2020

REPORT CARD FOR WEST VIRGINIA'S INFRASTRUCTURE

West Virginia Section of the American Society of Civil Engineers

INFRASTRUCTUREREPORTCARD.ORG/WESTVIRGINIA

ASCE

AMERICAN SOCIETY OF CIVIL ENGINEERS

COVER PHOTO:
NEW RIVER GORGE BRIDGE ON US 19 OVER NEW RIVER, FAYETTEVILLE, WEST VIRGINIA

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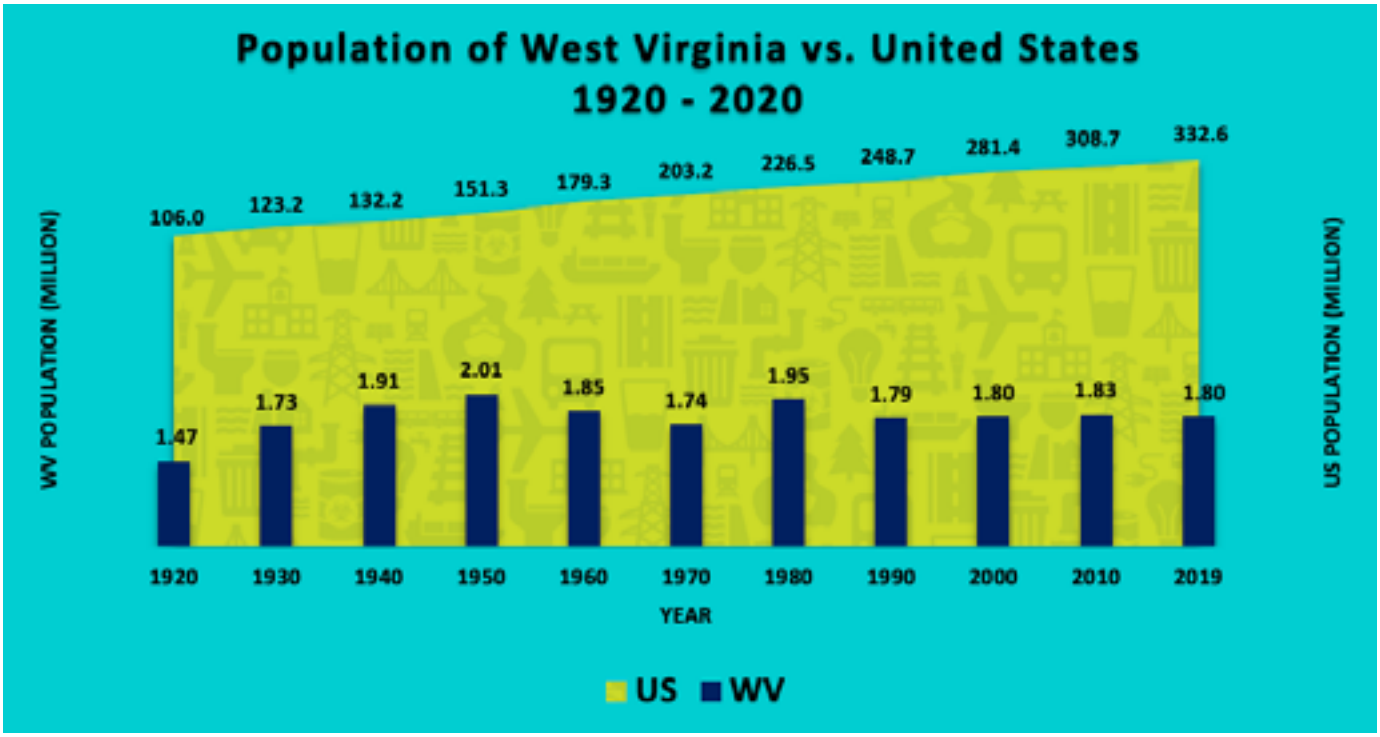
EXECUTIVE SUMMARY

West Virginia is full of natural beauty due to its rivers, lakes, and mountains. Residents and visitors enjoy fishing, boating, and hiking, but depend upon the state's critical infrastructure to access and preserve these resources while also providing for other everyday needs. However, West Virginia's population is declining. Much of the state's infrastructure constructed over the past 70 years has deteriorated while new construction, replacement, rehabilitation and repair efforts have not kept pace with the needs. West Virginia's challenges beg important questions: How will West Virginians maintain the aging infrastructure to ensure our families, friends, and visitors are safe? Does the state have adequate resources to maintain safe roads and bridges, provide clean drinking water, properly collect and treat wastewater, and ensure dams protect households and property?



Fortunately, every day, civil engineers focus on these types of infrastructure questions. Because infrastructure impacts so many aspects of the lives of West Virginia's citizens, the West Virginia Section of the American Society of Civil Engineers (ASCE) evaluated key aspects of our state's infrastructure. West Virginians benefit from this objective review undertaken by engineering experts. The 2020 West Virginia Infrastructure Report Card represents the first evaluation performed by the West Virginia Section of ASCE and focused on five categories of infrastructure.

In 2020, the overall grade for West Virginia's infrastructure was a cumulative grade of D. For comparison, the 2017 ASCE National Infrastructure Report Card for similar categories had a cumulative grade of D+. While West Virginia's grades are only better in one category, most are equal to or below the national grades and need to improve.

AVERAGE POPULATION AGES WEST VIRGINA AND UNITED STATES

Year	WV	US
1950	25.1	25.2
1960	28.5	29.2
1970	30.0	28.1
1980	30.4	30.0
1990	35.4	32.9
2000	38.0	35.3
2010	41.3	37.2
2019	41.9	38.4

Recommendation to raise West Virginia's grades include:

- Sustain the current momentum provided by the Roads to Prosperity program to remove all posted and poor condition bridges in the system.
- Increase overall investment in transportation sector is greatly needed. Nearly 10,000 jobs in West Virginia would be created if there was a $500 million annual increase in additional highway revenues. The FHWA estimates that $1.00 spent on road, highway and bridge improvements results in an average benefit of $5.20 in the form of vehicle operating costs reduced delays, and improved safety.
- Create a common system of criteria to be used to determine which projects are a priority to spend the state's limited funding. This would provide funds to make improvements to West Virginia's priority drinking water and wastewater infrastructure needs.
- Consolidate, when financially and geographically feasible, various wastewater plants to provide more resources to struggling utilities.
- Create a bond program for funding of water and wastewater systems similar to the 2017 Roads to Prosperity Program. This could be accomplished via a bond issue that would increase the grant and loan funding available through the West Virginia Infrastructure and Jobs Development Council (WVIJDC).
- Increase funding for the WV Dam Safety Rehabilitation Revolving Fund Program to expand resource accessibility for improvements and construction more accessible.

How will these challenges be addressed? The answer begins with this engagement. We hope the 2020 Report Card for West Virginia's Infrastructure will help by increasing awareness of infrastructure needs to help focus the discussion and limited resources on improving infrastructure to support West Virginia's economy and quality of life throughout the Mountain State.

ABOUT THE INFRASTRUCTURE REPORT CARD

GRADING CRITERIA

ASCE-West Virginia 2020 Report Committee is a group of dedicated civil engineers and engineering students from West Virginia who volunteered their time to collect and analyze data, prepare, review and revise each section, and develop the final Report Card. The committee worked with ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to provide West Virginia with a snapshot of the state of our infrastructure as it relates to us at home and on a national basis.

The Report Card Sections are analyzed 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

A
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.

B
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.

C
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.

D
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.

F
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.

2020 REPORT CARD FOR WEST VIRGINIA'S INFRASTRUCTURE

BRIDGES	D+
DAMS	D
DRINKING WATER	D
ROADS	D+
WASTEWATER	D

GPA

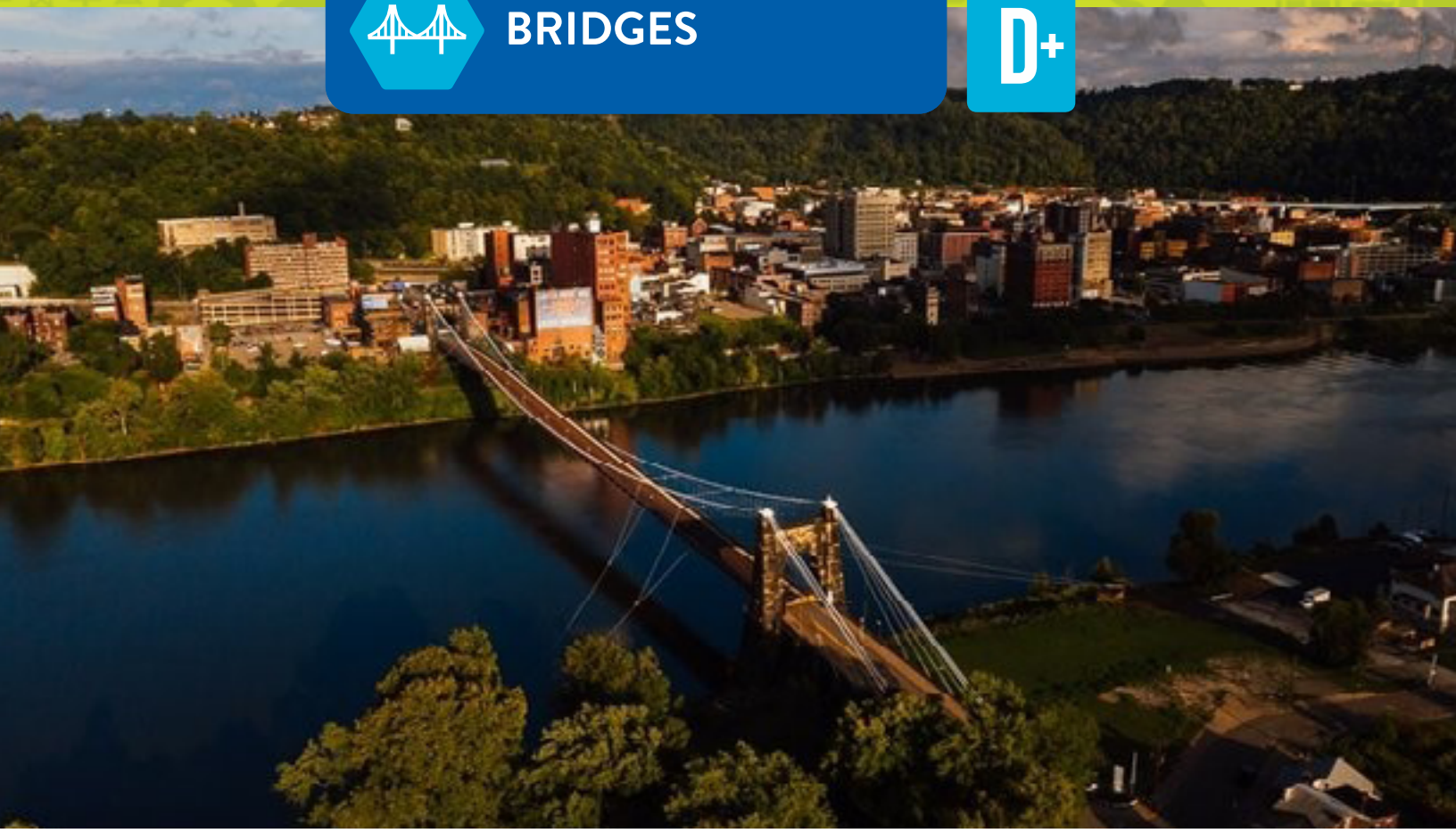
D

COMPARISON OF **2020 WEST VIRGINIA** AND **2017 NATIONAL GRADES**

Category	2020 West Virginia	2017 National
Bridges	D+	C+
Dams	D	D
Drinking Water	D	D
Roads	D+	D
Wastewater	D	D+

BRIDGES

D+



BRIDGES
GRADE: D+

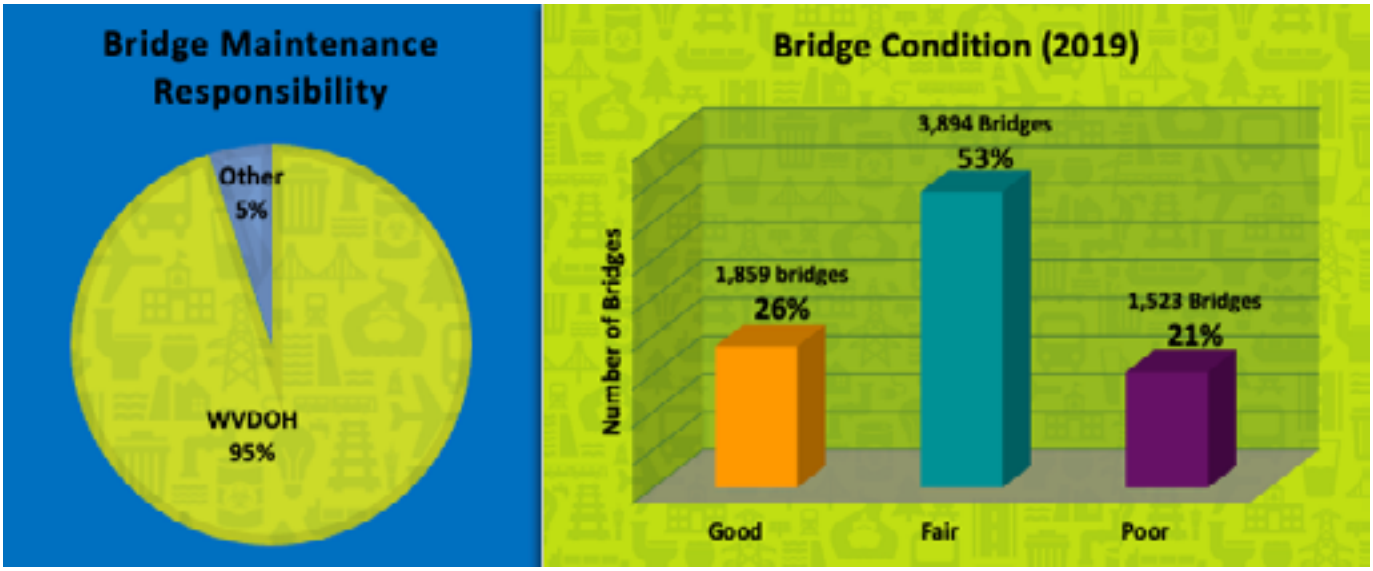
EXECUTIVE SUMMARY

It is crucial for West Virginia to have an exceptional bridge network so that residents and visitors can enjoy the beautiful mountain ranges and scenic views the state's blessed with. Over 95% of the state's 7,291 bridges are maintained by the West Virginia Division of Highways (WVDOH). Of those bridges, 21% or 1,531 are structurally deficient, a much higher percentage than the national average of 7%. Replacing, widening, strengthening, or repairing efforts are estimated to cost the state around $2.9 billion. In 2017, to address this investment need, the state increased the gas tax by 3½ cents per gallon which generates an additional $750,000 per year in funding. In that same year, the state also voted to fund The Roads to Prosperity initiative that includes funding measures that are expected to generate approximately $2.8 billion for highway and bridge construction over several years.

CONDITION AND CAPACITY

There are 36,000 miles of state-maintained highways in West Virginia. Given the topography of West Virginia, the number of rural bridges (6,176) greatly exceeds the number of urban bridges (1,115). Over 95% of the state's bridges are maintained by the West Virginia Division of Highways (WVDOH), making West Virginia one of the few states that maintain most of the bridges within its borders. The Federal Highway Administration (FHWA) still assists with funding the state's bridges, however it is up to the WVDOH to match this funding and assume full responsibility for the system.

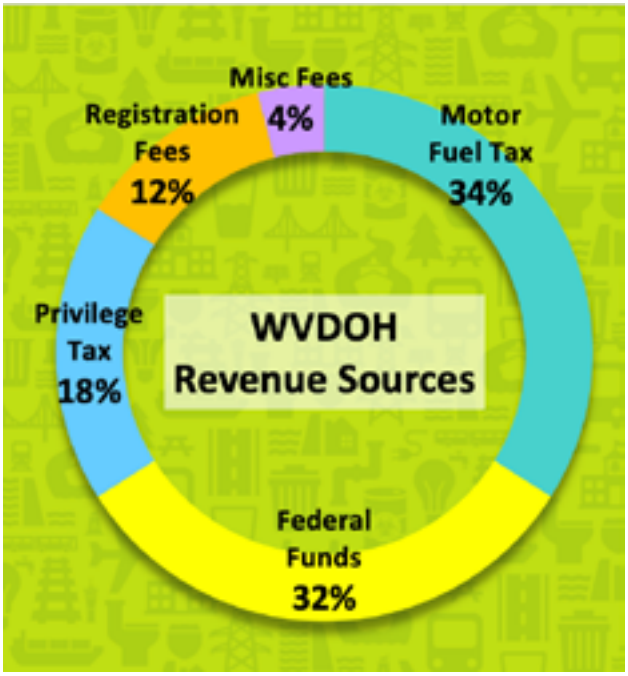
The FHWA establishes the guidelines for determining the condition of the nation's bridges; a poor rating means that a bridge is classified as structurally deficient. Although a bridge is classified as structurally deficient does not necessarily mean that it is unsafe but means that at least one of its features is assessed as poor. According to this classification, 21% of bridges in West Virginia are structurally deficient, well above the national average of just over 7%. This means that 1,531 out of 7,291 fall into this category, a value that has increased by 522 in the last 5 years. Furthermore, of the state's 40.7 million square feet of bridge deck, approximately 6.6 million square feet is structurally deficient.



Another critical factor of bridge infrastructure is structural capacity. Bridges are designed to carry certain loads in accordance with federal criteria. If a bridge is unable to carry these loads, it will be posted to alert motorists that it can only carry specified reduced loads. Approximately 907 of 7,291 bridges in West Virginia are posted for load restrictions. This equates to around 12.4% of all bridges in the state. Nationally, approximately 1 in 10 bridges or 10% are posted.

OPERATION & MAINTENANCE AND FUNDING

To maintain the state's inventory, West Virginia's bridges are inspected in 24-month intervals in accordance with the National Bridge Inspection Standards (NBIS). A small number of bridges meet the requirements for 4-year inspection intervals. Some more critical bridges are inspected yearly. Evaluating structures with a risk-based approach can decrease the interval to 12 months or less. These are federal guidelines that each state must follow. This allows West Virginia to locate and evaluate existing bridge deficiencies to ensure the safety of the traveling public. This also helps the state address any critical issues that are found and help slow deterioration of existing bridges.



Policies for new bridges are being implemented to ensure durability and safety, such as the use of weathering steel and jointless bridges. The Bridge Design Manual that was developed by the WVDOH, Engineering Division, is a guide for engineers to follow on the state's bridge design projects. It provides policies and design procedures for developing bridge contract plans and documentation.

Funding for West Virginia's bridges is obtained from state and federal sources. Primarily, the state funding comes from the State Road Fund which receives money from federal reimbursements and state revenue collections. Federal investment comes through the Highway Trust Fund (HTF) and authorized programs under the Fixing America's Surface Transportation (FAST) Act. The HTF is funded through a gas tax, which was raised in 2017, and the FAST Act expires September 2021. In FY2020, the federal investment was estimated to be $467 million.

State revenue includes motor fuel taxes, vehicle registration, vehicle privilege taxes and other miscellaneous fees. Currently, the gas tax in West Virginia is 35.7 cents per gallon of gas purchased. The vehicle registration fee has a fixed rate of $51.50 for one year and $103 for two years. Also, fees to title a new vehicle include a $15 title fee, 6% tax on purchases over $500, or $30 on vehicles with a purchase price under $500. Tolls are considered a miscellaneous fee to contribute to funding. As of January 1, 2019, the WV Turnpike has three mainline toll plazas in the state that saw the rate charged for a passenger car double from $2 to $4, the first increase since 2009. West Virginia also has the E-Z Pass, which allows travelers a discounted rate with each use.

An extremely significant part of current funding for West Virginia is the Roads to Prosperity program. Beginning in 2018, a total of $2.8 billion was being invested in capital projects over a four-year period. Funding for the program consists of $1.7 billion in General Obligation Road Bonds (GO Bonds), $550 million in Turnpike Revenue Bonds, and $500 million in Grant Anticipated Revenue Vehicle Bonds (GARVEE Bonds). Due to the massive size of this program, fiscally and the number of projects slated to be included, it is being delivered in waves over multiple years.

The COVID-19 pandemic has impacted state revenues and construction programs according to an ARTBA write-up from July 2020. It explains that revenues for the West Virginia State Road Fund were down by $38.4 million compared to original estimates from the State Budget Office.

FUTURE NEED

More state and federal funding is needed to maintain bridges in West Virginia. According to the 2020 American Road and Transportation Builders Association (ARTBA) Bridge Report, West Virginia's replacement, widening and strengthening costs were around $2.9 billion for approximately 3,660 bridges, with this cost rising each year. Over the last ten years, WVDOH revenue has averaged $1.15 billion each year to be reinvested back into the entire transportation program which includes all transportation related programs not just bridges.

Under the current federal program, transportation agencies tend to delay needed repairs and preventive maintenance and instead direct funds toward new construction projects, rather than toward fixing the existing problems at hand. If this practice continues, the future cost for bridge repair and maintenance will only increase over time.

PUBLIC SAFETY

Public safety is one of the most important aspects of a bridge. However, in recent years, more bridges are being classified as structurally deficient with over 4.5 million trips taking place over West Virginia's structurally deficient bridges each day. A slight majority of these trips, 55%, are occurring on bridges in urban settings.

The WVDOH is responsible for inspecting all bridges under its jurisdiction and control. If any bridge is found to be unsafe the Commissioner of Highways shall promptly condemn, close, and repair it. A bridge can be deemed safe but in need of weight restrictions to ensure continued use and safety for everyday motorists. The Commissioner of Highways may issue permits for applicants whose vehicles exceed legal load limits. These permits are monitored by WVDOH engineers and are commonly issued for single trip use.

RESILIENCE

Resilience is defined as an infrastructure system's ability to withstand or protect against multi-hazard threats in order to maintain or quickly recover its critical services with minimum consequences for public health, safety, the economy and national security. Some ways that West Virginia is pursuing resilience is by extending the system's service life and preventing structural deterioration and failure through asset management and improved materials.

The Transportation Asset Management Plan (TAMP) is a risk-based management approach where assets are evaluated to determine the level of expected risk and to establish appropriate mitigation plans. One of the strategies to address this risk is to update and review the Emergency Management Plan (EMP) every year.

Additionally, WVDOH has started limiting expansion joints on bridges, requiring the use of class H concrete (low-permeability) for decks to provide a second layer of protection against moisture and other contaminants from leaching into and deteriorating the deck, and epoxy coated reinforcement to reduce corrosion in decks.

Finally, WVDOH is trying to implement a 100-year service life design for new bridges within the state. This 100-year service life requirement is for non-replacement components on the bridge such as foundations, abutments, piers, etc. A non-replacement element is one that cannot be replaced through routine construction practices. This 100-year service life is currently only being used on the I-64 Nitro/St. Albans Bridge Replacement Project, but more projects are expected to follow.

INNOVATION

West Virginia is making efforts to utilize innovative technology to improve bridge infrastructure. Recently, the WVDOH constructed two press-brake-formed steel tub girder bridges. This design allows the bridge to be installed as a modular unit that can be transported to a project site, saving time and reducing costs. In addition, the state has adopted the use of Ultra High-Performance Concrete (UHPC). Advantages of UHPC include increased strength and durability and better overall performance characteristics, which result in increased safety and reduced costs. WVDOH is deploying the use of UAS (Unmanned Aerial System) for bridge inspections to help alleviate safety and congestion concerns for the traveling public and bridge inspectors. This system allows for faster, and sometimes more efficient, data collection. While this practice will not replace bridge inspections mandated by the FHWA, it will enhance them.

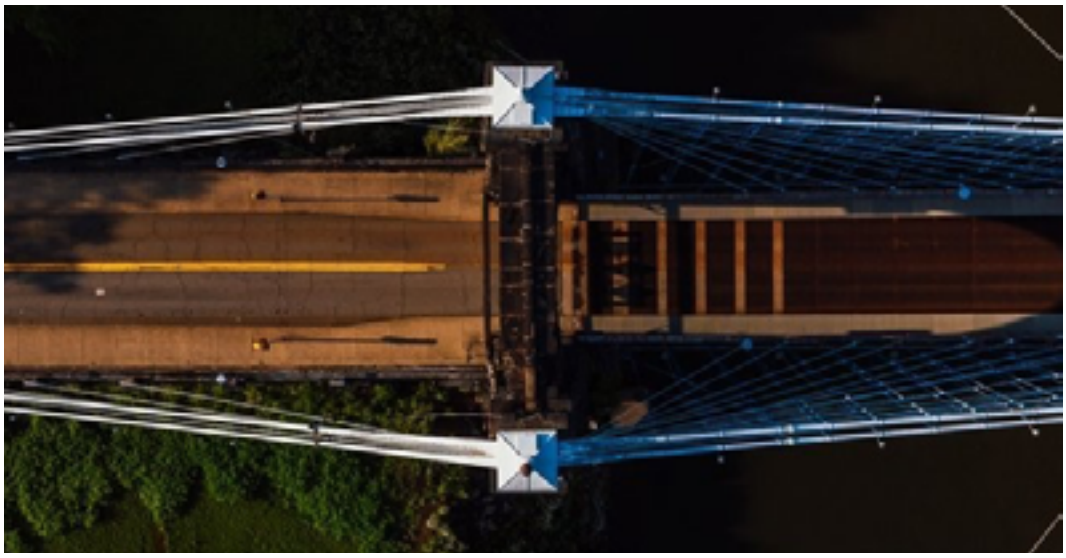
WVDOH uses sodium chloride (salt), calcium chloride and brine to treat the roads in anti-icing efforts. The New River Gorge Bridge in Fayetteville, West Virginia was the longest steel single-arch bridge in the world until 2003. The deck on this bridge is treated with cinders that have non-corrosive de-icing properties, because salt will degrade the steel. Unfortunately, it is cost-prohibitive to do this with every bridge in the system, so they continue to be treated with de-icing methods that potentially degrade bridge structures.

BRIDGES

D+

RECOMMENDATIONS TO RAISE THE GRADE

- Increase the funding needed from state and/or federal levels for proper operation and maintenance of current and future bridges.
- Continue to use to the TAMP to prioritize and decrease the structurally deficient bridges.
- Increase the amount of research done with specific products including expansion joint materials, concrete, and corrosion protection to name a few, to propel the industry toward better building products and rehabilitation methods that would prolong the life of West Virginia's bridges.
- Sustain the current momentum provided by the Roads to Prosperity program to remove all posted and poor condition bridges in the system and to maintain bridges so that they do not slip into the structurally deficient category. This would mean continuing the funding provided by the program, continuity in leadership philosophy and commitment to transportation, collaboration with FHWA, and perhaps cost sharing with private partnerships.



DEFINITIONS

West Virginia Division of Highways (WVDOH) - responsible for planning, engineering, right-of-way acquisition, construction, reconstruction, traffic regulation and maintenance of more than 36,000 miles of state roads

Federal Highway Administration (FHWA) - provides stewardship over the construction, maintenance and preservation of the nation's highways, bridges and tunnels

Structurally Deficient - when a significant load-carrying bridge element (deck, superstructure, substructure, or structural adequacy) is in poor condition or worse due to deterioration and/or damage

Privilege Tax - a tax levied in exchange for a privilege or license granted to the taxpayer. The fee for registering a motor vehicle is an example

Ultra High-Performance Concrete (UHPC) - concrete that meets a special combination of performance and uniformity requirement

Transportation Asset Management Plan (TAMP) - a strategic and systematic process of operating, maintaining, upgrading and expanding physical assets effectively throughout their life cycle

American Road and Transportation Builders Association (ARTBA) - a non-partisan federation whose primary goal is to aggressively grow and protect transportation infrastructure investment to meet the public and business demand for safe and effective travel

SOURCES

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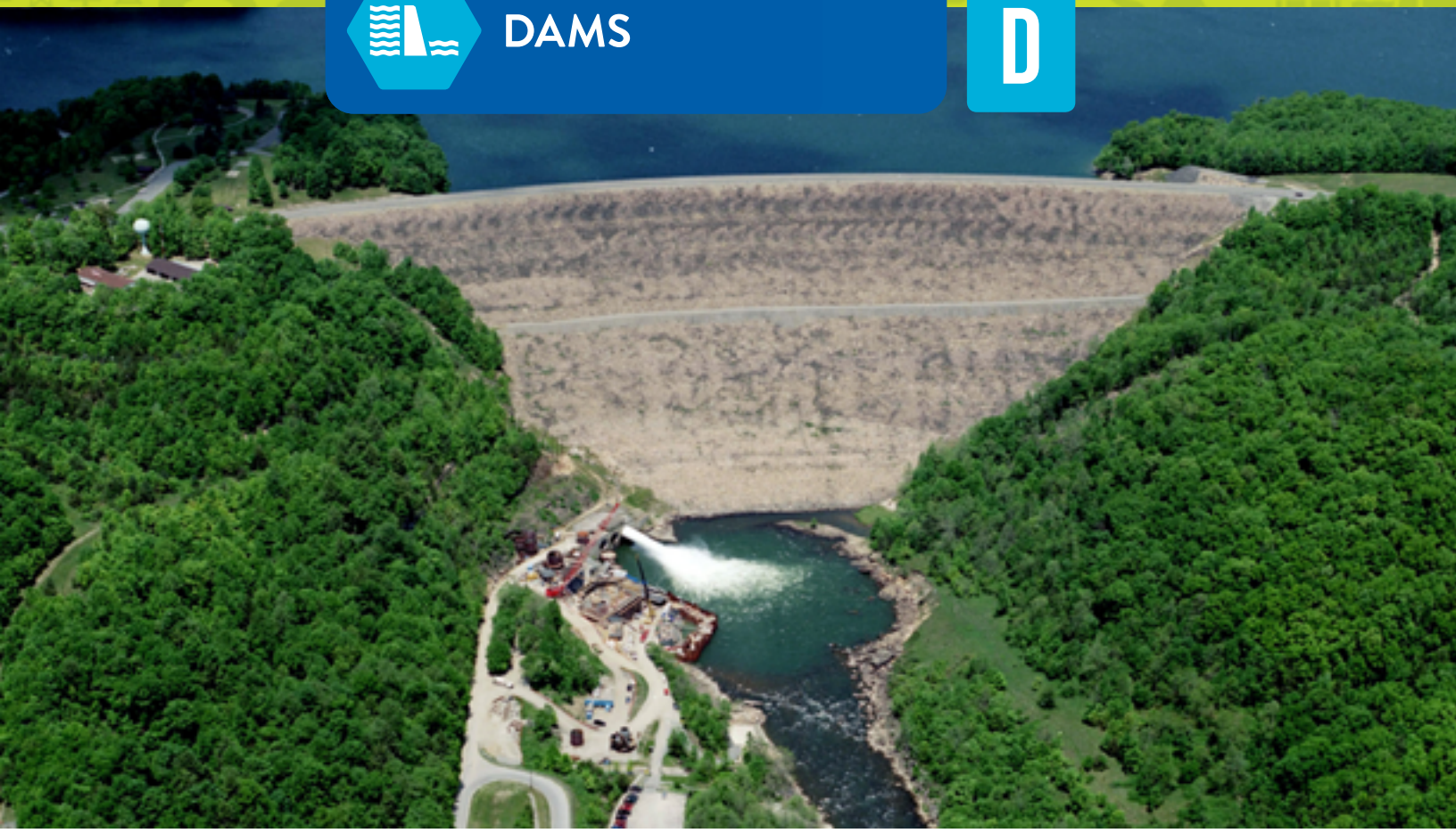
DAMS

D



DAMS
GRADE: D

EXECUTIVE SUMMARY

Since the Buffalo Creek Dam failure in 1972, West Virginia continues to make improvements to dams across the state. Assistance from regulatory agencies is increasing with additional funding and staffing. Seventy-five percent of the state's dams are classified as high hazard potential, and 75% of those have current Monitoring and Emergency Action Plans (MEAPs) – essentially tying the national average of 74%. Approximately 89% of West Virginia's state regulated high hazard dams are rated to be in fair or satisfactory condition compared to approximately 71% nationwide. With ever-rising costs for operation, maintenance, and repair, West Virginia still faces funding needs of more than $900 million and a long road ahead for increasing education and interest for protecting the state's dam infrastructure.

INTRODUCTION

Having geography earning her the nickname "The Mountain State," West Virginia's beauty may only be rivaled by her challenges. Dams play a key role in life through flood mitigation, recreation, and power production, to name a few ways. While federal dams are required to abide by their own regulations, all other government and privately-owned dams meeting certain criteria are required to abide by the specifications and guidelines set forth in the West Virginia Dam Control and Safety Act and the West Virginia Dam Safety Rule. These criteria are outlined in the Definitions section at the end of this report.

The state has a long history in the coal mining industry and has seen many dams constructed for operational purposes. While some values in this report include those, the report primarily focuses on non-coal dams as part of West Virginia's infrastructure as regulated by the West Virginia Department of Environmental Protection (WVDEP) Dam Safety Section and the federal government. Each year, age and weather continue to take their tolls on these structures, further increasing the need for additional action.

CONDITION AND CAPACITY

Recent dam failures in the country – including Michigan's Edenville Dam and Sanford Dam in 2020 – have highlighted the importance of dams and their conditions. According to the latest United States Army Corps of Engineers (USACE) published National Inventory of Dams (NID), the average age of the 586 dams in West Virginia is 53 years. In West Virginia, according to the 2019 NID, approximately 75% of dams are classified as high hazard potential, 15% significant hazard potential, 4% low hazard potential, and 6% undetermined.

DAMS BREAKDOWN (WITH MEAP[2])

	High Hazard Potential	Significant Hazard Potential	Low Hazard Potential	Undetermined Potential	Total
Federally Regulated	12 (12)	13 (13)	4 (0)	0 (0)	29 (25)
State Regulated[1]	345 (249)	71 (42)	18 (6)	26 (2)	460 (299)
Not Regulated	75 (63)	4 (2)	5 (3)	13 (1)	97 (69)
NID Total	432 (324)	88 (57)	26 (9)	40 (3)	586 (393)

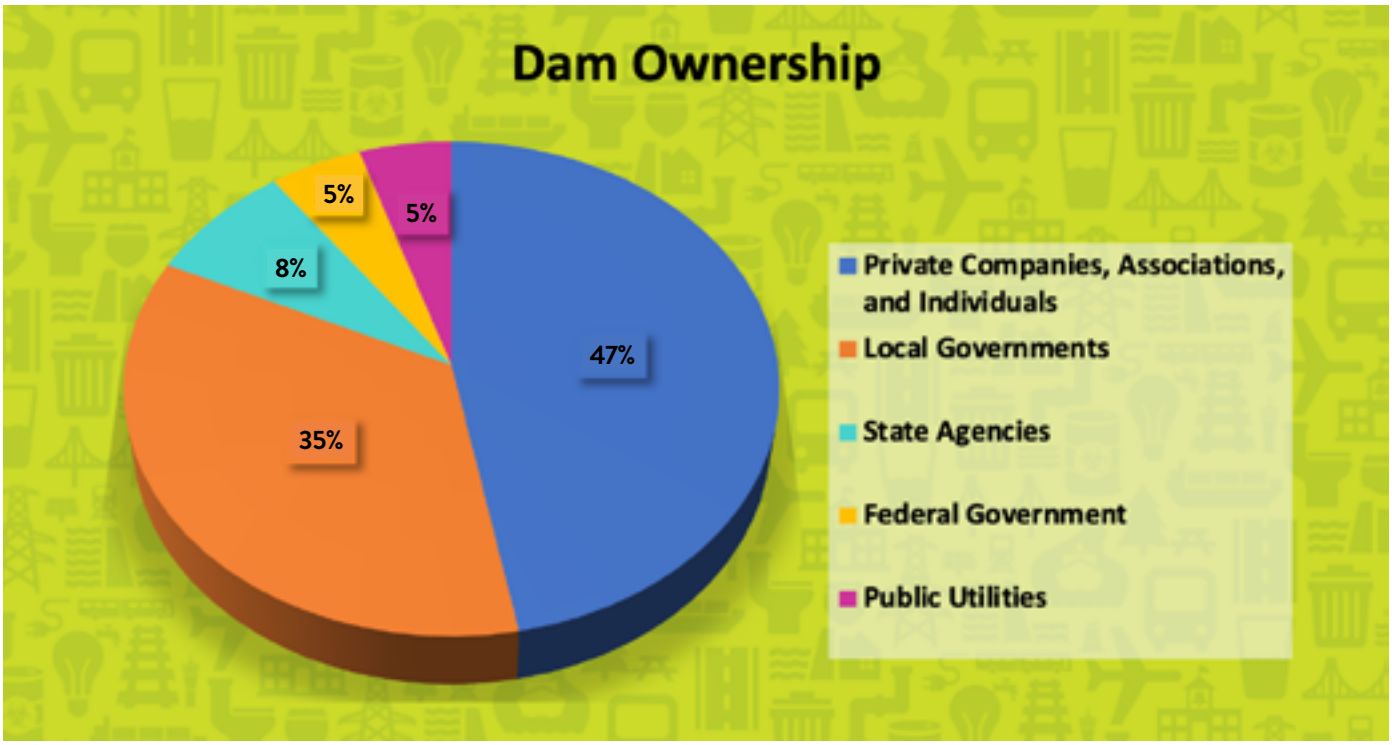
Source: NID, 2019 information

[1] Includes privately owned and those regulated by the WVDEP Division of Mining and Reclamation.

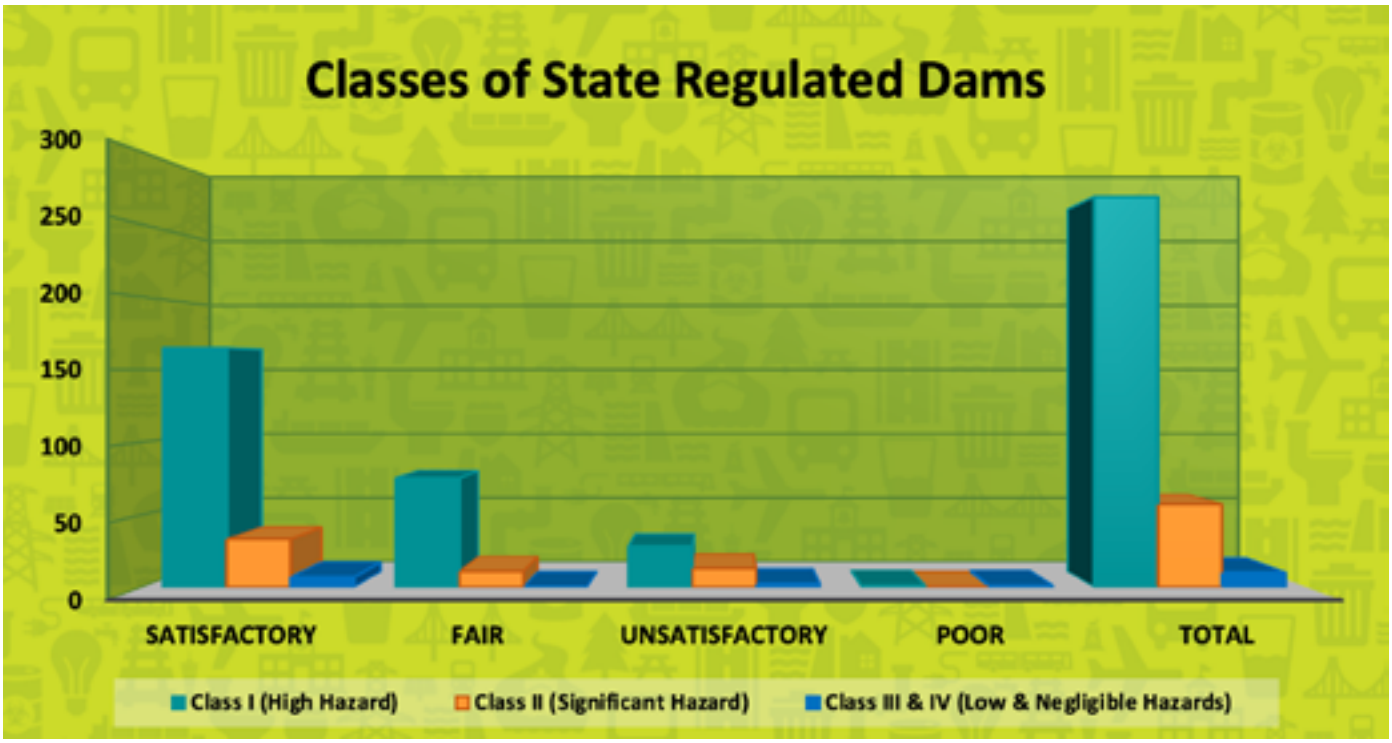
[2] See 'Public Safety & Resilience' section below for information on MEAPs.

The WVDEP Dam Safety Section also classifies dams and does so using four classes. These classifications (I, II, III, and IV) largely mirror those of the NID and are primarily determined by risk assessment and potential damage suffered from failure.

The state regulates 78% of dams, while federal agencies regulate 5%. The remaining dams are unregulated according to both the WV Dam Safety Program Performance Report and the 2019 NID. Many dams are initially given an NID number in the state's inventory, but they are later found to be too small or have been modified to be too small for their jurisdiction – and are therefore not regulated. Just because a structure was given an identification number in the NID does not mean it is a "dam" as defined/regulated by the Dam Safety Act. The dam may also have been completely removed. In some cases, one may have been designed and approved but was never built.



Many dams are affected by some combination of major issues including seepage, slips, missing or dilapidated toe drains, regular maintenance and outlet channel work. Based upon the NID criteria, 75% of West Virginia's fly ash dams are in Fair or Satisfactory condition. While all state regulated dams have yet to be assessed, current numbers show that approximately 89% of the high hazard dams are in fair or satisfactory condition.



Source: WVDEP Dam Safety Section, 04/29/2020

Notes:

1. Non-coal dams.
2. Information for dams within their jurisdiction and having an NID rating.
3. The Dam Safety Section categorizes dams within their jurisdiction by hazard class and compliance. However, to participate with the NID, the Dam Safety Section is in the process of assessing their dams using the NID's satisfactory rating system. This process has not yet been completed.
4. This same information was not available for federally owned and regulated dams.
5. Explanation of Classes can be found in Definitions section below.

According to the NID, the number of new dams completed in West Virginia peaked in the 10-year period from 1960 to 1969 at 141. The 1980s and 1990s saw 23 new completions each decade. While there are 185 undetermined completion dates, there have been only 24 dams completed since 2000 – approximately 20 years. While the sizes and uses are unknown, this slowing trend in construction of new dams may follow the state's decreasing population and declining mining industry.

OPERATION & MAINTENANCE

Operation, maintenance, repairs and improvements to dams are all significant propositions. The state has 29 federally owned dams and 281 dams owned by local governments, state governments and public utilities. Two hundred and seventy-five dams are privately owned – many of which are located on federal or state property. The frequency and level of operation and maintenance (O&M) attention for the state's dams can oftentimes be linked with the infrastructure's ownership. Unlike government and utility owners, when private owners must bear the financial burden for O&M, routine practices may go unaddressed.

To assist those dams under the State's jurisdiction, the Dam Safety Section currently utilizes four full-time engineers and two full-time inspectors for the entire state. Through inspections and reviews, they can provide guidance to owners. With 460 state-regulated dams – 345 of which are high hazard potential – this equates to each employee overseeing 77 dams (58 Class I). While the national average of 191 dams per full-time regulatory employee is significantly higher, the national average of 28 high hazard potential dams per person is quite a bit lower.

FUNDING AND FUTURE NEED

Current estimates to rehabilitate deficient dams in West Virginia total around $906 million according to the Association of State Dam Safety Officials (ASDSO). While private owners are responsible for investments in safety, rehabilitation and repair of their dams, federal funding may be available to them to aid repairs and maintenance. A new grant program, Rehabilitation of High Hazard Potential Dams (HHPD), through FEMA, allotted $10 million for all states in 2019 for a 35/65 owner/grant match. These funds are authorized to increase to $40 million in 2020 and $60 million each fiscal year from 2021 through 2026, though the program was underfunded at $10 million in 2020.

The Dam Safety Rehabilitation Revolving Fund Program was established in the West Virginia State Code to make federal funds available through a state-managed loan program. Unfortunately, the revolving loan fund has yet to become operational.

Funding for the Dam Safety Section is provided through the General Revenue, the Dam Safety Fund as provided by State Code, and a FEMA Grant through the National Dam Safety Program. Over the last three years, the budget has increased by 5.5%, which enabled the addition of two inspectors in 2018.

According to the WV Dam Safety Program Performance Report, the dam safety state budget per regulated dam was approximately $2,000 in 2018, which was above the national average of approximately $700 per state regulated dam. However, the dam safety state budget for regulated high hazard potential dams was below the national average, approximately $2,450 for West Virginia compared to $4,650 per dam nationally. Given the societal changes brought on in 2020 due to COVID-19, it is anticipated that potential funding will be further hurt in the future. While the full economic impact has yet to be seen, potential redirection of resources and decreases of revenues in some areas could lead to additional deferred maintenance and improvements to dams.

The need to maintain and improve dams continues to increase. New data and revised evaluation techniques have determined some dams to be inadequate to store and pass their required design storms. Thus, improvements will be an increasing challenge in the future.

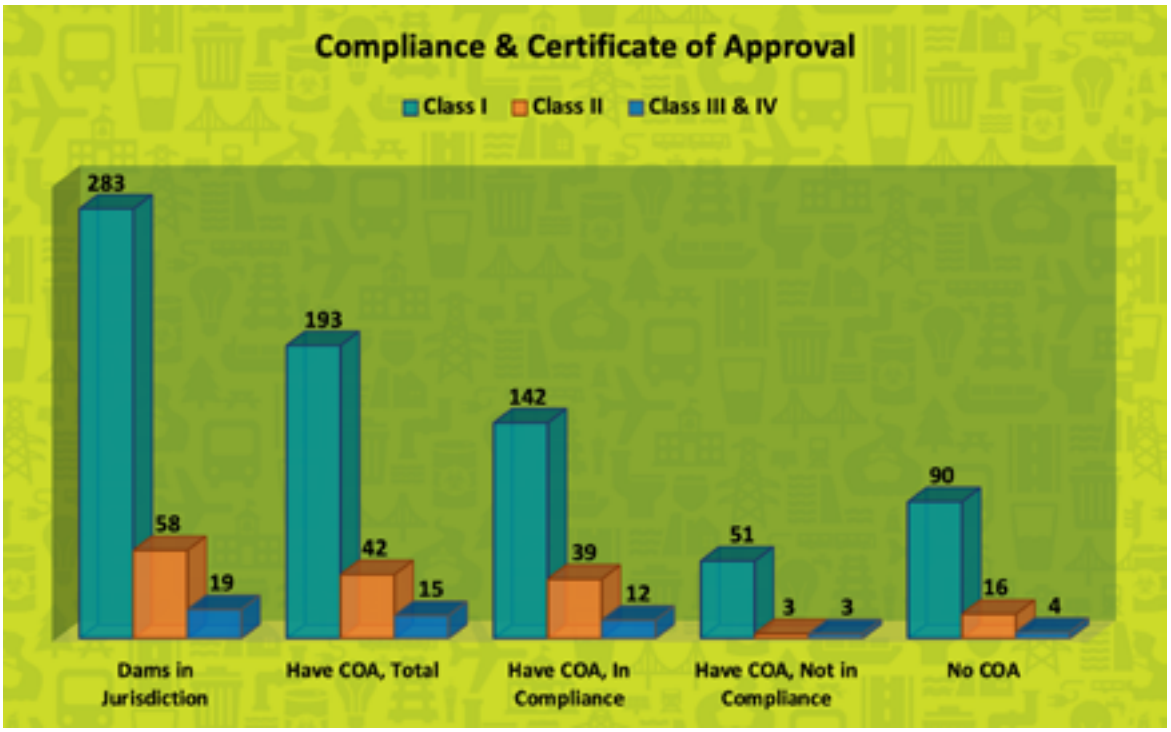
PUBLIC SAFETY AND RESILIENCE

The same topography which leaves much of the state susceptible to flash floods also provides natural locations for dams to provide flood control, recreation and sources for drinking water. The last 50-plus years, however, have seen significant changes to regulation and design standards.

In that time, national and state-level legislation on dams has been enacted and revised. State-level regulation has seen the creation of an entirely new agency – the WV DEP, in 1991 – with the Dam Safety Section and the Division of Mining and Reclamation thereafter. Additional data collection has also led to revisions to design storms and rainfall data used for design and evaluation.

Dams regulated by the WVDEP require their owners to develop approved MEAPs. These plans include evacuation measures and on-site planning procedures. Less than 2% of the state-regulated high hazard potential dams have exercised their MEAPs. See Chart 1 above for additional information on dams with MEAPs. These numbers have remained steady over the last five years.

Dams under the state's purview are evaluated for compliance with regulations. Compliance requires a dam to meet certain criteria, including obtaining and maintaining a Certificate of Approval (COA). Current numbers are as follows:



Source: WVDEP Dam Safety Section, 04/29/2020

Notes:

1. Non-coal dams.
2. There are 21 dams within the Dam Safety Section's jurisdiction which are considered "Unknown Hazard."

Overall, awareness and education may play one of the largest roles in the state's ability to manage runoff while protecting its people and assets for years to come.

RECOMMENDATIONS TO RAISE THE GRADE

- **Appropriate funding for West Virginia's Dam Safety Rehabilitation Revolving Fund Program to help make improvements and construction much more accessible.**
- **Fully fund federal dam safety and rehabilitation programs, such as the National Dam Safety Program and the High Hazard Potential Dam Rehabilitation Program.**
- **Appropriate additional funds to increase the dam safety budgets for state agencies.**
- **Develop a centralized system to track funding for the local government dams to help identify specific needs and potentially monitor a hierarchy of deficient dams. This could be part of a broader state-wide asset management plan tracking all major infrastructure items throughout their life cycles.**
- **Increase security measures.**
- **Further study in increased sustainability in design and rehabilitation may go far toward long-term performance of the structures.**
- **Improve emergency planning to help mitigate losses from dam failure, identify problems and update procedures to assist emergency management officials.**

DEFINITIONS

Dam – any structure of 25 feet (or more) in height and impounding 4,917,420 gallons (or more) or six (6) feet (or more) in height and impounding 16,391,400 gallons (or more) meets the general criteria for a dam

Monitoring and Emergency Action Plans (MEAP) – a document designed to provide for monitoring of a dam under various conditions so that an emergency at the dam will be observed promptly and reported to agencies and persons who may be affected. This document also provides a plan for the orderly notification and evacuation of downstream residents to a place of safety in the event of a potential or actual dam failure.

Fly ash – a byproduct of combustion of coal

DEFINITIONS (CONT.)

National Inventory of Dams (NID) – a database, maintained by the USACE, of dams in the United States

High-Hazard Potential Dam (HHPD) – A dam in which failure or mis-operation is expected to result in loss of life and may also cause significant economic losses, including damages to downstream property or critical infrastructure, environmental damage, or disruption of lifeline facilities

Significant-Hazard Potential Dam – A dam in which the failure or mis-operation is not expected to cause loss of life, but results in significant economic losses, including damages to downstream property, critical infrastructure, environmental damage, or disruption of lifeline facilities

Low-Hazard Potential Dam – A dam located in a rural or agricultural area where failure would not only cause the loss of the dam itself but may cause minor damage to nonresidential and normally unoccupied buildings, or rural or agricultural land Undetermined Hazard Potential – dams for which a downstream potential has not been designated or is not provided

Class 1 (High Hazard) Dams - Class 1 dams are those dams located where failure may cause loss of human life or major damage to dwellings, commercial or industrial buildings, main railroads, important public utilities, or where a high-risk highway may be affected or damaged. This classification must be used if failure may result in the loss of human life

Class 2 (Significant Hazard) Dams - Class 2 dams are those dams located where failure may cause minor damage to dwellings, commercial or industrial buildings, important public utilities, main railroads, or cause major damage to unoccupied buildings, or where a low-risk highway may be affected or damaged. The potential for loss of human life resulting from failure of a Class 2 dam must be unlikely

Class 3 (Low Hazard) Dams - Class 3 dams are those dams located in rural or agricultural areas where failure may cause minor damage to nonresidential and normally unoccupied buildings, or rural or agricultural land. Failure of a Class 3 dam would cause only a loss of the dam itself and a loss of property use, such as use of related roads, with little additional damage to adjacent property. The potential for loss of human life resulting from failure of a Class 3 dam must be unlikely

Class 4 (Negligible Hazard) Dams - Class 4 dams are dams where failure is expected to have no potential for loss of human life, no potential for property damage and no potential for significant harm to the environment

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DRINKING WATER

D

DRINKING WATER
GRADE: D

EXECUTIVE SUMMARY

Some drinking water systems in West Virginia are losing more than half of their treated water throughout the distribution systems. This non-revenue (lost) water requires investment in infrastructure replacements and technology improvements to locate and replace sections of the lines associated with the leaks. However, West Virginia has a very rough and rugged topography with many streams and rivers which make locating leaks difficult. This presents a major challenge for improving West Virginia's already struggling drinking water infrastructure. Currently water utilities are seeking approximately $302 million to address their needs. Inter-agency collaborations are expanding access to resources to upgrade drinking water infrastructure and for training personnel, including the implementation of asset management systems. To improve the resilience of the state's drinking water networks, personnel are responding to utilities impacted by natural disasters to share expertise and assist in returning to normal operations.

BACKGROUND

West Virginia's drinking water is supplied by private companies and public utilities with some of the more rural regions using individual groundwater wells or springs. American Water Company, Inc., a publicly traded water utility, is responsible for supplying drinking water to approximately thirty percent of West Virginia's population. The state is also served by municipalities, public service districts (PSDs), cooperatives, or homeowner associations. Not only do these systems supply the state with drinking water, they are also responsible for supplying water for fire safety systems.

CONDITION AND CAPACITY

There are 437 community public water systems within the state serving approximately 1,526,701 persons and 610,742 structures, which is 62 percent of the structures being supplied with treated water in the state. Approximately 30% of the homes in West Virginia are not connected to a public water system and are served by cisterns or private wells.

According to the State Public Service Commission (PSC) website, the state has made great strides improving the availability of the data regarding the condition of these systems. These updates have mostly been with systems that have been updated or added during the past 5 years, so information prior to that time is not logged electronically. Each town or city lists the amount of funds needed for improvements to its water system; however, the issues at each site are not listed. The PSC database was used to make the observation that many drinking water systems have non-revenue (lost) water at or greater than half of the water provided to the transmission and distribution systems from water treatment plants. Like other states, West Virginia has begun using Geographical Information Systems (GIS) to track and manage their systems more efficiently. The GIS system on the West Virginia Infrastructure and Jobs Development Council (WVIJDC) website shows what projects are in progress and planned.

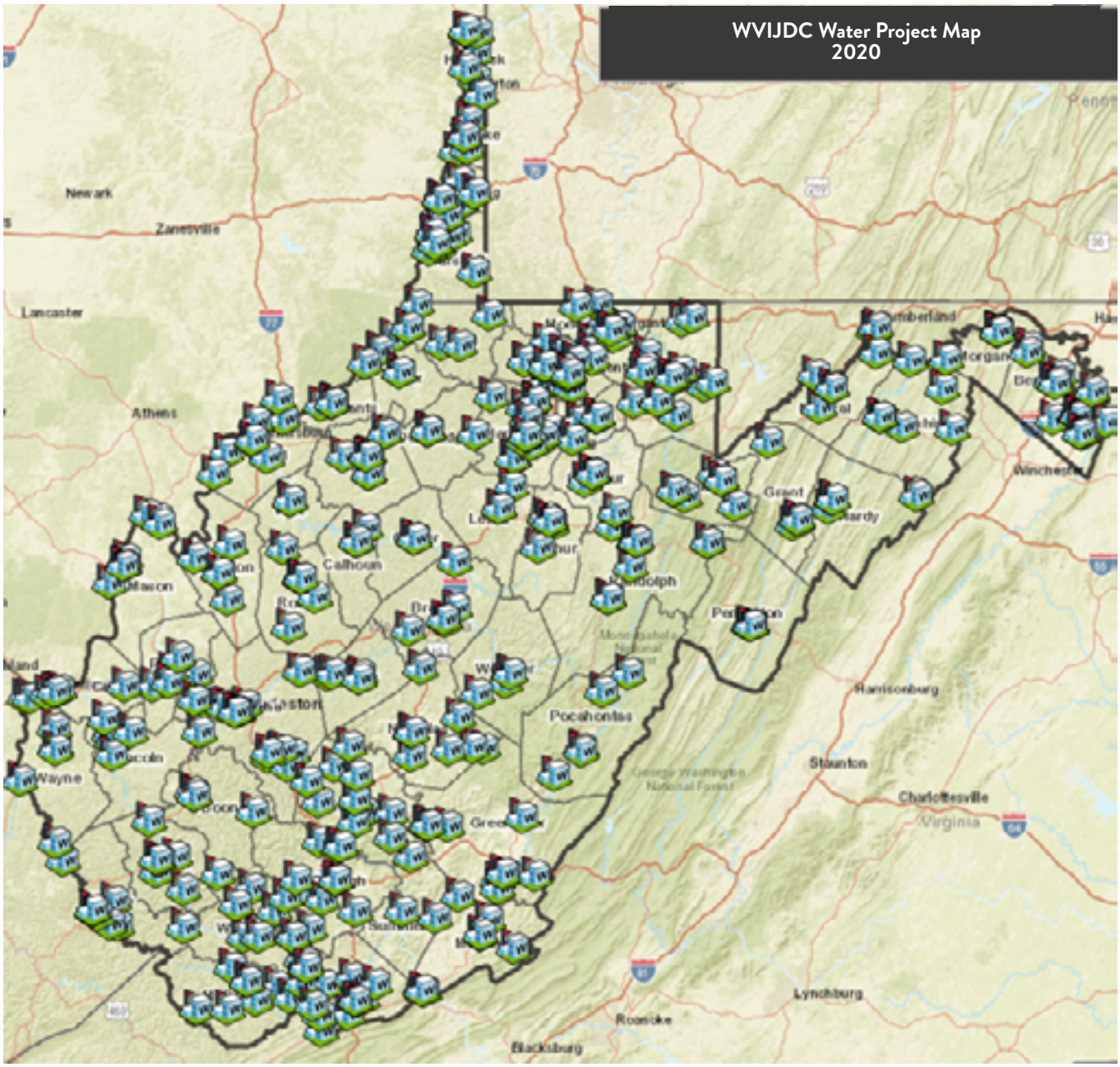
Of the state's population consuming public drinking water between June 2016 and May 2019, approximately half consumed drinking water from systems that were out of compliance with the U.S. Safe Drinking Water Act (SDWA). These instances of non-compliance tell a complicated story as all episodes do not necessarily reflect poor water quality. Instead, non-compliance issues have multiple causes including insufficient sampling, testing errors, improper record keeping, or a true SDWA water quality violation. While many of the Environmental Protection Agency's (EPA) drinking water standards follow those outlined in the SDWA, since EPA does not regulate drinking water from private wells, condition data is scarce for this water source. On average, there are currently 148 million gallons of water withdrawn and delivered every day for domestic use. This number is likely to decrease due to the state's declining population.

OPERATION & MAINTENANCE, FUNDING AND FUTURE NEED

Funding and financing for the state's drinking water infrastructure comes from federal, state, and local sources. At the federal level, West Virginia obtains some of its funding from the Drinking Water State Revolving Fund (DWTRF). In fiscal year 2020 West Virginia received approximately $11 million from the DWTRF with WVIJDC providing the 20%, in-state match. This funding is provided annually by the EPA to enable the state to fund two distinct programs to assist drinking water systems. Most of the funding goes toward infrastructure projects through the DWTRF. A smaller portion is set aside for the capitalization grant funds to aid and monitor water systems' performance. The current funding is not adequate to meet the state's infrastructure needs.

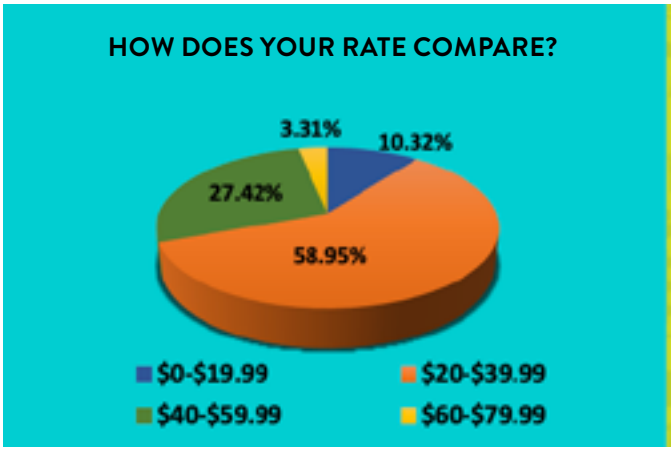
Public utilities can also obtain funding for projects from Abandoned Mines Lands and Reclamation (WVDEP-AML) Waterlines Program, Appalachian Regional Commission, Community Development Block Grant Program, US Department of Agriculture

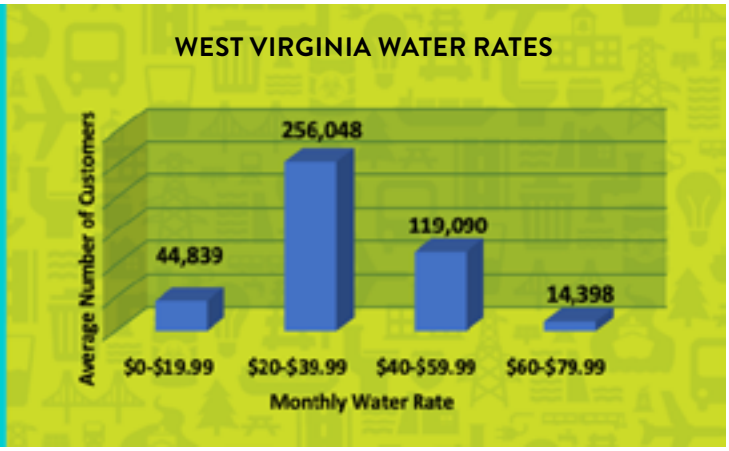
(USDA), US Economic Development Authority, WV Infrastructure and Jobs Development Council (WVIJDC) and WV Water Development Authority (WVWDA). WVDEP-AML is funded through federal legislation which will end in 2021, and additional funds for the Program may not be available thereafter. USDA allocates $40 to $50 million annually to West Virginia. Notably, West Virginia successfully obtained approximately $30 million of unused USDA funds for the Lewisburg Water Project.



NOTE: Each flag represents a WVIJDC Project.

WVIJDC receives an annual allocation of funds from excess lottery revenues and works with all the funding agencies on projects throughout the state. WVWDA has issued bonds for projects to obtain significantly lower interest rates than what a small utility could obtain on its own and has recently assisted with loans for design work. These funding agencies are members of or participate with the WVIJDC at the monthly public meetings which WVIJDC holds to process funding (grants and low-interest loans) for drinking water project applications.





Aside from supporting large capital projects, user rates are critical for funding utilities' day-to-day operations and maintenance. The average monthly water bill for West Virginians is $47.53, which is over $7 more than the national average of $40.00. However, West Virginia's decreasing population (1,954,000 to 1,806,000 from 1980 to 2018) and decreasing water usage has reduced revenue for water utilities and caused a subsequent reduction in their ability to sustain the needed levels of infrastructure investment. Therefore, many water utilities have raised rates to keep up with ever-increasing cost of operation and maintenance. A lower population also leads to a loss of tax dollars appropriated to the water systems. With West Virginia's drinking water systems already needing approximately $302 million in upgrades, the decrease in revenue and allocated funds will lead to a longer time frame for the state's water system to be updated and repaired.

Further complicating the matters of drinking water funding and future need are the revenue and financing implications due to the 2020 COVID-19 pandemic. While the full economic impacts are not yet known, the potential exists for a decrease in revenue, redirection of resources, and/or a continued deferral of maintenance and improvements to drinking water facilities.

PUBLIC SAFETY

At various points between June 1, 2016 and May 31, 2019, approximately 237,176 people or 15.5% of West Virginias consumed water from drinking water systems that were out of compliance with the U.S. SDWA Standards. According to the National Resources Defense Council, approximately three-quarters of West Virginia's water systems had at least one violation of the SDWA during the above listed three-year period. As previously mentioned, the non-compliance violations do not necessarily reflect poor water quality but may reflect un-met testing requirements or incorrect record keeping. However, the magnitude of public safety concerns must be addressed.

RESILIENCE AND INNOVATION

West Virginia is located in a unique area that does not face many natural disasters apart from flooding. Due in part to the state's steep topography and climate, flooding is a major issue in the state. In the last 40 years alone, the state has had two 1,000-year floods, one in the south-central area in 2016 and one in the north central area in 1985. Floods often have major negative effects on drinking water systems, because generally they are located near a river or another body of water. The West Virginia Water/Wastewater Agency Response Network (WVWARN) program is in place to help utilities in the case of an emergency; it helps locate trained operators and equipment necessary to help control and recover from a drinking water disaster. Additionally, the River Alert Information Network (RAIN) is in place to protect several drinking water sources in Northern West Virginia, mostly in the Monongahela River Basin.

An innovation in West Virginia is the West Virginia GIS Statewide Strategic Plan. Strategic plan preparation began in August 2009 and uses image analysis software for land inventory and natural resource assessment applications. Building upon this foundation, in 2017 the WVIJDC developed a Needs Assessment Report that works in conjunction with the GIS system. Using this system, the council gathered data using GIS and then assessed the needs of the state based on that information. Both are useful innovations in infrastructure assessment now and into the future.

RECOMMENDATIONS TO RAISE THE GRADE

- Create a common system of criteria to prioritize projects for spending the state's limited funding.
- Completely use allocated state funds leaving no reserves. Once all the funds are used, then searching for or leveraging other sources such as bond issues could take place.
- Require the state to match federal funds, when necessary.
- Create a bond program for funding of water and wastewater systems similar to the 2017 Roads to Prosperity Program, which currently is financing improvements to the deteriorated road and bridge infrastructure.
- Increase funding for certified operator training to provide knowledge of the Safe Drinking Water Act and increase compliance of systems with SDWA standards.
- Continue to consider Public-Private Partnerships (PPPs) as an additional funding source and progress when appropriate.

DEFINITIONS

Topography - the arrangement of the natural and artificial physical features of an area

Geographical Information Systems (GIS) - a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data

West Virginia Infrastructure and Jobs Development Council (WVIJDC) - a source for state funding of water and sewer infrastructure projects

Public Service Districts (PSD) - public corporations established by county commissions with approval of the West Virginia Public Service Commission. These local entities manage the development and maintenance of water, sewage and gas systems covering areas specified by each county commission

Safe Drinking Water Act (SDWA) - the principal federal law in the United States intended to ensure safe drinking water for the public

Environmental Protection Agency (EPA) - an independent agency, specifically an independent executive agency, of the United States federal government for environmental protection

1,000-year Flood - a flood of that magnitude (or greater) that has a 1 in 1,000 chance of occurring in any given year. In terms of probability, the 1,000-year flood has a 0.1% chance of happening in any given year

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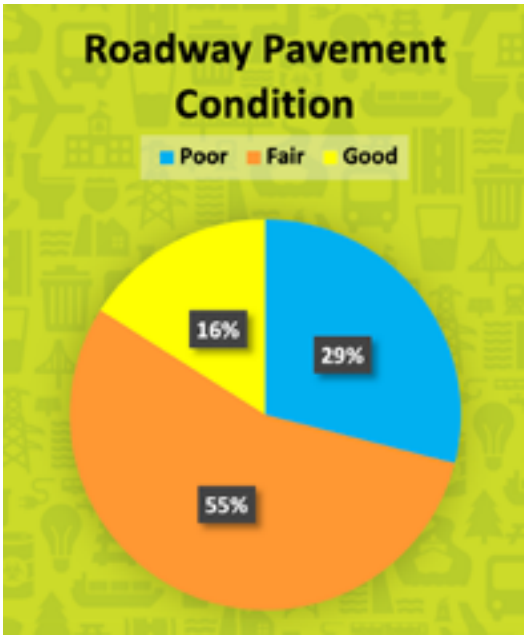
ROADS
GRADE: D+

EXECUTIVE SUMMARY

West Virginia Division of Highways (WVDOH) maintains the sixth largest highway system in the nation with its purview extending across 93% of the state's 38,000 miles of roadways; 88% is rural and 12% urban. WVDOH is one of only four states that maintain both state and county roads, many over mountainous terrain which makes maintenance and safety challenging. In 2017, the fatality rate on West Virginia's rural roads was nearly three times higher than other roads in the state and almost double the national average. The projected cost of pavement maintenance is reaching $400 million annually, while near-term (2025) travel projections are expected to increase by 37%. Thankfully, the Roads to Prosperity Program, initiated by Governor Jim Justice in conjunction with the WVDOH, and the completion of a few capacity-adding projects are expected to enhance safety, support the state's economy, and improve overall road conditions.

CONDITION AND CAPACITY

In West Virginia, there are over 38,000 miles of public roadway. Roughly 36,000 miles are state owned and about 900 are federally owned, with 88% being rural and 12% urban. Unfortunately, 29% of major roads are in poor condition, while 55% are fair, and only 16% are in good condition. For comparison, 21 percent of the nation's roads are considered in poor condition. Additionally, the repaving cycle for secondary roads is approaching a 33-year cycle, nearly two decades beyond the ideal 12-year cycle. This means that a secondary road, a road supplementing a main road, paved today will not be repaved for another 30 years. Driving on these rough roads is costing West Virginia motorists $758 million every year, which amounts to $647 per driver, in the form of increased Vehicle Operating Costs (VOC). In addition to VOC, traffic congestion throughout the state costs drivers an additional $225 million in the form of lost time and wasted fuel. By 2026, the state will need to add 142 miles of additional lanes to the interstate system in order to relieve the growing traffic congestion. To reflect this, Vehicle Miles Traveled (VMT) per person is expected to increase by 37% to 26 billion miles by 2025.



OPERATION & MAINTENANCE

West Virginia is one of only four states that owns and maintains nearly all the public roadways. Of the 38,000 miles of roads, the West Virginia Division of Highways (WVDOH) is responsible for 93% of that, which is the highest percentage in the nation. Despite the relatively small size of the state, West Virginia maintains the 6th largest highway network in the nation. According to the Statewide Transportation Improvement Plan (STIP), maintenance is the third mandated priority, after debt service and administrative support. Routine maintenance includes snow removal, brush cutting, bridge inspections, pothole patching and ditch cleaning, to name a few.

Routine maintenance cost WVDOH $315 million in 2018. These maintenance costs are predicted to decrease $13 million annually from 2020 to 2024 because of the completion of many ongoing projects. There are risk-based plans like the Transportation Asset Management Plan (TAMP) and the STIP, which go into great detail about operations and maintenance. The main objective of the TAMP is to strategically streamline financial and physical assets to better improve the state's transportation efficiency. The outcomes of the TAMP then influence the planning process of the STIP.

FUNDING

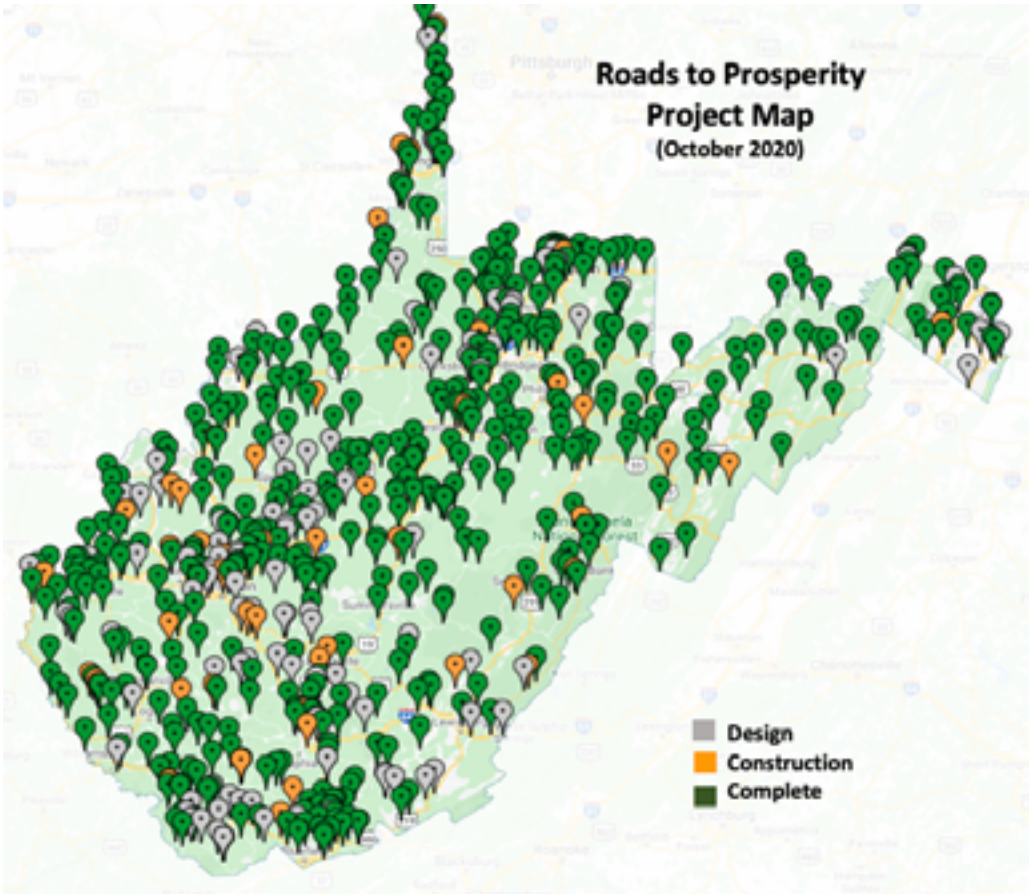
The funding for West Virginia's roadways comes from state and federal sources. The WVDOH's primary source of funding is the State Road Fund which grows based on state revenue collections and federal reimbursements. State revenues are made up of motor fuel taxes, registration fees, vehicle privilege taxes and other miscellaneous fees, which totaled $853 million in 2018. Federal investment comes through the Highway Trust Fund (HTF) and authorized programs under the Fixing America's Surface Transportation (FAST) Act. The HTF is funded through a gas tax, which was raised by 3.5 cents per gallon in 2017, taking the floor on the varying tax from $3.005 to $3.04; the FAST Act expires September 2021. In 2018, WV received approximately $460 million from the Highway Trust Fund.

In 2010, the WV Legislature transferred $27.3 million from the Motor Fuel Shortfall Reserve fund to the State Road Fund to try and stabilize conditions of the roadways. Then, in 2012, $15 million had to be transferred from the Lottery Revenue Fund into the State Road Fund to once again bolster the WVDOH's paving program. From 2013 to 2015, revenues collected steadily increased by $39 million. From 2015 to 2016 a dramatic decrease of $51 million was recorded. Finally, in 2018, funds rebounded to the aforementioned $853 million.

Another significant part of funding for West Virginia is the Roads to Prosperity program. Beginning in 2018, a total of $2.6 billion has been invested in capital projects over a four-year period. Funding for the program consists of $1.6 billion in General Obligation Road Bonds (GO Bonds), $500 million in Turnpike Revenue Bonds, and $500 million in Grant Anticipation Revenue Vehicle Bonds (GARVEE Bonds). Due to the massive size of this program, the program itself is being delivered in waves over multiple years.

An approach called value engineering has been implemented in various applications throughout the state to reduce project costs and preserve statewide funding while maintaining the efficiency of the project. Value engineering is a systematic and organized approach to providing necessary functions in a project at the lowest cost. The improved collaboration between engineers, lawmakers, and law enforcement has the potential to save lives and money.

The COVID-19 pandemic has caused impacts to revenue and funding throughout the state, including proposed roadway projects. According to comments from the WVDOH, the $20 million 2021 spring paving program has been indefinitely postponed. Additionally, according to the State Budget Office, revenue within the WV State Road Fund was down by $38.4 million compared to original estimates.

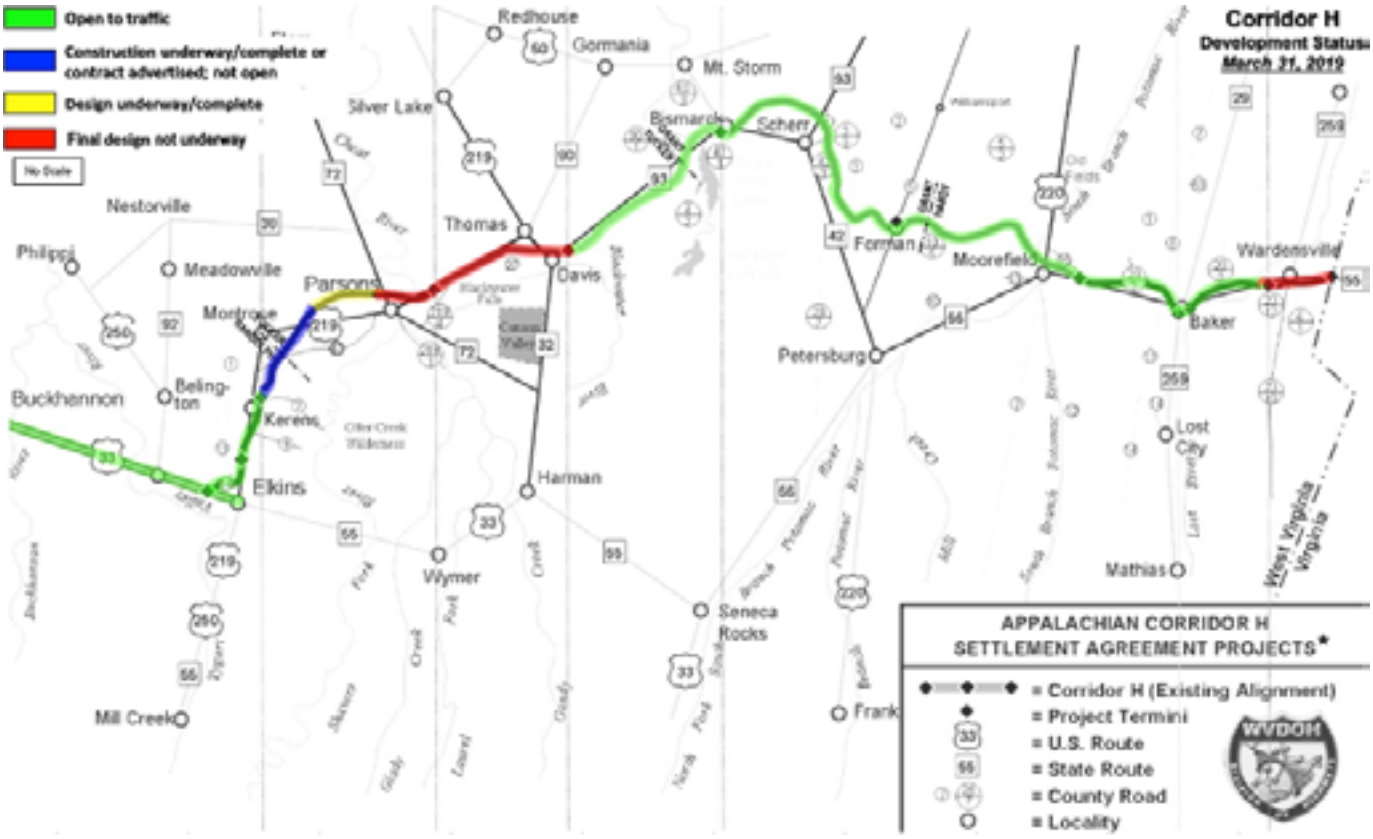


FUTURE NEED

Due to a lack of transportation funding, the miles of roadway in poor condition is projected to increase from 29% to 34% by 2023. An update from the West Virginia Long Range Multi-Modal Transportation plan shows a travel demand model that compares VMT from 2010 to 2040. That model shows that, without significant project development, several rural roads will have deficient levels of service. The total estimated annual road repair and preservation needed is $1.6 billion.

The Roads to Prosperity Program aims to address West Virginia's future needs by catching up on improvements to the rapidly deteriorating road conditions. Over the next several years, more than 700 projects across all 55 counties will provide new roads and bridges while simultaneously fixing the existing ones. This program has created over 48,000 jobs and has affected more than 1,200 miles of roadway.

Further needs for the state include the completion of the Appalachian Development Highway System (ADHS), but more specifically the completion of Corridor H. Corridor H is the longest in the state at 134 miles. It is roughly 77% complete with 103 miles open to traffic. The remaining 31 miles are going to be difficult to construct due to the mountainous terrain. As a result, it is estimated to cost nearly a $1 billion to complete.



PUBLIC SAFETY

The primary goal of engineering and the importance of quality of infrastructure are to protect the safety of the public. Since 2007, the state's average annual deaths on roads and highways are 344, with 2,800 serious injuries. In 2018 alone, West Virginia had a traffic fatality rate of 16.3 fatalities per 100,000 people, which was much higher than the national average of 11.2. This trend of a high fatality rate is particularly significant on West Virginia's rural roads which had a fatality rate of 2.55 fatalities per 100 million VMT compared to 0.97 across all other roads in the state.

Motor vehicle crashes, in which roadway design was likely a contributing factor have cost West Virginia motorists $534 million per year in the form of medical costs, productivity loss, travel delays and insurance costs. To combat these undesirable statistics, West Virginia has coordinated with the federal Highway Safety Improvement Program (HSIP). In 2007, West Virginia developed its first Strategic Highway Safety Plan (SHSP) which outlines actionable goals and highlights accomplishments of the state's safety improvements.

RESILIENCE AND INNOVATION

In June 2016, a 1,000-year flood devastated West Virginia, leaving 23 dead, thousands of homes and business destroyed, half a million residents without power, and $46 million worth of damaged roads. In response to this disaster, the Office of Economic Opportunity and the Community Development Office merged together to create the West Virginia Community Advancement and Development Office (WVCAD). The goal of WVCAD is to encourage strong civic engagement through a focus on infrastructure, sustainability, compliance and resiliency. The resiliency unit aims to better prepare communities for extreme events through innovative resilience projects, such as the development of the Community Development Block Grant – Disaster Recovery (CDBG-DR) program, which provides funding assistance during the recovery process to low- to moderate-income persons and areas.

The Federal Highway Administration (FHWA) Every Day Counts (EDC) initiative is designed to identify and deploy innovation focused on shortening project delivery, enhancing roadway safety and improving environmental sustainability. Since West Virginia has a high number of run-off-the-road crashes, it was sensible to implement the pavement overlay High Friction Surface Treatment (HFST). The HFST is placed on sharp turns where many similar accidents have occurred.

Another aspect of the FHWA EDC is Traffic Incident Management (TIM). The WVDOH has partnered with the West Virginia State Police with the goal of training 100% of first responders to enhance the safety for travelers and responders themselves.

RECOMMENDATIONS TO RAISE THE GRADE

- **Increase the awareness of Value Engineering to be utilized in more projects throughout the state in order to reduce project costs and preserve funding budgets. This would hopefully allow for an increase in project completion while maintaining appropriate funds.**
- **Complete the remaining 31 miles of Corridor H on schedule and within budget. The anticipated completion of Corridor H will drastically increase the economy of West Virginia. This will save significant travel time for passenger vehicles and freight, and it would create thousands of jobs. Corridor H will connect northwestern Virginia to central West Virginia.**
- **Increase investments into transportation from both state and federal sources. Nearly 10,000 jobs in West Virginia would be created if there was a $500 million annual increase in new highway revenues. The FHWA estimates that $1.00 spent on road, highway and bridge improvements results in an average benefit of $5.20 in the form of vehicle operating costs, reduced delays, and improved safety.**

DEFINITIONS

Appalachian Development Highway Syste m (ADHS) - a series of highway corridors in the Appalachian region

Bond - a loan that is given to a large company or government

Corridor H - a 134-mile roadway that is part of the ADHS

Federal Highway Administration (FHWA) - a division of the United States Department of Transportation, (USDOT)

Fixing America's Surface Transportation (FAST) Act - federal legislation that allows states to fund their transportation needs

Highway Trust Fund - a funding source that finances most federal government spending on highways

Highway Safety Improvement Program (HSIP) - a core federal-aid program with the purpose of achieving significant reduction of traffic injuries and fatalities

Legislation - a collective group of laws

Lottery Revenue - money generated from people playing the lottery in West Virginia

DEFINITIONS (CONT.)

Motor Fuel Shortfall Reserve Fund - funds that get transferred into the General Reserve fund for the purpose of gaining funds in case motor fuel tax receipts fall short

West Virginia Development Office (WVDO) - works to improve the quality of life for all West Virginians by strengthening communities and expanding the state's economy to increase the quantity and quality of jobs

Roads to Prosperity Program - comprises a series of funding measures that, over the next several years, are expected to generate approximately $2.8 billion for highway and bridge construction and maintenance across West Virginia

Rural - rural areas comprise open country and settlements with fewer than 2,500 residents

Statewide Transportation Improvement Plan (STIP) - a federally required document that has listings of all projects and future projections

State Road Fund - the major source of funding used by the WVDOH

Strategic Highway Safety Plan (SHSP) - a major component of the HSIP, a statewide coordinated safety plan which provides comprehensive framework on how to reduce injuries and fatalities

Transportation Asset Management Plan (TAMP) - a document that describes how the state plans to manage their roadways and other assets

Urban - Urban areas comprise larger places with greater than 2,500 residents. Urban areas do not necessarily follow municipal boundaries. They are essentially densely settled territory as it might appear from the air.

Vehicle Operating Costs (VOC) - the maintenance cost of a vehicle

Vehicle Miles Traveled (VMT) - how many miles a vehicle travels, used when comparing data

West Virginia Division of Highways (WVDOH) - the highway division of the West Virginia Department of Transportation (WVDOT)

West Virginia Long Range Multi-modal Transportation Plan - a document that outlines and identifies goals of where transportation should be by the end of the plan, 20 years minimum

1,000-year Flood - a flood of that magnitude (or greater) that has a 1 in 1,000 chance of occurring in any given year. In terms of probability, the 1,000-year flood has a 0.1% chance of happening in any given year

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WASTEWATER
GRADE: D

EXECUTIVE SUMMARY

Many of West Virginia's wastewater utilities have worked diligently to operate and maintain their systems, but only a quarter of these utilities employ asset management to extend the infrastructure's life. Routine rehabilitation, service extensions, and day-to-day operations can overtax some utilities' resources because user rates are too low, the rate-paying population base is dwindling, and existing financing mechanisms are undesirable. Therefore, as of 2020 significant portions of the state's wastewater systems have deteriorated including 59 combined sewer systems requiring $1.2 billion to address state and federal requirements. From a positive perspective, inter-agency collaborations are expanding access to resources to upgrade wastewater infrastructure to meet new water quality standards and networks of wastewater sector personnel are responding to utilities impacted by natural disasters to share expertise, assist in returning to normal operations, and improve resilience.

CONDITION AND CAPACITY

West Virginia's wastewater infrastructure faces challenges due to aging systems. The lack of preventative maintenance has resulted in significant failures across the state. Factors influencing inadequate preventative care include decreasing numbers of ratepayers to contribute to available revenue and insufficient access to capital funding. For instance, over the past several decades, the U.S. Census Bureau indicates a decreasing trend in the state's population. Since several federal programs tie their state-by-state funding to population, a smaller piece of the pie is anticipated.

Although the state's population is decreasing, the infrastructure previously built to serve a larger population remains in place and must be maintained. The few areas experiencing population growth are either planning to or expanding their facilities for future need. An example is the Morgantown metropolitan area, which is served by the Morgantown Utility Board. Since 2017, a $100 million project has been underway that will allow them to meet current and future needs of its growing service area. Another area undergoing population growth is Martinsburg. In 2016, this city completed a $53.5 million renovation, which will enable the growing population to have capacity for future growth and downstream residents to have cleaner streams.

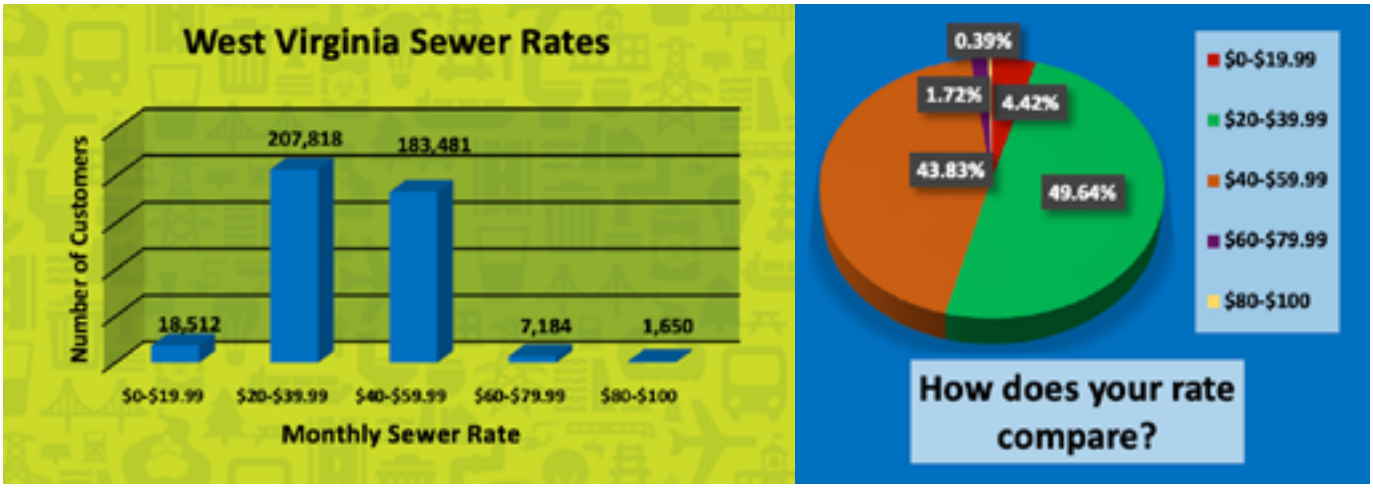
The most recent (2012) U.S. Environmental Protection Agency (USEPA) Clean Watershed Needs Survey (CWNS) indicated that the state had 266 publicly owned wastewater treatment plants (WWTPs), and according to the West Virginia Infrastructure and Jobs Development Council's (WVIJDC) "2017 Needs Assessment", there are 293 public sewer utilities. With an estimated population of 1.82 million (2017), and nearly 450,000 buildings served by public wastewater systems, the resulting low ratio of structures served per sewer utility (1,500:1) is an indicator of the state's rural nature and unique challenges associated with maintaining small systems.

West Virginia University's Integrated Database estimates that the state has approximately 1.3 million residents, of which a significant portion reside in the 500,000 structures that are not connected to sewer systems and treatment plants but address their wastewater treatment needs via on-site systems. Of this group of wastewater systems, approximately 60% are insufficiently meeting user needs. Failed septic systems and their accompanying leach fields can lead to contaminated runoff reaching local streams. However, these unsewered areas can serve as high priority locations for agencies to direct funding for wastewater system extensions.

OPERATION & MAINTENANCE

The responsibility for day-to-day maintenance of the state's wastewater infrastructure falls upon the 293 public sewer utilities. A major problem for many of the small utilities is the low number of ratepayers, which results in an inability to generate adequate revenue for maintenance, rehabilitation and replacement. Coupled with the growing shortage of certified wastewater operators and the challenge of offering competitive wages, maintenance at small utilities is often a victim of inadequate staffing.

A significant factor influencing revenue needed for adequate operation and maintenance (O&M) is overregulation. According to a report prepared in 2014 titled "Regulation of Publicly Owned Water and Sewer Utilities", West Virginia is one of the most regulated states. Specific impacts involve hindrances to ratemaking and project financing. In 2015, the Legislature passed a bill removing an approval process from state regulatory purview for 22 publicly owned utilities. The purpose of this regulatory change was to test whether partially deregulating larger water and sewer utilities would provide greater latitude to increase their resources to improve precautionary maintenance and execute capital projects. To date, the results of this deregulation effort have not been studied.



Additionally, smaller wastewater utilities also struggle with routine O&M and tend to be reactionary to system issues, leaving them vulnerable to expensive failures without adequate resources for financial recovery. A reason for this tendency is that it can be a difficult decision to raise rates, and it is further complicated by the regulatory challenges that may be faced before additional revenue is ever realized. In WV, rate changes by most public utilities must be approved by their governing body and the Public Service Commission.

A positive influence on O&M is the requirements imposed upon recipients of loans from the West Virginia Department of Environmental Protection (WVDEP) Clean Water State Revolving Fund (CWSRF) program. The SRF program includes a stipulation that recipients develop and implement an asset management plan. This requirement has been in place since 2010 and resulted in 73 of the state's 293 (25%) public wastewater utilities completing asset management plans. Asset management plans must be streamlined across utilities to provide them with greater assurance that their financial resources are efficiently utilized for O&M, repair, and replacements.

FUNDING & FUTURE NEED

According to WVIJDC's "2017 Needs Assessment", $395 million worth of wastewater projects were awaiting funding. An additional $1.6 billion was needed to finance combined sewer overflow (CSO) control projects. Furthermore, $10.7 billion was also needed to construct sewers to every unserved house, exclusive of costs for upgrading existing systems or new construction of wastewater treatment facilities. Thus, the total identified need in 2017 was $12.7 billion.

A primary source of project financing is the CWSRF program, which is managed by the WVDEP. For FY2020, the estimated net available funds are $55 million. Like many other states, most of the available funds originated from annual USEPA capitalization grants. The USEPA's rules require recipient states to provide a 20% match for each annual grant awarded, which West Virginia fulfills through utilization of WVIJDC funds. In addition to the state's match, the available funds are further comprised of loan repayments and returns on investments. At the end of calendar year 2019, the WVIJDC had approximately $100 million available for water or wastewater projects.

In 2019, other sources of funds for capital improvements included U.S. Department of Housing and Urban Development (HUD) and Appalachian Regional Commission (ARC) ($12.7 million, combined) and U.S. Department of Agriculture (USDA) Rural Development ($17 million). Moving forward, if similar funding levels occur, the CWSRF, USDA, ARC, WVIJDC and HUD programs will equate to an estimated total of $185 million, which is far short of the $12.7 billion of needs.

While there is some state and federal funding available, most utility funds come from the rates their customers pay. Based on the statewide average monthly water usage of 3,400 gallons for residential customers, the monthly charge across the state ranges from a low of $8.82 to a high of $87.52. This wide range is likely evidence of the variations of revenue allocated to operations, maintenance and debt associated with capital improvements. According to a survey of 25 of the 293 public wastewater utilities, which included many of the largest within the state, the average monthly sewer rate is $32. This is less than the national average sewer rate of $34 based on a similar consumption rate.

Some publicly owned utilities prefer to delay projects while attempting to secure grant funding in order to avoid debt. Oftentimes this can result in holding rates to low levels while the cost of needed improvements escalates due to inflation, which increases the future needs of funding from state and federal agencies.

Given the societal changes in 2020 due to COVID-19 that left many un- or under-employed, negative impacts to revenue and the ability to finance projects may be realized in the future. While the full economic impact has yet to be seen, the potential exists for decreasing revenue, redirection of resources, and the continued deferral of maintenance and improvements to wastewater facilities.

PUBLIC SAFETY

The WVDEP and USEPA are in charge of permit compliance. In recent years, inadequate sewer systems have caused concern across the state. For example, there is one federal consent decree where the USEPA Region 3 and the U.S. Department of Justice are taking enforcement actions against a Sanitary Board.

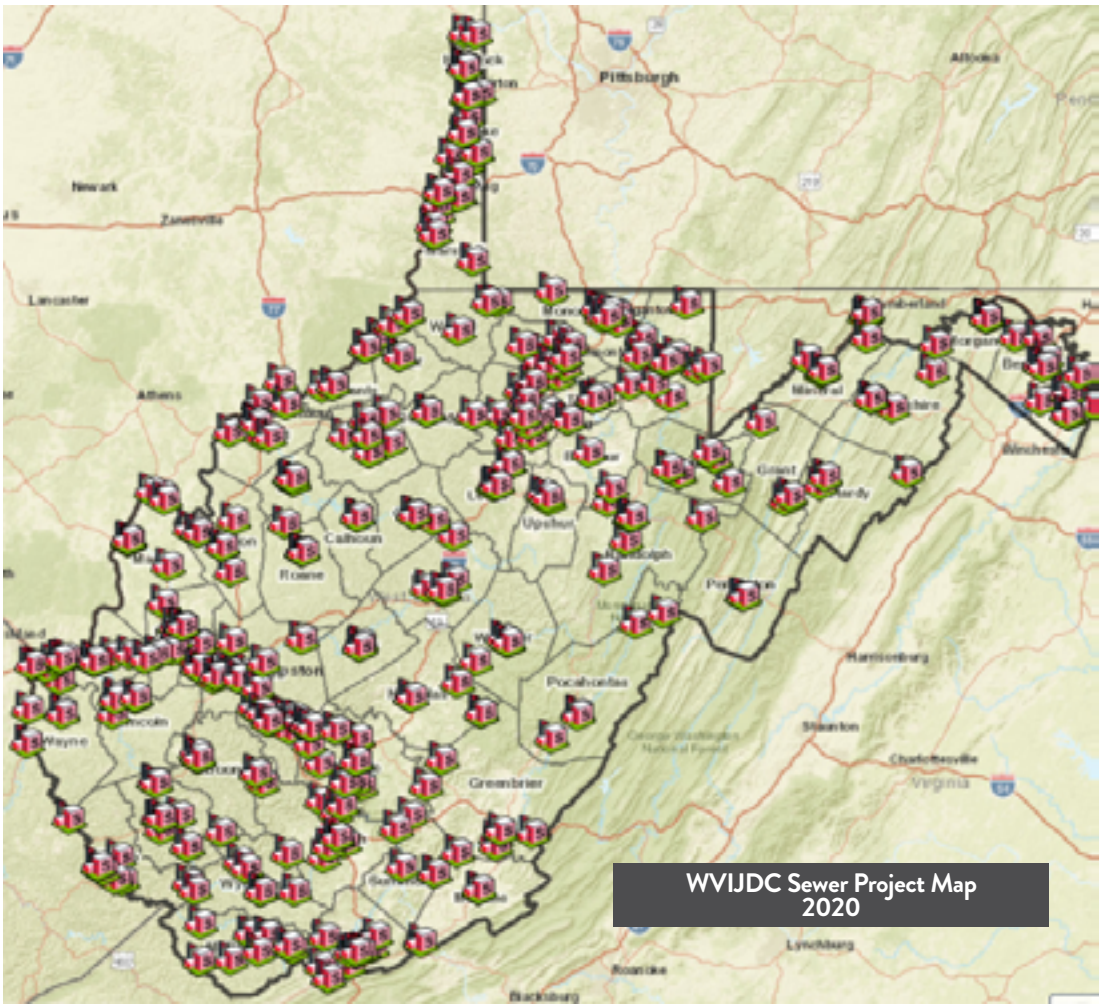
Additionally, the USEPA has been involved in exploring methods for solving the problems of unsewered areas within the Mud River watershed. As a result of documented bacterial contamination in the watershed, a pilot project was initiated by the USEPA in the mid-2000s. The project involved the construction of decentralized treatment systems serving clusters of residences in Lincoln County. In-kind contributions were made by local agencies, residents and educational institutions. Monitoring of the efficacy of these systems is ongoing, which, overall, has been a success. Following this success, the WVDEP, through the CWSRF program, financed four additional projects totaling $2.9 million.

Several of our larger communities have wastewater systems with combined sewer overflows (CSOs), including Charleston, Huntington and Wheeling. Parkersburg, another large community, has separate sanitary sewer overflows (SSOs). Many of their CSOs and SSOs discharge to recreational waters including the Ohio, Kanawha, Elk and Little Kanawha Rivers. Statewide there are 59 CSO and three SSO public wastewater systems of various sizes that discharge untreated wastewater into our rivers and streams. Over the past two decades, improvements have been made to many of these systems resulting in decreased discharges of untreated wastewater. However, the need remains significant for additional funding to eliminate overflows and assure that these waterbodies are safe for recreational use and public water supplies.

INNOVATION

Innovation has been fueled by various agencies that help serve the state's wastewater utilities. The WVDEP collaborates with communities and state and local agencies to develop innovative solutions for struggling wastewater utilities. Whether it be consolidation of systems, guidance in proper operations, or provision of funding packages, the WVDEP strives to develop innovative solutions for many communities. Another noteworthy agency is the WVIJDC, which functions as a statewide clearinghouse for most state and federal funding sources. These two agencies strive to provide innovative funding solutions to cash-stricken systems.

In situations where stricter nutrient limits were imposed by the USEPA, like that in the Chesapeake Bay watershed, the WVDEP and WVIJDC collaborated to lobby the Legislature for a separate funding source. This separate funding source helped to relieve much of the financial burden placed on affected wastewater utilities due to the need for upgrading or replacing older technology to meet new standards. For instance, nutrient removal systems were added to many WWTPs, including the City of Martinsburg's WWTP. Not only were the nutrient treatment processes new and innovative to the wastewater community, but, in West Virginia, the collaboration of these two agencies to secure state-level grant funding for expensive and required upgrades for many public utilities was unprecedented.



Note: Each flag represents a WVIJDC project.

RESILIENCE

In June 2016, severe flooding struck 12 counties in the state's southcentral and southeastern areas. This event, which at some locations was estimated to be of a 1,000-year recurrence frequency, exposed weaknesses and strengths in the resiliency of many wastewater systems. Due to their proximity to affected streams and rivers, several utilities experienced damage to their collection systems, while none experienced structural damage to their WWTPs. The lack of structural damage can be attributed to the WVDEP's strict enforcement of design requirements associated with 100-year flood events. Since WWTP damage was limited to equipment, only, it allowed these facilities to return to service quickly.

Many unaffected utilities from around the state assisted with repairing damaged pump stations and treatment plants through their participation in the West Virginia Water/Wastewater Agency Response Network (WVWARN). Communities, such as Elkview and others, were provided assistance in returning their systems to service. The 2016 flooding event, like other similar events that have occurred over the past decades, exposed weaknesses common to numerous systems constructed within narrow flood-prone valleys comprising much of the state's terrain. However, WVWARN improved the resiliency of wastewater systems by developing a network to help affected systems return to operation and by sharing their knowledge developed from lessons learned from previous catastrophic events.

RECOMMENDATIONS TO RAISE THE GRADE

- Combine, when financially and geographically feasible, various sewer utilities and/or plants and, where pertinent, improve the resilience of systems in the flood-prone areas and provide more resources.
- Require all funding programs to include asset management plans as a condition of receipt of project financing. Furthermore, develop a program for auditing the implementation and updating of asset management plans.
- Develop programs for monitoring, repairing, replacing, and constructing decentralized wastewater treatment systems statewide.
- Create a bond program for funding of water and wastewater systems similar to the 2017 Roads to Prosperity Program, which is providing funding for improvements to deteriorated road and bridge infrastructure. This could be accomplished via a bond issue that would increase the grant and loan funding available through the WVIJDC.
- Collaborate with agencies and the Legislature to continue easing regulatory burdens affecting revenue and project financing.
- Ensure sewer rates cover the full cost of service including operation, maintenance and capital costs.
- Improve the compilation and analysis of data by state agencies that can be utilized for benchmarking wastewater utilities. This information will be useful in building the case for rate adjustments and additional funding (federal and state) and measuring progress in raising the grade.

DEFINITIONS

U.S. Environmental Protection Agency Clean Watershed Needs Survey (CWNS) - an assessment of capital investment needed nationwide for publicly owned wastewater collection and treatment facilities to meet the water quality goals of the Clean Water Act

Septic System- a highly efficient, self-contained, underground wastewater treatment system

United States Department of Agriculture (USDA) - a department of the U.S. government that manages various programs related to food, agriculture, natural resources, rural development, and nutrition

Appalachian Regional Commission (ARC). A federal agency that provides grant funding for infrastructure projects situated within a defined area near the Appalachian Mountains.

U.S. Bureau of Census - an agency in charge of producing data about the American people and the economy

Private Facilities/Systems - wastewater systems not owned or operated by a public agency

Public Facilities/Systems - wastewater systems that are owned or operated by a public agency or government

Combined Sewer Overflows (CSOs) - when a combined stormwater and wastewater system overflows and discharges into nearby streams, rivers, and other bodies of water

Separate Sanitary Sewer Overflow (SSO) – when a separate sanitary sewer system that conveys wastewater, only, overflows and discharges into nearby bodies of water.

West Virginia Department of Environmental Protection (WVDEP) - West Virginias' environmental agency in charge of environmental protection and regulations

West Virginia Infrastructure & Jobs Development Council (WVIJDC) - the clearinghouse for most state and federal funding programs, and one of the sources of project financing

WASTEWATER

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DEFINITIONS (CONT.)

Centers for Disease Control and Prevention (CDC) - leading national public health institute charged with protecting public health and safety

Grey Water - a term used to describe wastewater without fecal contamination

Federal Consent Decree— an agreement between the federal government and another party without admission of guilt, can lead to federal charges if agreement broken

Chesapeake Bay Initiative - a program providing assistance to agricultural producers to minimize excess nutrients and sediments and restore the Chesapeake Bay

1,000-year Flood - a flood of that magnitude (or greater) that has a 1 in 1,000 chance of occurring in any given year. In terms of probability, the 1,000-year flood has a 0.1% chance of happening in any given year

Rural - rural areas comprise open country and settlements with fewer than 2,500 residents

Grant - a sum of money given by a government or other organization for a particular purpose

Amendment - a budget modification pertaining to a grant

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