Drinking Water State Revolving Fund (DWSRF);
- State Land & Investment Board (SLIB);
- USDA Rural Utilities Service (RUS);
- Mineral Royal Grant (MRG);
- Community Development Building Grants (CDBG);
- Special Assessments (Special Improvement Districts, Tax Financing Districts, etc.)

In 2019, the above funding agencies allocated more than \$41.5 million to drinking water infrastructure expansions and improvements. Additionally, the 2021 Infrastructure Investment and Jobs Act will allocate \$335 million over five years to Wyoming for improvements to water infrastructure. Wyoming has historically been able to fund drinking water system projects and expects to continue to be able to provide funding, though loan applications have been increasing.



There has been a concerted effort by funding agencies to educate communities that lack sufficient financial resources to lessen their reliance on funding assistance from state agencies. Education has sought to improve the understanding of funding tools including metering, regular inflation-based rate increases, and debt collection on deficient users. However, additional education is not a silver bullet, as high construction costs in rural and remote areas are a challenge for these systems that is not easily solved.

Other challenges for rural public water systems include significant hesitancy from users when attempts are

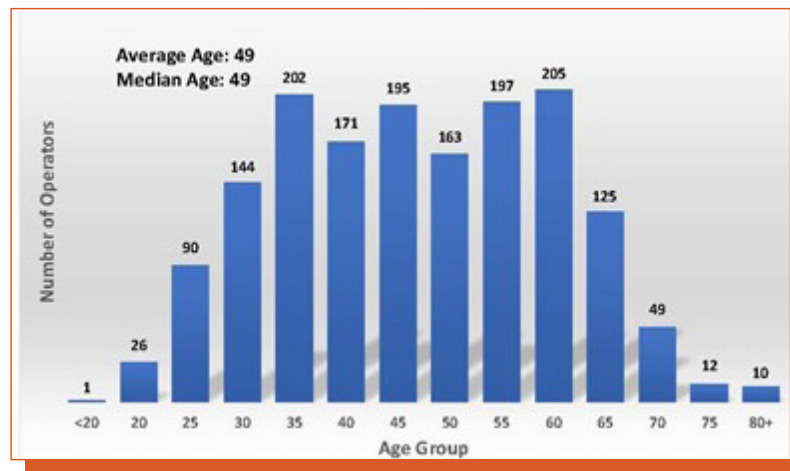
made to increase their fees. Many residents with limited resources or on fixed incomes are concerned about affordability, particularly when significant rate hikes are proposed. In rural areas, economies of scale—when more users in a concentrated area allow the utility to capitalize on efficiencies and charge lower rates—are often impossible. While it is important that these rural communities ensure they are collecting the necessary fees to operate their system and fund future improvements, state and federal funding play an essential role in keeping safe drinking water available.

## OPERATION AND MAINTENANCE

All public and private water systems within the State of Wyoming require experienced operators certified by the Wyoming Department of Environmental Quality. These water operators are responsible for the maintenance of the infrastructure as well as the quality of water provided to consumers and the certification ensures

that all operators are educated about water treatment or water distribution procedures. There are currently 1,589 certified operators (for both water and wastewater) in the State of Wyoming. The following graph depicts the age range of the State’s current certified operators.

**FIGURE 1: AGE DISTRIBUTION OF WYOMING OPERATORS (JANUARY 2021), COURTESY OF WYDEQ**



The average and median age of currently certified operators is 49 years old. As these experienced operators retire, water systems are facing challenges finding new operators and may face a gap in operator knowledge during periods of turnover. It is imperative that municipalities focus on recruiting, hiring, training, and retaining new operators. One strategy may be to emphasize the importance of a certified operator to the health and safety of the public.

Annually, the 192 public water systems surveyed in the 2018 Public Water System Survey Report spending an average of \$507,293 on operation and maintenance and \$5,541 on water quality testing, which amounts to about 40% of an average annual system budget. The increases in these amounts over the past 10 years are on par with the rise in inflation, though as regulations increase and systems age, utilities can expect larger increases in operation and maintenance financial needs.

## PUBLIC SAFETY

All public and private water systems regulated by the EPA are required to test the quality of their water regularly to ensure compliance with EPA and DEQ requirements. If tests result in violations, water systems are required to address the issue immediately. Of the 772 water systems in Wyoming regulated by the EPA, 27 or 3.5% have received formal enforcement actions within the last year as of August 2022. These enforcement actions include failure to monitor for certain contaminants, notify the public and the EPA of violations, deliver an annual report, and clean and inspect a water tank. The public water systems, the DEQ, the EPA, and the State funding boards provide expertise and oversight to quickly and efficiently address issues in water quality when they arise. Strategic ways to strengthen public safety within water systems include assisting and educating operators with reporting requirements and methods, prioritizing updates or replacements for portions of existing systems which are older than 20 years, and identifying and replacing dead-end spans of pipe that can hold stagnant water. In general, the public water systems in Wyoming are facilitating improvements and seeking funding for future needs.

## RESILIENCY

According to the EPA, each community water system serving a population of greater than 3,300 persons is expected to perform a Risk and Resilience Assessment to determine, among other things, the risk to the infrastructure system from natural hazards. After completing the assessment, the community is required to develop an emergency response plan. The EPA reported that all required communities in Wyoming, except for two, have an up-to-date emergency response plan, and that the EPA is working actively with the two systems to

develop their plan.

However, out of the 772 public water systems in the State of Wyoming, 563 of those systems serve a population less than 3,300 persons. While there may be no federal mandate to develop an emergency response plans, local decision makers should consider developing such approaches to protect drinking water infrastructure from malevolent or natural hazards.

## INNOVATION

The public water systems within the State of Wyoming pursue innovative techniques to provide quality drinking water to their users. The techniques include:

- The formation of regional Joint Powers Boards to extend access to quality drinking water and to share the costs of the systems among rural communities;
- The implementation of technologies such as telemetry equipment and radio read meters to improve the accuracy and ease with which operators can monitor and track their systems;
- The integration of leak detection methods to assist operators in locating sources of leaks;
- The use of system-wide water modeling to predict the behavior of the system as reasonably possible under different usage scenarios;
- The development of GIS systems to create comprehensive databases of information on the system and to share maps and information within the public entities.





## RECOMMENDATIONS TO RAISE THE GRADE

1. Continue or increase prioritization of funding for creation or expansion of existing raw water systems or irrigation systems to lessen the burden on drinking water treatment systems and sources.
2. Improve individual water systems' financial stability and funding reserves for improvements by installing meters and regularly reevaluating rate structures to ensure operation, maintenance, and testing costs are being met and funds are being set aside for improvements.
3. Prepare to increase funding to rural water systems due to the coming increase in regulations.
4. Encourage all public water systems in the State to develop an Emergency Response Plan in the case of a natural hazard or malevolent act.
5. Encourage communities to develop raw water or irrigation systems by educating users and expanding the existing funding availability to reduce many communities' burden during times of high-water use.
6. Continue to prioritize assisting and educating operators about reporting requirements and methods.
7. Promote water operator careers and continue to invest in water operator education to ensure the long-term stability of the profession within Wyoming.
8. Prioritize updates or replacements for portions of existing systems which are older than 20 years.
9. Identify and replace dead-end spans of pipe that can hold stagnant water.
10. Implement asset management programs for water systems to support their long-term high level of service and financial stability.



**DRINKING  
WATER**



## **SOURCES**

- EPA's ECHO compliance system: <https://echo.epa.gov/>
- Wyoming Department of Environmental Quality Wyoming Water Development Commission Wyoming State Loan and Investment Board, Drinking Water State Revolving Fund, FY2022 Intended Use Plan
- EPA's website (PDF attached): Basic Information about Wyoming and Tribal Drinking Water Programs in EPA Region 8
- WWDC's 2018 Public Water System Survey Report
- 2020 LEGISLATIVE REPORT WYOMING WATER DEVELOPMENT PROGRAM
- IJJA Fact Sheet
- Wyoming's Water Resources





 ROADS



I-90, SHERIDAN, WY





# EXECUTIVE SUMMARY

Wyoming's 580,000 residents are spread across almost 100 million square miles of often harsh terrain, making safe, resilient roadway connections necessary for essential services, movement of goods, and recreation. 55% of non-interstate highways and 46% of interstates within the national highway system in Wyoming have pavement in good condition, with negligible in poor condition. By contrast, an estimated 39% of state-owned local pavement – and 68% of that county owned – is in poor condition. Not including bridges, a WYDOT-commissioned study found a \$169.2 million annual shortfall for state surface transportation, before accounting for the significant needs at the city and county levels. Significant engineering interventions are needed to reduce traffic deaths in Wyoming, which are sixth worst in the country as a rate of miles traveled and absolute worst as a rate of population: 25.4 per 100,000 compared to 11.0 nationally.

## BACKGROUND

Wyoming has been described as a small town with a very long main street, reflecting the willingness for the citizens to drive longer distances for community, work, recreation, and shopping. This is reflected in Wyoming's more than 14,000 vehicle miles traveled per capita in 2018 which was the highest in the nation, while the next highest state was Mississippi at 11,900.

Wyoming roads are critical for getting people to work, facilitating tourism of the natural beauty of the state, and enabling the agriculture industry to transport their goods to market. The road network is the backbone of the state's economy and allows travel and recreation for the people who live there.

Wyoming has 29,666 miles of public roadway owned by city and county governments, as well as the state and federal governments. Of the nearly 30,000 miles, 11,419 are paved; these segments are where the largest share of vehicle miles traveled are recorded. Additionally, most of the heavy vehicle traffic is concentrated on I-80 where 62.5% of the truck miles are recorded. It has been estimated that over 85% of those trucks are not beginning or ending their routes within Wyoming, meaning that Wyoming forms a "bridge state" that maintains a critical link from the west coast to the Midwest.

EAST SHERIDAN AVE., CODY, WY



## CAPACITY

Wyoming’s low population and rural nature results in some of the least congested roads in the nation. The federal government measures the congestion on the National Highway System (NHS) by travel time reliability, measured as the percent of additional time a motorist can expect it to take to arrive at their destination compared to their expected arrival time – a value larger than 1 indicates congestion issues. Using cell phone data and truck transponders it has been shown people can arrive at their destination within the expected time in Wyoming.

There are isolated roads currently suffering from congestion issues and in need of intervention. Two of these routes are WY22 and WY390 in the Jackson area. In the United States the Level of Service (LOS) metric measures the quality of the vehicle traffic service by 6 letter grades, with “A” being the best and “F” being

the worst. WY22 and WY390 LOS are often assigned a D or E, meaning driving speeds are not reliable and any disruption causes major ripple effects through the system.

Resolving congestion on a medium and long-term basis requires providing motorists with feasible, affordable, safe alternatives to driving. In Jackson, Casper, and Cheyenne – where population is growing in a denser manner – investment in frequent transit routes attracting motorists out of their cars could move more people through the roads. Active transportation infrastructure, such as off-street trails and protected bike lanes in roads invite many drivers to use more affordable transportation tools such as e-bikes on comfortable, safe routes on daily trips.

## CONDITION

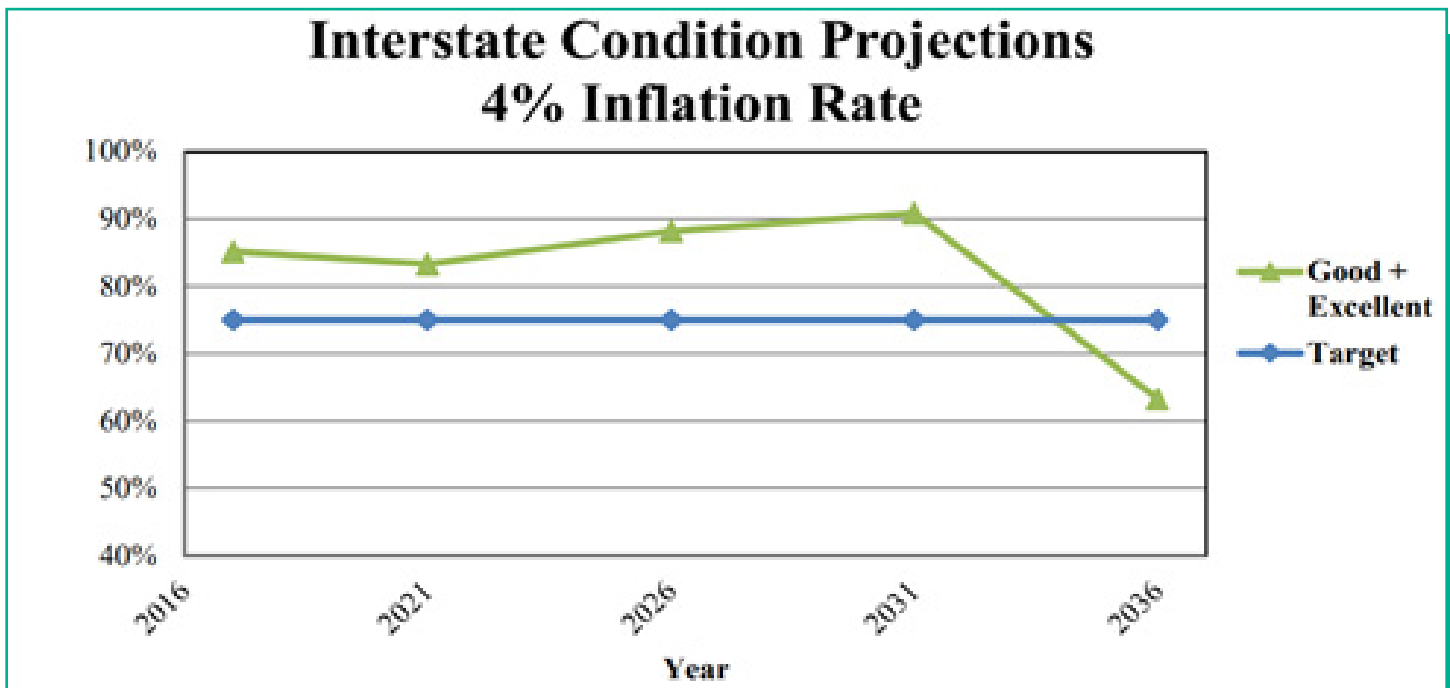
WYDOT uses the national standard method of collecting roadway surface condition by measuring the ride, rutting, and cracking of the pavement. These three measures are used to determine if the road surface is good, fair, or poor and is reported nationally on an annual basis. Fifty-eight percent of Wyoming’s paved roads are owned and measured by WYDOT and are broken down into three categories: Interstates, Non-Interstate NHS, and Non-NHS.

WYDOT has been gathering data on state roads for over 20 years. Combining this data with construction history of the road has resulted in good models predicting future conditions and funding models. Using this data for asset management, an optimized preservation plan was developed, balancing light, medium, and heavy treatments on the highway. While few of the roads are in poor condition, WYDOT’s flat funding and the effects of inflation show funding must increase to maintain current conditions in the future. The following chart from WYDOT’s Asset Management Plan shows the effect of inflation on the interstate pavement condition using the 2016 models and measurements.

NORTH MAIN STREET, SHERIDAN, WY



**FIGURE 1: INTERSTATE CONDITION PROJECTIONS**



The counties own 22% of the paved roads and have begun to gather data using the national and WYDOT-supported methodologies. They have found that most of their roads are in poor condition and are not funded to improve. The counties have set aside funds for the University of Wyoming through the Technology Transfer/Local Technology Assistance Program to gather the pavement surface data along with using ground penetrating radar to determine pavement thicknesses to assist in modeling. The University does provide advice on pavement treatment priorities based on this data.

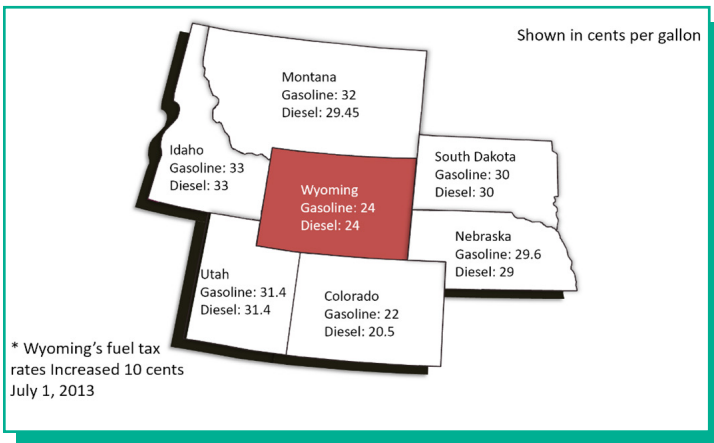
The ride measurement used by WYDOT and the counties is problematic at lower speeds due to factors such as surface drainage and utility features. Therefore, cities in Wyoming do not use it, meaning their pavement conditions cannot be directly correlated with the state and county. The 20% of roads owned by cities is assumed to be similar in condition to the counties. The following table shows the 2019 percentages for the non-county roads and the 2016 data for the county roads.

Road	% Good	% Fair	% Poor
Interstate	46	51	3
Non-Interstate NHS	55	44	1
Non-NHS	44	17	39
County	10	22	68

As a point of comparison to some nearby states' Interstate roadway surface percentage in good condition were reported as: Montana having 58%, North Dakota having 84%, South Dakota having 76%, and Nebraska having 80% good. Nationally the percentage of good Interstate pavement condition is 62% good.

Poor roads increase the cost to people driving and biking by accelerating vehicle and bike depreciation, adding repair costs, increasing fuel consumption and wearing or puncturing tires. Poor roads in Wyoming are calculated by TRIP, a national transportation research nonprofit group, to result in an annual cost of \$356 to each road user per year.

## FUNDING

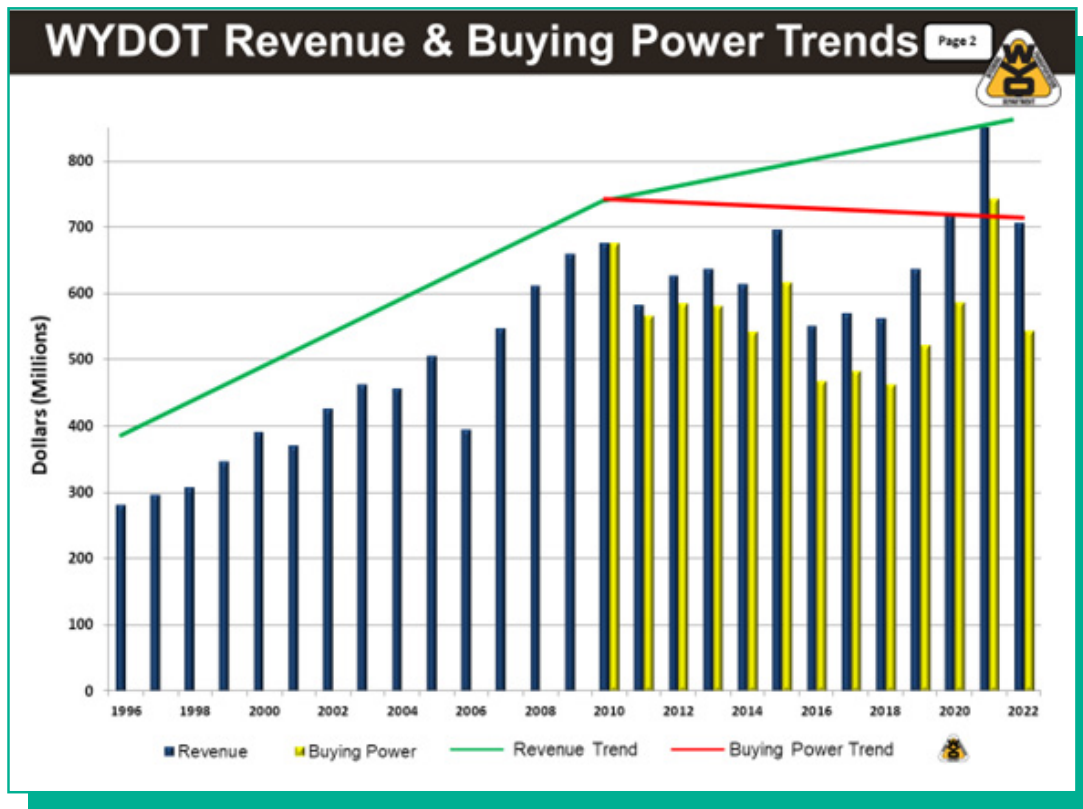


Wyoming residents pay for the use of the roads primarily through the state's fuel tax and registrations. Wyoming's fuel tax is distributed 27.5% to counties, 15% to cities, and 57.5% to the state. Diesel is distributed 20% to counties, 5% to cities, and 75% to the state highways. Currently, Wyoming's fuel tax is about five cents per gallon below the average of the adjoining states and nationally.

A critical partner in the roadway system is the federal government, with their focus on interstate movement of goods and people. WYDOT receives the bulk of the

federal roadway funds coming into the state, currently making up 58.54% of the overall WYDOT budget, and 76% of the capital improvement program. Most of the federal aid requires a match, some at an 80/20 split for federal and state percentages, respectively.

The federal motor fuel tax is currently 18.4 cents-per-gallon, and the federal diesel tax is 24.4 cents-per-gallon. Neither of these rates have been raised since 1993. Inflation and increased vehicle efficiency have significantly decreased the spending power of the gas and diesel taxes. Like the federal rate, state gas and diesel taxes in Wyoming are not linked to inflation. While the last increase of 10 cents per gallon in 2013 was substantial for the towns, counties and the state, inflation has eaten away at how much spending ability these funds provide. The following chart is from the 2022 full budget presentation from WYDOT and strictly in reference to the state highways. However, the trends experienced on state highways represent the same issues seen in counties and towns. The green line is a general trend of the overall budget, while the red line represents the trends including the effect of inflation.



## FUTURE NEED

As discussed above, most of the roadway funds comes from a per-gallon gas tax. As use of electric vehicles expands, fuel efficiency improves, and gas usage decreases, the gas tax becomes more obsolete and drifts further from a “user fee”. Nationally, there has been some movement to a user fee based on the miles driven. This idea is referred to as a Road User Charge (RUC), and for limited roads it could be seen as a toll. A RUC is technologically feasible, but resistance based on difficulty in implantation and privacy issues exist. Inflation continues while the gas tax remains static, and the real purchasing power of existing funds continues to deteriorate. The funding mechanism as it stands now is not sustainable for all transportation system providers.

WYDOT contracted with a consultant in 2021 to review the needs of the state transportation system. One of

## OPERATION AND MAINTENANCE

Funding available to Wyoming road managers at the city, county, and state levels from all sources for road and bridge maintenance may be characterized as adequate to maintain the status quo but is insufficient to improve current conditions. WYDOT has stopped all expansion projects and many reconstruction projects

their findings shows that maintenance is underfunded by \$9.9 million annually, about 10%. This was based on several factors such as the Maintenance Quality Assurance reviews. The WYDOT asset management plan calls for an expenditure of \$160 million for pavement, but the consultant found this is underfunding the true need of \$236.7 million annually. Other surface transportation shortfalls found were traffic, safety, and future highway expansion - \$16.6 million, Wildlife crossings - \$22.4 million, and delayed Statewide Transportation Improvement Program (STIP) projects - \$43.6 million. Not including bridges, the total annual shortfall for state surface transportation is \$169.2 million. It should be noted that these funding gaps do not take into account the significant needs at the city and county jurisdiction.

to focus on maintenance and operations, a “fix it first” ASCE supports. As existing roads age, maintenance costs increase, hindering all agencies’ abilities to make significant gains or even maintain status quo.



ABSAROKA STREET, POWELL, WY



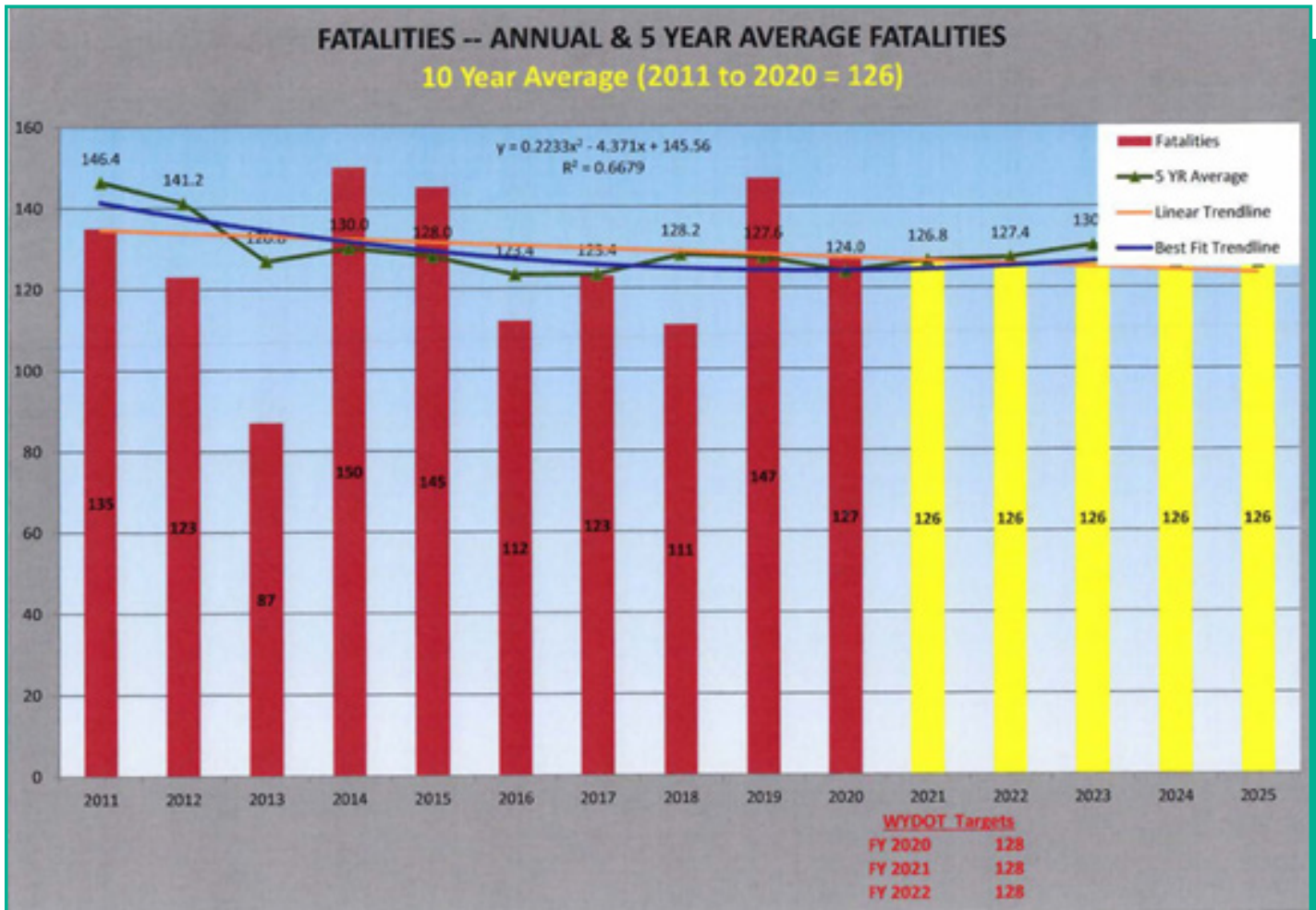
## PUBLIC SAFETY

110 people died on Wyoming roads in 2021 and 128 in 2022 as of December 19th, according to WYDOT – after 127 in 2020 and 147 in 2019. When one looks at the fatalities per 100 million miles traveled, Wyoming is the sixth worst in the nation, and counting fatalities per 100,000 population Wyoming is the worst in the nation: 25.4 compared to the national average of 11.0. These numbers are unacceptable and preventable.

Road engineering and design is a way to reduce fatal crashes and serious injuries from those incidents. Most of Wyoming’s recorded road fatalities are from single vehicle roll-overs or motorists leaving the traveled way. Low-cost improvements for safety in those cases include center and edge line rumble strips, improved physical separation with plastic or metal barriers, and improved signage warning of curves.

While Wyoming’s seat belt usage has increased over the past years, it still lags the national average. Two-thirds of the 76 motor vehicle occupants who died on Wyoming roads in 2021 were not wearing a seat belt.

Wyoming’s pedestrian and bicyclist fatality and serious injury numbers remain stubbornly steady. They represent a tenth of the annual fatality total and are not location-specific, suggesting a need for broad-based improvements in sidewalks, pedestrian crossings, and more designated bike facilities that are physically separated from car traffic.



## RESILIENCE

Resilience of the roadway system is critical in Wyoming due to the lack of alternatives, including redundant routes. Closed routes may cause a several hundred-mile detour to continue a journey during an emergency. WYDOT has reviewed their systems for resiliency, finding most of the issues are related to storms. Freight is most impacted along the interstate corridors, while tourism is more impacted in the mountainous regions.

## INNOVATION

Supporting autonomous vehicles will require vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and infrastructure-to-vehicle (I2V) connectivity to improve monitoring and reporting of road conditions to vehicles. In 2015, the U.S. Department of Transportation (USDOT) selected Wyoming as one of three locations to test and deploy advanced dedicated short-range communication (DSRC) technology to improve safety and mobility. In the Connected Vehicle Pilot (CVP), WYDOT is researching the technology needs on I-80. Other issues of inclement weather, pavement delineation, and information delivery in rural areas have yet to be solved. The good news is currently WYDOT Intelligent Transportation System is fully funded in the annual budget to provide the needed message signs, dispatch ability, 511, and traveler advisory radio.

WYDOT continues to seek funding for freight redundancy along the interstate through the prospective addition of bypass lanes to get around stalled vehicles or more snow control options. Avalanche control on the mountain passes remain an area of emphasis.

WYDOT aggressively pursues wide ranging research projects from wildlife interaction to material usage. These research projects continue to show a positive benefit, and often are directed for implementation on non-state roadway systems. In addition, WYDOT has a program where new materials can be submitted for testing and approval and is available to the other road management agencies.



E. SHERIDAN AVE RECONSTRUCTION, CODY, WY



## Recommendations to Raise the Grade

Despite being underfunded, the state-owned transportation system is currently meeting the federal requirements for minimizing the percent of the system in poor condition. Since the state-owned system moves most people and freight, it is providing the basis needed for the economy. It indicates WYDOT, the cities, and the counties are managing the proper project mixes and continuing innovation efforts to work with a tight budget creatively and efficiently. A predictable and continuous funding of the aging infrastructure and transportation assets that make up the network is needed to cover the ongoing, increasingly expensive maintenance.

The following recommendations have all either been rolled out in other states or are being investigated:

1. Wyoming must correct the short-term funding issue by at a minimum of keeping up with the inflation rate, ensuring funding continues to support cities, counties, and the state ownerships. The lack of funding has generally prevented road managers from improving their systems for the projected future need.
2. Wyoming must consider the long-term funding model to consider the shifting of fuel used, such as the national shift to electric vehicles.
3. State, county, and local governments should incorporate best practices safety designs to each project, including road redesigns that reduce motorist speeds, mitigate rollover crashes, and prioritize the safety of people walking and biking.
4. Wyoming must continue to lead research such as the connected vehicle and wildlife crossing to ensure the system is sustainable and we are ready for the future needs.
5. WYDOT must continue its leadership role in innovation, technology transfer, and assistance of funding for county and city road managers.



ROADS



## Sources

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- Wyoming Department of Transportation Asset Management Plan – 2018
- Dye Management Group Needs Summary Report – November 2020
- Wyoming T2/LTAP “A Monitoring Program of Wyoming County Paved Roads” 2015
- Wyoming Department of Transportation 2021 Full Operating Budget Presentation
- Insurance Institute for Highway Safety – Highway Loss Data Institute: Population, fatal motor vehicle crashes, motor vehicle crash deaths and motor vehicle crash death rates per state, 2019
- Wyoming Highway Safety Data Graphs 2021
- FHWA Transportation Performance Management State Performance Dashboards and Reports





WASTEWATER



PROJECT NAME, LOCATION





# EXECUTIVE SUMMARY

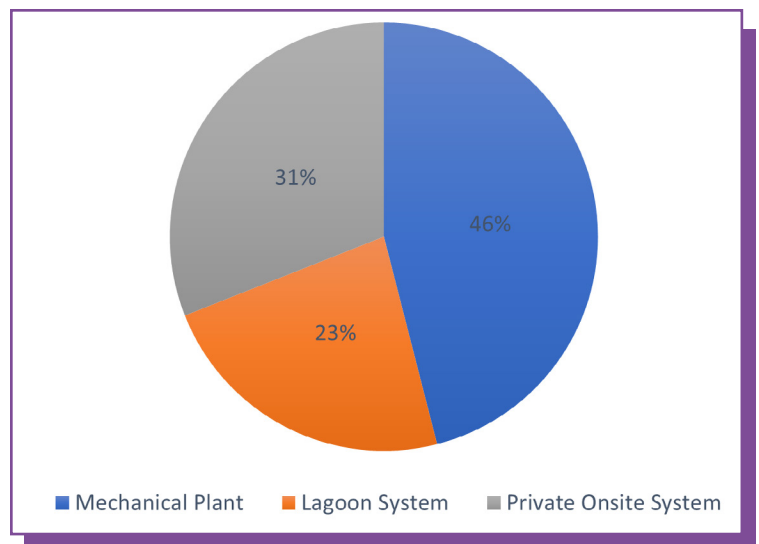
Wyoming's wastewater treatment facilities include publicly owned mechanical wastewater treatment plants (serving 46% of the population), publicly owned lagoons (serving 23% of the population), and private onsite treatment systems (serving 31% of the population). A 2012 study indicated that most of the 96 publicly owned treatment works in the state are under capacity for existing wastewater flows, but notable exceptions in areas expected to grow population are at or over capacity: The Cokeville Wastewater Treatment Plant and Lagoons in Afton, Manville, Sundance, and Wheatland. Almost half of the systems identified in the 2022 Intended Use Plan listed the need to replace undersized sewer mains, pump stations, or other equipment. The 2021 Bipartisan Infrastructure Law will add almost \$10 million to Wyoming's 5-year, \$450 million wastewater spending plan. Local funds may be more difficult to amass with statewide median sewer rates about half of the national average and the failure of a 2020 constitutional amendment to raise the cap on municipally incurred debt.

## BACKGROUND

The people of Wyoming are served by a variety of types of wastewater treatment facilities, including mechanical wastewater treatment plants, lagoons, septic systems, and package treatment plants. Wastewater can be conveyed to the treatment system through sewer services, sewer mains, and pump stations. There are 96 publicly owned treatment works in Wyoming that collectively serve approximately 69% of the state's population, according to the 2012 Clean Water Needs Study completed by the Environmental Protection Agency (EPA). Eighteen facilities are mechanical wastewater treatment plants and 78 are lagoons. Mechanical wastewater treatment plants are more complex and more effective and can treat more pollutants than lagoon systems, which consist of holding ponds that treat wastewater biologically. However, lagoons are less costly to construct and maintain. Both

types of facilities meet Wyoming wastewater treatment regulations and treat wastewater to a suitable degree to discharge into the environment. Eighty six of the 96 publicly owned treatment works in Wyoming serve small communities of less than 10,000 people with 57 facilities serving a population of less than 1,000 people. The remaining 31% of the state's population not served by publicly owned treatment works is served by septic systems or other onsite treatment systems.

## PERCENT OF POPULATION SERVED BY WYOMING'S WASTEWATER TREATMENT SYSTEMS



## CONDITION

The majority of the municipal wastewater collection and treatment systems in Wyoming were constructed in the 1960s and 1970s. Many of the treatment systems have been upgraded since construction, but most collection systems are original. The design life of a sewer main is between 50 and 100 years depending on the material, so many municipalities may need to consider replacement soon, especially in older areas of town.

Each year, as required by the 1987 Clean Water Act, the Wyoming Department of Environmental Quality and the Wyoming State Land and Investment Board develops the Clean Water State Revolving Fund Intended Use Plan which identifies and prioritizes the wastewater treatment and non-point sources projects most likely to apply for funding through the State Revolving Fund in the next five years. The most common wastewater collection and treatment system issues identified in the

2022 Clean Water Intended Use Plan are deteriorating conditions and insufficient capacity of sewer mains and lagoons; compliance problems for E. coli, BOD, pH, ammonia, and total suspended solids; areas of towns with inadequate onsite treatment systems; and infiltration from groundwater and stormwater. The solutions to these issues and opportunities to increase efficiency within treatment systems include replacing, rehabilitating, and upsizing sewer mains, manholes, and pump stations; replacing aging treatment plant equipment; installing emergency generators; rehabilitating or upgrading lagoons; expanding collection systems; installing or extending electronic control systems; and upgrading stormwater infrastructure at the treatment facilities. The 2022 Intended Use Plan Identifies the Basin Lagoon and the Kemmerer-Diamondville facility as being near the end of their useful lifetimes.



8" SANITARY SEWER REPLACEMENT, SPRINGVIEW STREET, THERMOPLIS, WY



**BIG HORN RIVER CROSSING, THERMOPLIS, WY**

## CAPACITY

The 2012 Clean Water Needs Study indicated that most of the 96 publicly owned treatment works in the state are at or under capacity for existing wastewater flows. However, there are notable exceptions that are at or over capacity: the Dixon Lagoon, the Afton Lagoon, the Cokeville Wastewater Treatment Plant, the Glenrock Lagoon, the Manville Lagoon, the Sundance Lagoon, and the Wheatland Lagoon. Dixon's population is not expected to change significantly over the next 20 years but the population of Afton, Cokeville, Glenrock, Sunance, and Wheatland are expected to grow over the next 20 years. The 2022 Intended Use Plan identifies the Reliance/North Sweetwater, the South Big Horn Hospital, the Ten Sleep, and the Park County lagoons as

having reached capacity. The populations of Park County and Big Horn County are expected to grow slightly over the next 20 years, though the populations of Sweetwater County and Ten Sleep are expected to decrease.

Almost half of the systems identified in the 2022 Intended Use Plan listed the need to replace undersized sewer mains, pump stations, and/or equipment. Many areas of the state have inadequate onsite treatment systems, and of these recognized areas, multiple publicly owned treatment works are planning to extend sewer mains to these areas to alleviate this problem.

## OPERATIONS AND MAINTENANCE

The operation and maintenance (O&M) of Wyoming's wastewater treatment systems faces multiple challenges: systems are aging, energy costs are rising, treatment requirements are changing, experts to teach trainings relevant to Wyoming's systems are hard to find, and new manufactured chemicals are being introduced into

wastewater. Hiring new operators is challenging because of a small pool of candidates, low salaries, increasing demands of the job, and challenges in finding training. However, because of advance planning, owners of wastewater systems have generally been successful in hiring new operators as operators retire. To help with



training needs, the Wyoming Water Quality & Pollution Control Association is building a water and wastewater training group to help the operators pass the upper-level exams. This program includes virtual plant tours, groups for sharing experiences, and relevant trainings.

One group of chemicals of concern are per- and polyfluoroalkyl substances (PFAS), which are manufactured coatings and materials with widespread use in many household, commercial, and industrial products. PFAS break down very slowly over time, may cause harmful effects in humans, and have the potential to make sludge disposal significantly more expensive. EPA is taking concrete steps to regulate the discharge of PFAS through wastewater, but regulations are in the early stages. The Wyoming Association of Rural Water Systems is participating in a class-action lawsuit that would have companies responsible for PFAS create a

fund to finance testing to determine what treatment systems have PFAS and remediate any issues, which would allow systems to keep the costs of treating PFAS away from rate payers.

Less is known about the successes and challenges of operating and maintaining onsite wastewater treatment systems in Wyoming. The Wyoming Department of Environmental Quality requires maintenance of systems by the owner but does not require the administration of an O&M inspection program, though counties can require an inspection program. A sound treatment and disposal design, correct installation, continued maintenance, and recognition of when the system has reached the end of its life are imperative to ensure proper treatment and disposal of wastewater and to protect the quality of the receiving water.



## FUNDING

Financing for public wastewater projects comes from federal and state grants and loans, rate payers, local 1% sales taxes, municipal bonds, capital facilities taxes, and cities' reserves. Examples of grants and loans are the Clean Water State Revolving Fund, the Wyoming Capital Construction Loan Program, and the Mineral Royalty Grant Program. The median sewer fee in Wyoming is approximately \$27 for a single-family residence with three household members using an average of 200 gallons of water per day in towns with a population of more than 3,500. That's compared to the national sewer fee of \$54, averaged across all households.

The Wyoming constitution allows municipalities to incur a debt of up to 4% of the assessed value of taxable properties across the service area for wastewater treatment projects. As sewer collection systems and treatment facilities age, this amount may not be enough to keep up with the costs of operations, maintenance, repairs, and replacement of sewer infrastructure, especially considering the age of these systems in Wyoming and environmental regulations which are

regularly updated as treatment technologies advance. A constitutional amendment that was backed by the Wyoming Association of Municipalities to allow the legislature to set a new, ideally higher, limit on municipal incurred debt was on the ballot in the 2020 election and failed.



**SPRINGVIEW STREET SEWER REPLACEMENT, THERMOPHIS, WY**

## FUTURE NEED

Historically Wyoming has been able to finance all projects that apply for financing through the Clean Water State Revolving Fund (CWSRF), although over the last four years the number of anticipated projects and financing needs have generally been increasing. This financing is provided to counties, municipalities, joint powers boards, state agencies, and other political subdivisions to finance wastewater and non-point source projects. Over the next five years, the State Loan and Investment Board expects to award almost \$450 million in financing for 178 wastewater and stormwater projects, with almost \$83 million awarded for 60 projects in Fiscal Year 2022. Through the 2021 Infrastructure Investments and Jobs

Act (IJA) – aka Bipartisan Infrastructure Law – the EPA will provide more than \$9 million in the first of five years to the Wyoming Clean Water State Revolving Fund, including almost \$500,000 in supplemental appropriations to address emerging contaminants. Smaller towns with populations of less than 10,000 people have approximately 33% more funding need per capita than larger towns, though cost per capita is an issue with infrastructure projects across the state. As Wyoming's wastewater infrastructure ages and the need for financing increases, Wyoming's ability to finance all CWSRF-eligible projects may not be possible in the future.

## PUBLIC SAFETY

Wyoming has approximately 92 wastewater treatment facilities regulated under the Wyoming Pollutant Discharge Elimination System (WYPDES) Program, which regulates point source discharge to surface water. Not all publicly owned treatment works discharge to

surface water; many are non-discharging. Twenty-one private treatment facilities discharge to surface water and are required to obtain a permit through the WYPDES program. Of these 92 surface-discharging facilities, 31 have significant violations, which are defined

as “environmental violations of sufficient magnitude or duration to be an enforcement priority”. Seven facilities in the past five years have received formal enforcement actions. The majority of the violations and failures are in smaller systems. Many of these violations are due to inadequate reporting of the data and not because of a failing test result. These reporting inadequacies stem from the use of newer online submission requirements and a lack of operator training on these systems.

## RESILIENCE

Damage from natural disasters in Wyoming is typically not large enough to meet the funding threshold for support from the Federal Emergency Management Agency (FEMA). To support the needs of water and wastewater utilities in Wyoming during emergencies, the Wyoming Water and Wastewater Agency Response Network (WYOWARN) serves as a network to provide mutual aid and assistance among utilities by enabling collaboration and sharing personnel, tools, and equipment.

## INNOVATION

The DEQ monitors wastewater treatment systems through periodic self-monitoring and inspections. If an issue arises at a treatment system, the DEQ works with the owner and operator to correct the issue. When an impairment issue arose at the Brooks Lake Lodge in Fremont County, they took the opportunity to invest in a new treatment technology. Brooks Lake was deemed “impaired” by the Wyoming Department of Environmental Quality after an abundance of nutrients and degraded conditions caused fish kills. It was not clear to what extent the wastewater treatment facility at the Brooks Lake Lodge upstream of the lake was affecting the water quality of the lake, but the lodge invested almost half a million dollars for a new treatment system that uses “bio-dome” technology. This technology uses a combination of floating hexagonal plastic pods on the surface of the sewage lagoon and aeration to ensure proper degradation of sewage in the lagoons. The pods insulate the wastewater and assist in the decomposition of organic matter within the sewage.

The Wyoming Department of Environmental Quality (DEQ) is investigating concentrations of nitrates in local water supply wells that exceed the EPA maximum contaminant level of 10 mg/L in the Hoback Junction area of Teton County. Septic systems are alleged to be causing and/or contributing to the high levels of nitrate concentrations in the study area as concentrations higher than 2 mg/L are indicative of human-caused contamination.

As the threat of cyber-attacks emerge across the nation, Wyoming’s wastewater treatment plants are no exception. These threats span from phishing emails to exploitation of aging technology. The Wyoming Association of Rural Water Systems is coordinating trainings with IT experts to educate treatment plant managers and operators on how to recognize cyber threats, mitigate risks, update incident response plans, and promote awareness.

Some counties in recent years have been increasing the availability of and ease of access to information about onsite wastewater treatment systems. The Casper-Natrona County Health Department has a Sewer Septic Information Lookup Geographic Information System (GIS) with access to permitting documents that enables the public to view information about permitted onsite wastewater treatment systems. Teton County’s GIS shows sewer district and improvement and service district boundaries, pump station locations, and sewer line locations as well as links to permitted septic system applications and site plans for properties with onsite septic systems. This information is valuable for decision makers, engineers, and maintenance providers, as well as the public.



## RECOMMENDATIONS TO RAISE THE GRADE

1. Increase public engagement and participation in wastewater treatment projects and awareness of the important role wastewater collection and treatment systems play in protecting public and environmental health.
2. Require septic systems be inspected and septic tanks be pumped every three to five years.
3. Facilitate more communication between engineers and operators to improve wastewater treatment system design life, simplify system operation, and enable access to expertise.
4. Fund a wastewater circuit rider, similar to the circuit riders who support public water systems, to travel the state to expand support of wastewater operators with system operation, maintenance, government, finances, rate analyses, fixed asset management, applications for loans and grants, and training.
5. Decrease WYPDES violations by improving the collection and reporting of data at systems with multiple violations.
6. Encourage owners and operators of wastewater systems to actively pursue needed replacements and upgrades to take advantage of current available financing and to conduct rate analyses to ensure money is available for current and future operations and maintenance, including operator salaries.
7. Invest in increasing awareness of and training to protect against cyber-attacks.
8. Continue to increase access to existing information about wastewater treatment facilities and collection systems that could increase public knowledge, influence decisions made about new developments by decision makers and engineers, and aid in the maintenance of facilities.
9. Balance risk versus density when planning for new developments, including implementing source water protection plans in all counties.



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