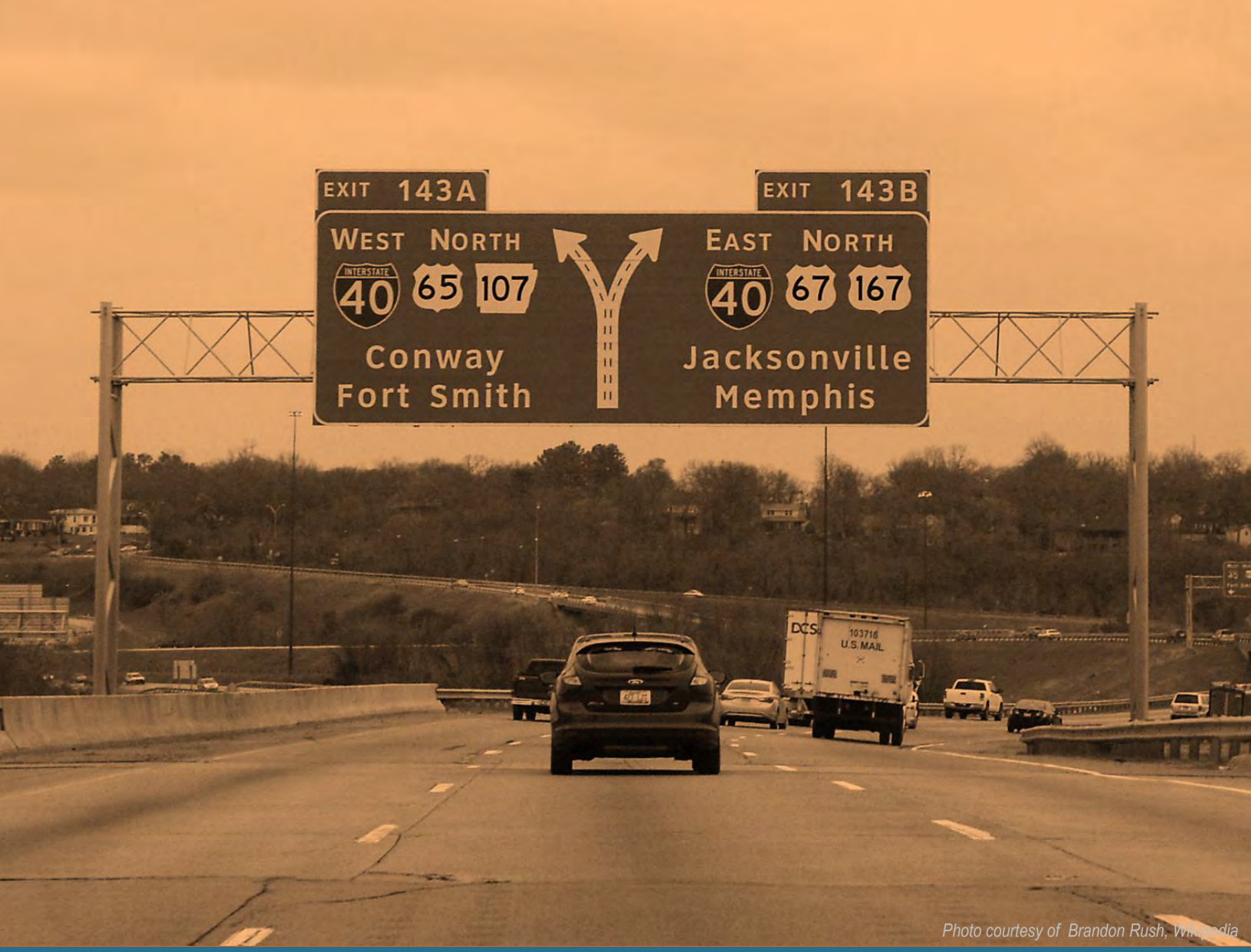


*Photo courtesy of Brandon Rush, Wikipedia*

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

# 2014 REPORT CARD FOR ARKANSAS' INFRASTRUCTURE

**October 2014**
**ARKANSAS SECTION OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS**
**WWW.ARASCE.ORG**

# 2014 Report Card for Arkansas' Infrastructure

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|---|---|
| **ROADS**<br>**D+** | Arkansas has the 12th largest state highway system in the nation with 16,398 miles. While Arkansas has taken steps to improve road conditions, due to the lack of available funding the State has begun putting needed projects on hold as the federal Highway Trust Fund's long-term solvency is uncertain and no state revenue sources are identified to backfill the investment needed. |
| **BRIDGES**<br>**C+** | Arkansas has 12,523 bridges. While progress has been made in improving the condition of Arkansas bridges, 32% of all Arkansas bridges have been in service for at least 50 years. In Arkansas, the average age of bridges in service is 38 years, while 21% of bridges are deficient by bridge deck surface area. The estimated cost to repair or replace all 2,658 structurally deficient bridges in Arkansas is $1.14 billion. To put this need in perspective, in 2012, Arkansas spent approximately $7.2 million on bridge maintenance. |
| **TRANSIT**<br>**D+** | Residents in 60 of the 75 counties in Arkansas have access to some type of public transportation service, and ridership estimates imply that nearly half a million people are in need of public transportation at some time. Two urbanized areas in the State have established transit service on a fixed route—Little Rock and Fayetteville. Due to the location of the ridership, only 36% of the estimated potential 13 million transit trips in the State are being met. This need is projected to grow to 9.6 million trips and 560,000 people by 2020. |
| **DRINKING WATER**<br>**D+** | Arkansas' public water supply accounts for approximately 404 million gallons per day to serve 2.6 million people. For the next 20 years, an estimated $6.1 billion dollars of funding will be necessary to keep up with the State's growing drinking water needs. Arkansas' water transmission and distribution system, which consists mostly of buried pipes, represents 72% of the capital needs of drinking water facilities in the State. Of the 2,615 miles of water transmission and distribution lines that will require replacement or rehabilitation within the next 20 years, 14% of these projects need attention now. A state-wide 2014 Arkansas Water Plan is currently under development by the Arkansas Natural Resources Commission to evaluate the state's water needs until 2050. |
| **WASTE-WATER**<br>**C+** | Wastewater infrastructure is important to all modern societies to keep the water unpolluted and able to naturally replenish. EPA's Clean Watersheds Needs Survey from 2008 and 2012 shows that the investment needs for wastewater facilities for the next 20 years in Arkansas have jumped from $470 million to $763 million. The 2012 Survey found that 214 wastewater treatment facilities in Arkansas needed facility upgrades and improvements over the next 20 years, and water treatment systems needed doubled the improvements compared to 2008. There was also a ten-fold increase for secondary treatment facilities from $15M to $126M. Although most of the facilities are currently reasonably maintained and normally operated below design capacities, the future needs of Arkansas' wastewater systems will need a significant amount of capital investment. |
| **LEVEES**<br>**D** | Levee systems are built to prevent flooding by piling earth along rivers. In Arkansas, there are 106 levee systems, and of them, 90 are federal levees and 16 are non-federal levees. Less than 70% of the systems have adequate flood protection or added safety height to the levee design. Currently more than 50% of systems in Arkansas are 'inactive' in the USACE Rehabilitation and Inspection Program due to poor inspection ratings. Of the 13 major levees in Arkansas longer than 25 miles in length, inspection ratings show that no levee system was rated as acceptable; 4 out of the 13 systems are rated as minimally acceptable, and nine out of the 13 are rated as unacceptable. |
| **DAMS**<br>**D** | Dams in Arkansas are designed and built primarily to provide flood risk management, water supply, recreation, hydropower, and transportation. Arkansas has 1,193 state regulated dams across the state, and approximately 1 in every 5 of these dams have either high-hazard or significant hazard potential. The number of high hazard dams is 144 or 12% of regulated dams, and the number of significant hazard dams is 92 or 8% of regulated dams. While on an upward trend previously, the 2013 State Dam Safety budget has declined. When the budget is compared in context of the number high hazard potential dams, Arkansas does not meet the national average. |

## D+ Arkansas GPA

# Arkansas' Infrastructure Earns D+ Grade Overall

The condition of Arkansas' infrastructure impacts our families, our friends, and our businesses every day. While most of us don't think about infrastructure, there isn't an hour of the day where Arkansas' communities aren't using infrastructure. When you turn on the shower, drinking water pipes bring clean water to your house, and when you go to work, your car or bus uses roads and bridges to take you safely there.

Our nation has benefited from reliable infrastructure for a long time, but over the last decade, our infrastructure assets have deteriorated with age, and the wear-and-tear from time is starting to show. To explain how Arkansas' infrastructure is doing, this inaugural ***Report Card for Arkansas' Infrastructure*** provides grades and facts that show the condition and needs facing Arkansas' infrastructure.

## Recommendations to Raise the Grades

Raising the grades in Arkansas will require targeted investments and modernization across each infrastructure sector. However, ASCE believes there are several key solutions to improve infrastructure conditions and drive economic growth in the state:

### 1. Increase Leadership in Infrastructure Renewal

Arkansas' infrastructure is a responsibility of local leaders, and leadership is needed to maintain and renew the infrastructure the generations before us have built. Bold leadership and a vision for how strategic infrastructure investment can help local communities are needed to reverse the current trends.

### 2. Promote Sustainability and Resilience

Today's infrastructure must meet the community's ongoing needs, and at the same time, protect and improve environmental quality. Sustainability, resiliency, and ongoing maintenance must be an integral part of improving the area's infrastructure. Today's transportation systems must be able to withstand both current and future challenges. Both structural and non-structural methods must be applied to meet challenges. Infrastructure systems must be designed to protect the natural environment and withstand both natural and man-made hazards, using sustainable practices, to ensure that future generations can use and enjoy what we build today, as we have benefited from past generations.

### 3. Develop and Fund Plans to Maintain and Enhance Arkansas' Infrastructure

Infrastructure investment must be increased at all levels, but it also should be prioritized and executed according to well-conceived plans that focus on the health and goals of the system. The goals should center on freight and passenger mobility, intermodality, and environmental stewardship, while encouraging resiliency and sustainability. The plans must reflect a better defined set of federal, state, local, and private sector roles and responsibilities and instill better discipline for setting priorities and focusing funding to solve the most pressing problems.

## About ASCE's Report Card

The American Society of Civil Engineers (ASCE) enhances the welfare of humanity by advancing the science and profession of civil engineering. Simply stated, civil engineers are creative, people-serving and problem-solving leaders who make our lives easier to live from one day to the next. Founded in 1852, the American Society of Civil Engineers represents more than 145,000 civil engineers worldwide and is America's oldest national engineering society.

Established in 1981, the Arkansas Section of the American Society of Civil Engineers has brought together the civil engineering community, and with the power of volunteers, we also help our community with programs to strengthen the growth of science and mathematics in Arkansas and raise awareness about issues that impact the community. A team of volunteers created this ***Report Card for Arkansas' Infrastructure*** to provide the public a clear indicator of the state's infrastructure needs. We are your neighbors across the state, and we believe there is no better time than now to build a better tomorrow.

# D+ ROADS

## Summary

Arkansas has the 12th largest state highway system in the nation with 16,398 miles. The State Highway System carries 80% of the total traffic and 95% of all heavy truck traffic that uses the public road system in Arkansas, but the condition rating on the road is only 46 out of 100.

While Arkansas has taken steps to improve road conditions, due to the lack of available funding the State has begun putting needed projects on hold as the federal Highway Trust Fund's long-term solvency is uncertain and no state revenue sources are identified to backfill the investment needed.

Table 1 displays the overall condition of Arkansas' State Highway System. In Arkansas, the average PCI on the State Highway System is rated 46 out of 100, and over 85% of the State Highway System has a level of service of good or above. The estimated capacity of the Arkansas State Highway System needs to improve by approximately 192 miles.

## Current Conditions and Capacity Needs

Arkansas' State Highway System is composed of several road systems, which form an extraordinarily large transportation network for the state's citizens and businesses. It is the 12th largest state highway system in the nation with 16,398 miles. Arkansas interstate construction's began in the 1950s and was completed in the 1970s to support the country's revived commerce post-World War II, and today Arkansas' road network still impacts the state's economic development, safety, and tourism. While Arkansas has taken steps to improve road conditions, due to the lack of available funding the State has begun putting needed projects on hold as the federal Highway Trust Fund long-term solvency is uncertain and no state revenue sources are identified to backfill the investment needed.

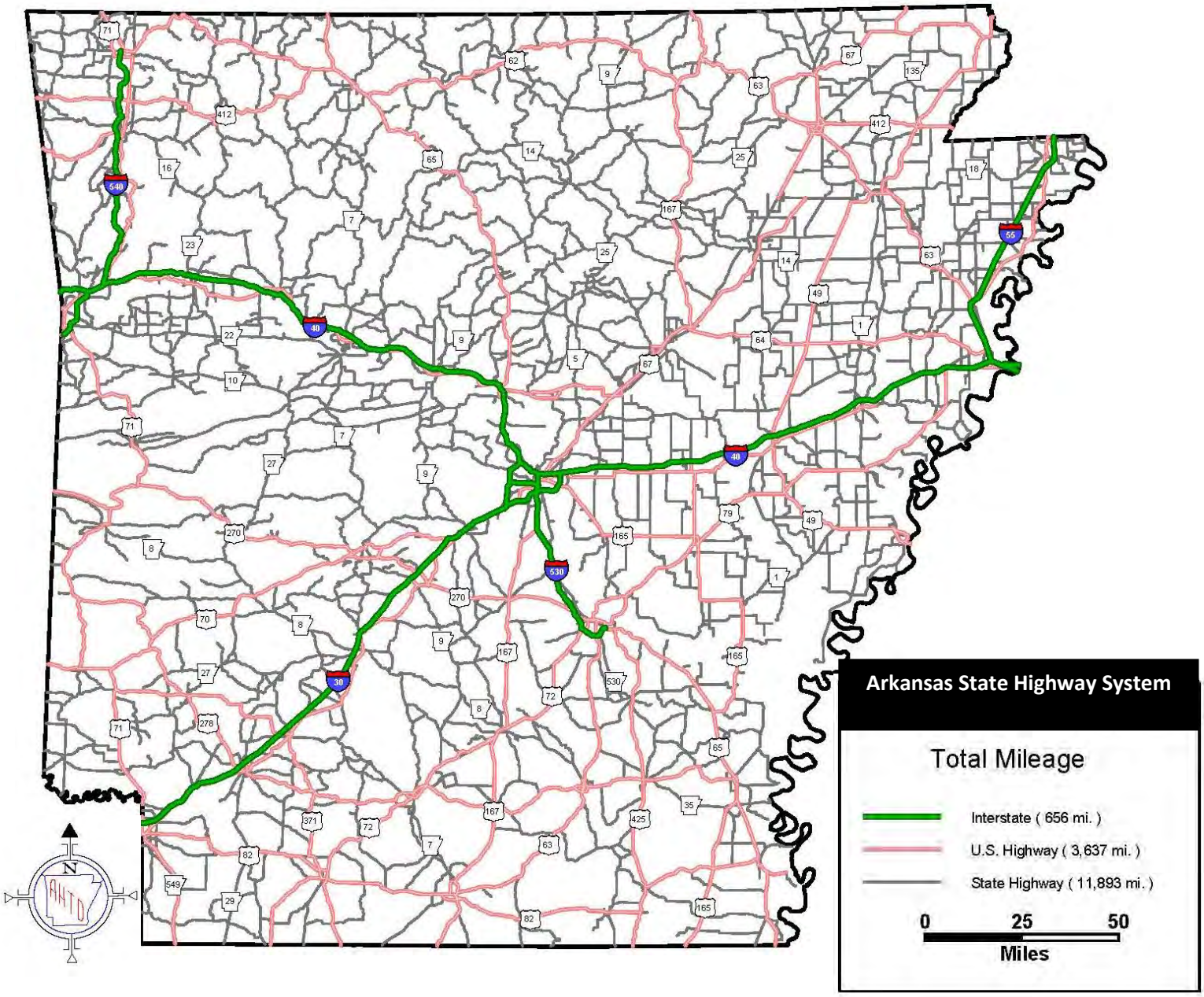
To assess the current condition of Arkansas roads, several key statistics were reviewed including the Pavement Condition Index (PCI), safety statistics, and the Level of Service (LOS) for the Arkansas State Highway System (State Highway System). In 1923, the State Highway System mileage was 6,719 miles. By 1965, that mileage had doubled to 13,294 miles. While the State Highway System is only 17% of the total public roadway miles in Arkansas, it carries 80% of the total traffic and 95% of all heavy truck traffic that uses the public road system in Arkansas.

Table 1 displays the overall condition of Arkansas' State Highway System. In Arkansas, the average PCI on the State Highway System is rated 46 out of 100, and over 85% of the State Highway System has a level of service of good or above. The estimated capacity of the Arkansas State Highway System needs to improve by approximately 192 miles. Figure 1 shows the state's current State Highway System.

**Table 1. Arkansas Road Conditions**

| Highway System Type | Pavement Condition | Safety | Capacity Needs |
|---|---|---|---|
| Interstate System | GOOD | GOOD | 13% (85 miles) |
| National Highway System | MEDIOCRE | GOOD | 4% (156 miles) |
| Arkansas Primary Highway Network | MEDIOCRE | MEDIOCRE | 3% (192 miles) |
| Arkansas Non-Primary Highway Network | POOR | POOR | 0% (0 miles) |
| **Arkansas State Highway System** | **POOR** | **POOR** | **1.2% (192 miles)** |

**Figure1. Arkansas State Highway System**




Level of Service (LOS) is a qualitative measure that describes traffic conditions in terms of speed, travel time, freedom to maneuver, comfort, convenience, traffic interruptions and safety. Six classifications, the letters A through F, are used to define LOS where A represents the best conditions and F represents heavily congested flow with traffic demand exceeding highway capacity. Over 85% of the State Highway System has an LOS rating of B or above. However, there are areas where the LOS is rated D or lower. Rating of D or lower is more common in urban state highways.

**Figure 2. Primary Areas Where Levels of Service Issues Arise**

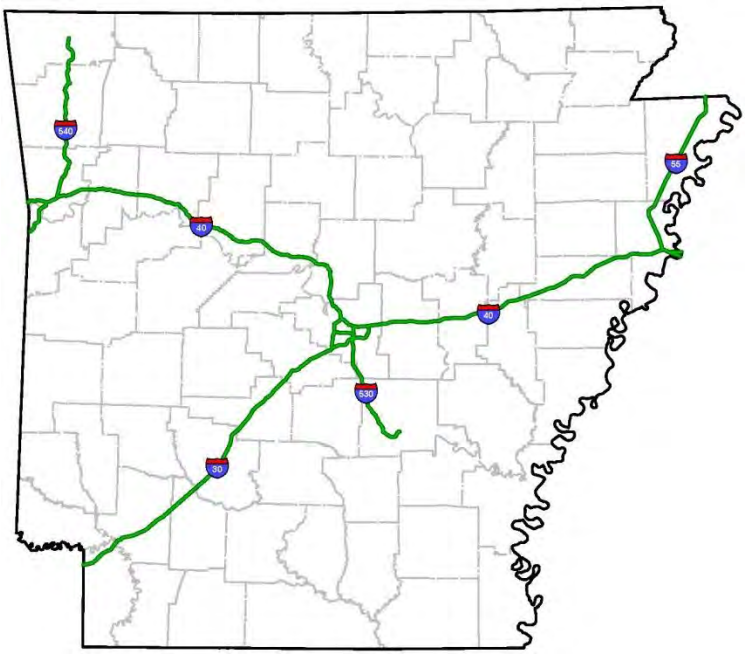
*Red, Orange, and Yellow Lines indicate and LOS below D.*

***Little Rock Area LOS***


***Fayetteville Area LOS***

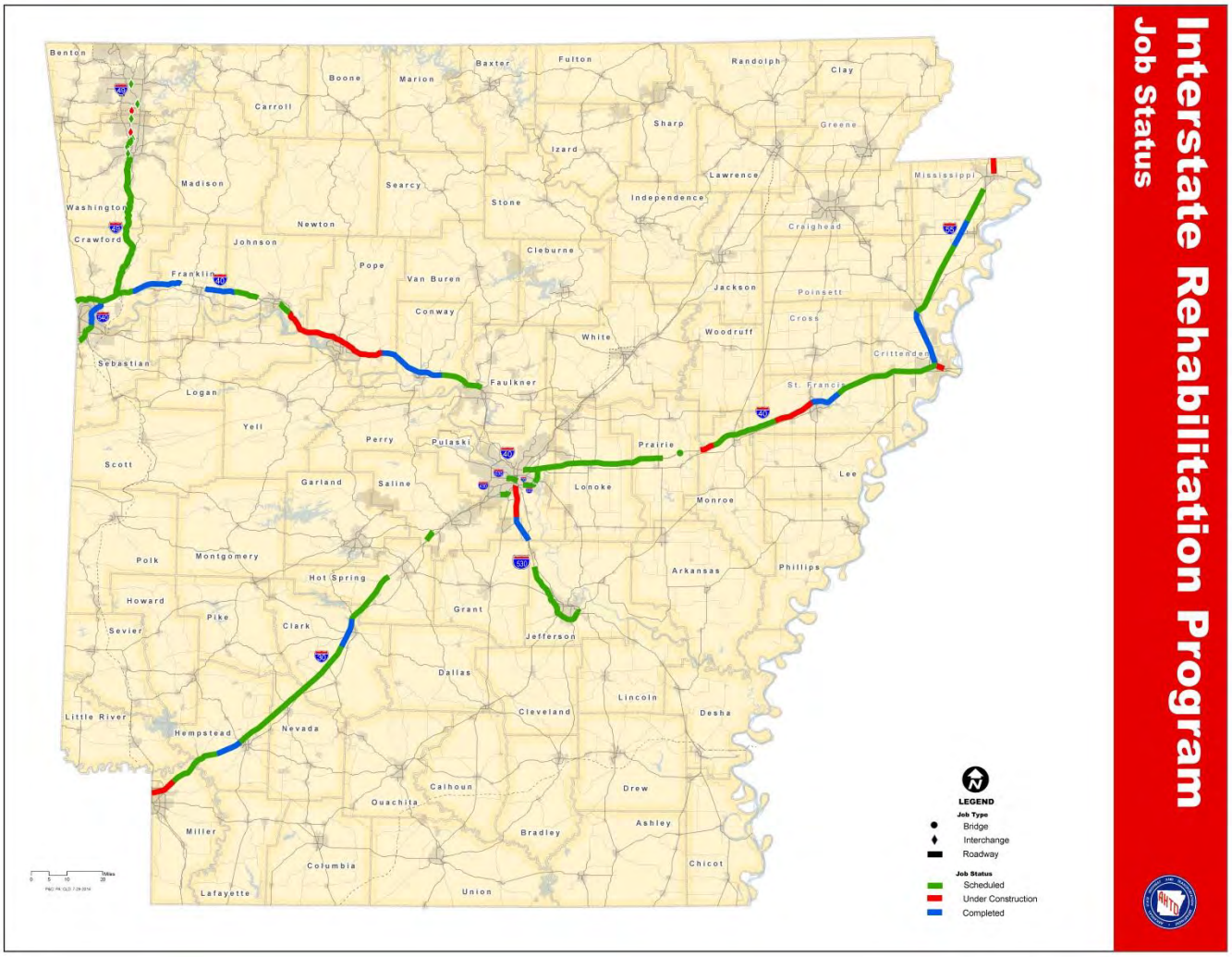

The Interstate System is one of the subsystems that make up the State Highway System. Arkansas currently has approximately 656 interstate miles. Figure 3, illustrates the Arkansas Interstate System. Since the Interstate system was completed in the mid-1970s, more than 30 years of wear and tear resulted in one of the roughest interstate systems in the country, and in 1999, Arkansas passed the Interstate Rehabilitation Program (IRP) for system preservation. System preservation is defined as rehabilitation of interstate highways, reconstruction, and resurfacing and shoulder improvement.

**Figure 3. Arkansas Interstate System**



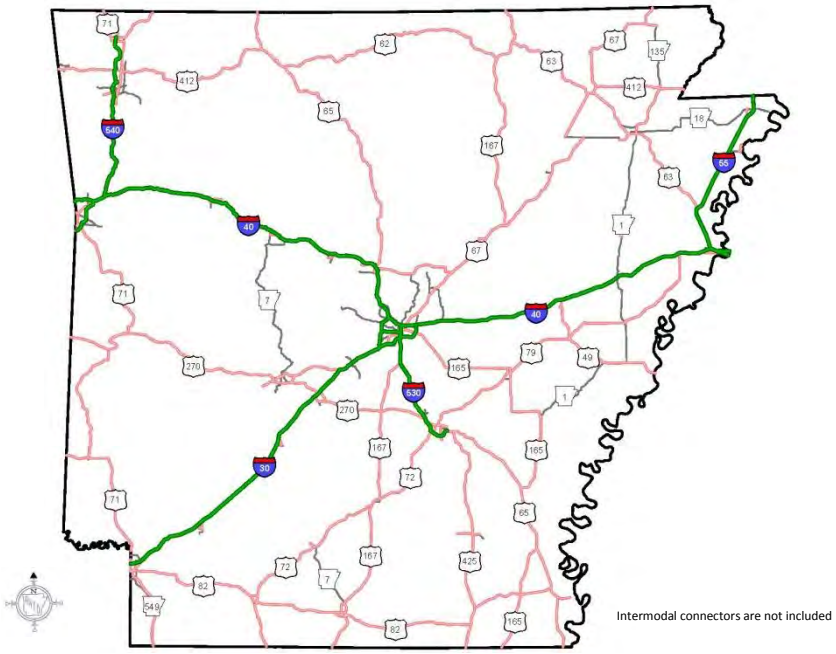

The IRP exceeded $1 billion, which included funds from Grant Anticipation Revenue Vehicle (GARVEE) bonds, federal-aid Interstate Maintenance, and other highway revenue sources. The IRP provided major improvements to approximately 50% of Arkansas' Interstate System. Upon completion of the IRP program, interstate condition quality improved from 63% in poor condition to only 14%in completion. When the final project was completed, 72% of the Interstate System was considered in good condition.

To continue preservation of the Interstate System, Arkansas voters passed the IRP again in 2011. The 2011 IRP will improve 455 miles of the Interstate System. The combination of bond proceeds and existing federal and state revenues is expected to support approximately $1.2 billion in construction on the Interstate System over the life of the program.



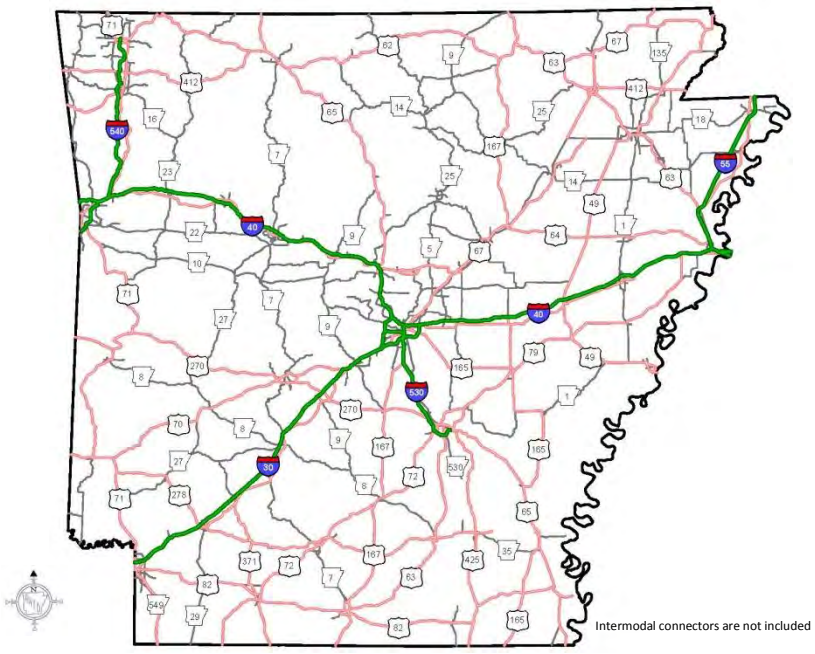

The National Highway System (NHS) is a nationwide network of approximately 160,000 miles of roadways which are important to the nation's economy, defense, mobility, security, and safety. Arkansas' portion of the National Highway System (NHS) is approximately 3,765 miles. Figure 4 illustrates Arkansas' portion of the National Highway System. Arkansas continues to improve on the NHS. One of the largest improvements made in the NHS was the States' Interstate System. Arkansas' current PCI on the NHS is 40. The LOS on rural NHS roads is at an acceptable level, B or above. However, the LOS on urban NHS roads still needs improvement. Urban areas of central and northwest Arkansas include routes with an LOS F which is unacceptable.

**Figure 4. National Highway System**



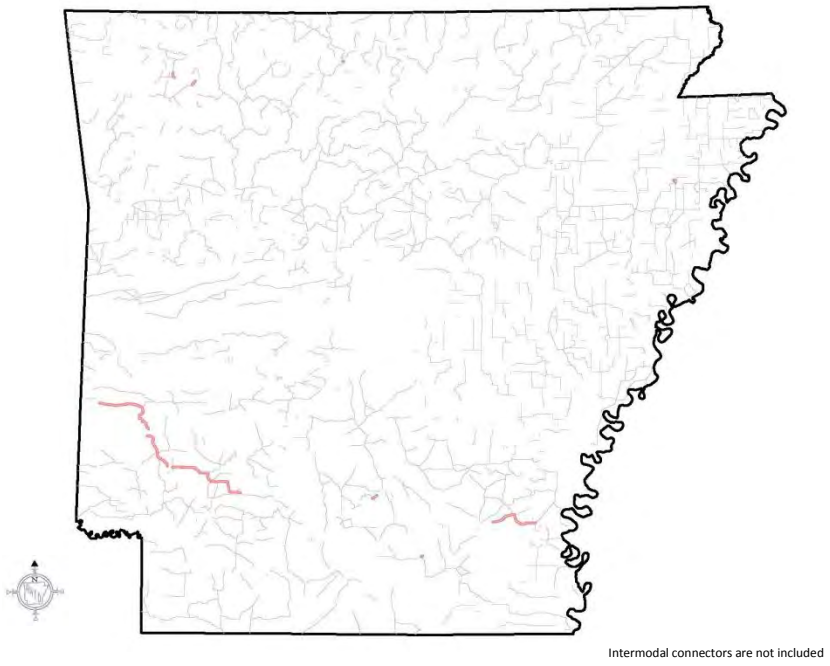

The Arkansas Primary Highway Network (APHN) includes significant routes that are important to the State's transportation service because of its characteristics and performance. The 7,819 mile APHN system provides interstate and regional movement, linkage to population centers and critical service and carries approximately 92% of travel on the State Highway System. This system accounts for close to 50% of the total State Highway System. Figure 5 illustrates the APHN. Arkansas' current PCI on the APHN is only 44 out of 100.

**Figure 5. Arkansas Primary Highway Network**



The Non-Arkansas Primary Highway Network (Non-APHN) serves an important economic role to ruralcommunity functions. These highways are often the sole means of access for local economic activity. The Non-APHN is a system of 8,830 miles, this system accounts for more than 50% of the total Arkansas State Highway System. Figure 6 illustrates the Non-APHN. Arkansas' currently PCI on the Non-APHN is 49 out of 100.

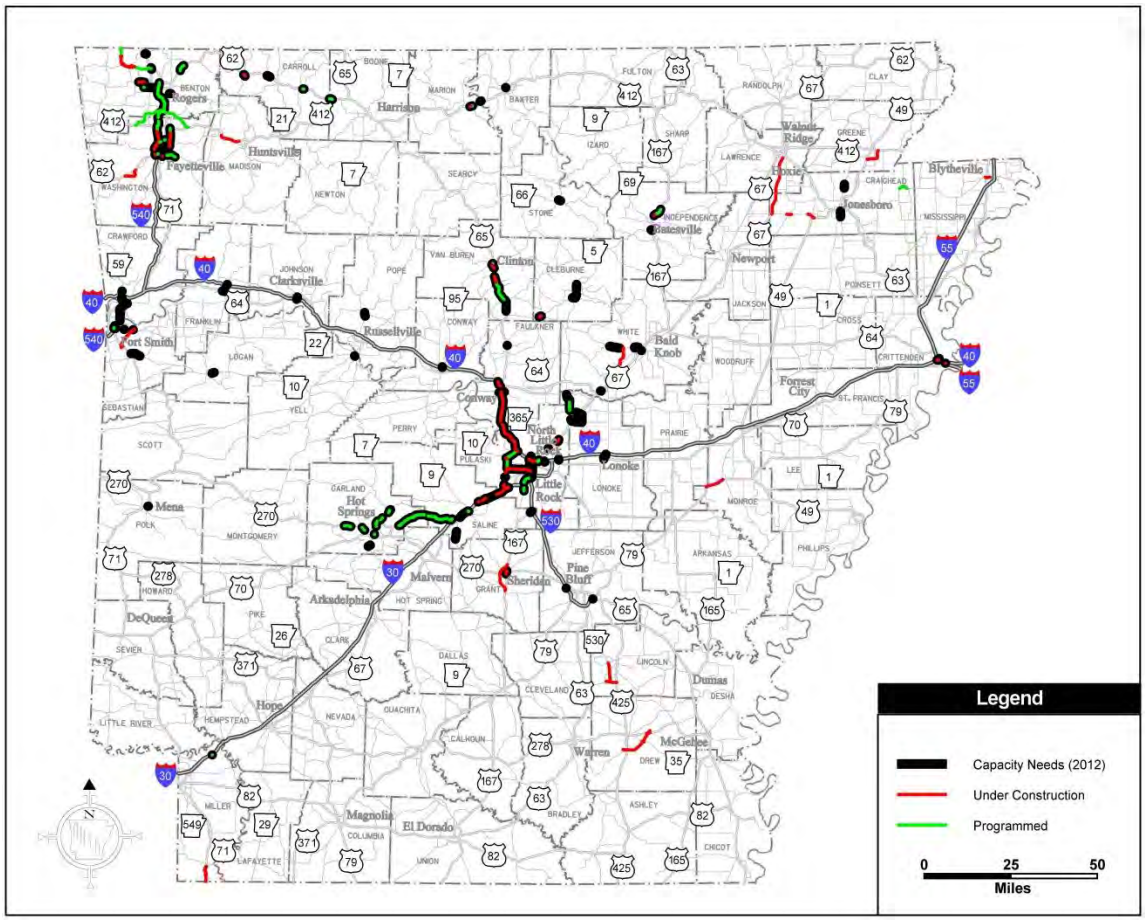
**Figure 6. Non-Arkansas Primary Highway Network**




In 2007, 650 individuals were killed on Arkansas roadways which was one of the highest rates in the nation. Subsequently, the State of Arkansas implemented measures to reduce motor vehicle fatalities, such as a statewide trauma system, the passing of a graduated driver's license law, a primary seat belt law, and the installation of over 1,000 miles of rumble strips and over 100 miles of cable median barriers. As a result, the number of roadway fatalities in Arkansas decreased in 2011 to 551, or 1.67 deaths per 100 million vehicle miles traveled. In only four years, Arkansas was able to decrease fatalities through proactive public policy. Even with these improvements, the National Highway Traffic Safety Administration (NHTSA) showed Arkansas to have the second highest traffic fatality rate in the nation in 2010. The 2013 Strategic Highway Safety Plan's main focus is to move *Toward Zero Deaths* on Arkansas roadways.

New location and major widening projects are needed to improve capacity needs. Arkansas currently has approximately 192 miles of capacity needs. These improvements address urban and rural areas related to congestion and safety. With growing traffic volumes, continued infrastructure improvements are necessary. Arkansas' capacity need locations are shown in Figure 7.

**Figure 7. Capacity Needs**




# Funding Needs

Arkansas ranks 43rd in the U.S. for revenue brought in per mile of road. Compared to a state like Illinois which has roughly the same amount of miles of roadway, Arkansas is bringing in 23 cents for every mile while Illinois brings in $1 per mile. The AHTD estimates that an additional $200 million annually is needed over the next 10 years for highway congestion, pavement and bridge conditions, maintenance, administration, and operations to remain at current levels.

The estimated cost for the state's original interstate system running 542 miles was $837 million funded mostly by the federal government, yet repairing these same roads in 2011, the estimate for repairing about 60% of those miles in today's market was $950 million

- State highway revenue from most traditional sources down $10.2 million for the first 7 months of SFY 2014
- Consumption down 19.7 million gallons (1.7%) for 2014
- Natural gas tax revenue up
- Result – overall revenue down $1.3 million for 2014
- Revenue from 0.5% Sales Tax under DF&A projections for 6 of 7 months
- Total is $2.8 million (3.2%) under projections

# Improvement Needs

Arkansas has made many improvements to the State Highway System since 2011. However, there are many highway needs still unmet. Arkansas roadways with LOS ratings of D though F need enhancement in order to increase travel efficiency. Routes with elevated IRI ratings need improvement and capacity needs will continue to increase with population and growing traffic volumes. While only approximately 192 miles of capacity needs have been identified, resources are needed to meet these increasing demands. The traffic fatality rate in Arkansas is the second highest in the nation, but Arkansas is making progress in reducing fatalities on Arkansas' roadways. Yet despite these efforts toward improvement, it is recognized that every fatality is one too many.

# Sources

Arkansas State Highway and Transportation Department, http://arkansashighways.com

Arkansas State Highway and Transportation Department, Arkansas Strategic Highway Safety Plan, http://arkansashighways.com

# C+ BRIDGES

## Summary

Arkansas has 12,523 bridges. While progress has been made in improving the condition of Arkansas bridges, 32% of all Arkansas bridges have been in service for at least 50 years. In Arkansas, the average age of bridges in service is 38 years, while 21% of bridges are deficient by bridge deck surface area. The estimated cost to repair or replace all 2,658 structurally deficient bridges in Arkansas is $1.14 billion. To put this need in perspective, in 2012, Arkansas spent approximately $7.2 million on bridge maintenance.

## Current Conditions and Capacity

The Federal Highway Administration (FHWA) and the Arkansas State Highway and Transportation Department (Department) define a bridge as a structure erected over a depression or obstruction, including a roadway or track carrying traffic, and having a length of more than 20 feet. Arkansas currently has 12,523 bridges in the National Bridge Inventory (NBI). Of the 12,523 bridges, 7,249 are owned by the state and 5,274 are owned by the counties or cities. The Department uses federal-aid highway funds, as well as state and local funds to address bridge needs. Table 1 displays the deficiency of Arkansas bridges by owner.

**Table 1. Current Arkansas Bridge Conditions**

| Owner | Average Age[1] | Total Number of Deficient Bridges[1] | Total Percentage of Deficient Bridges by Deck Surface Area[2] | Grade |
|---|---|---|---|---|
| **State** | 44 | 1179 | 20% | **B-** |
| **Counties** | 31 | 1260 | 24% | **C** |
| **Cities** | 33 | 219 | 32% | **D+** |
| **Total** | **38** | **2658** | **21%** | **C+** |

Over 85% of the mileage of the Arkansas State Highway System was added before the 1970s. With over 12,000 bridges, Arkansas has more bridges than half the states in the nation. Many of the bridges in Arkansas are reaching the end of their service lives, and most are deteriorating at an accelerating rate. This deterioration comes as demands on the state highway system are increasing. The expected life of a highway bridge built in the last half of the 20th century is approximately 50 years. Figure 1 illustrates examples of deterioration on Arkansas bridges. As of December 2012, the average bridge in Arkansas is 38 years old.

**Figure 1. Deteriorating Bridges in Arkansas**


Table 2, shows that more than 56% of all bridges in Arkansas have been in service for at least 35 years, while 32% of all Arkansas bridges have been in service for at least 50 years.

**Table 2. Age of Bridges in Arkansas**

| Owner | Number of Bridges | Number of Bridges 35 Years or Older | Percentage of Bridges 35 Years or Older | Number of Bridges 50 Years or Older | Percentage of Bridges 50 Years or Older |
|---|---|---|---|---|---|
| State | 7,249 | 4,978 | 69% | 2,997 | 41% |
| Counties | 4,306 | 1,573 | 37% | 830 | 19% |
| Cities | 968 | 420 | 43% | 209 | 22% |
| **Total** | **12,523** | **6,971** | **56%** | **4,036** | **32%** |

*Note: The "10 Year Rule" was applied in the determination of deficiency status within these data tables.*

All Arkansas bridges are inventoried and inspected on a frequency in accordance with the National Bridge Inspection Standards (NBIS). All bridges are issued a sufficiency rating of 0 to 100 as a quantitative measure of bridge adequacy. The Department will use the sufficiency rating and engineering judgment to determine if a bridge requires maintenance, rehabilitation, or reconstruction. Table 3 shows the sufficiency rating of Arkansas bridges by owner. As illustrated, 57% of Arkansas bridges have a sufficiency rating less than 80 and 11% of bridges have a sufficiency rating less than 50.

**Table 3. Sufficiency Rating by Owners in Arkansas[1]**

| Owner | Number of Bridges | Number of Bridges with Sufficiency Less Than 80% | Percentage of Bridges with Sufficiency Less Than 80% | Number of Bridges with Sufficiency Less Than 50% | Percentage of Bridges with Sufficiency Less Than 50% |
|---|---|---|---|---|---|
| State | 7,249 | 3,713 | 51% | 470 | 6% |
| Counties | 4,306 | 2,960 | 69% | 918 | 21% |
| Cities | 968 | 707 | 73% | 84 | 9% |
| **Total** | **12,523** | **7,380** | **59%** | **1,472** | **12%** |

*Note: The "10 Year Rule" was applied in the determination of deficiency status within these data tables.*

Deficient bridges are further classified as structurally deficient or functionally obsolete. A bridge is considered structurally deficient if significant load-bearing elements are found to be in poor condition or the waterway adequacy, which is the ability of the bridge to remain open to traffic during varying levels of flooding, is insufficient. A bridge is considered functionally obsolete if it does not meet current design standards such as lane width or shoulder width, vertical clearance, or approach conditions. While both types of deficient bridges are tracked, structurally deficient bridges are watched closely for safety reasons.

Table 4 shows the deficient bridges by owner in Arkansas. State and city owned bridges represent a lower percentage of structural deficiency compared to county owned bridges. The percentage of Arkansas bridges that are functionally obsolete is

much higher than the percentage of structurally deficient bridges. Bridges owned by cities in Arkansas include approximately four times more functionally obsolete bridges than structurally deficient bridges.

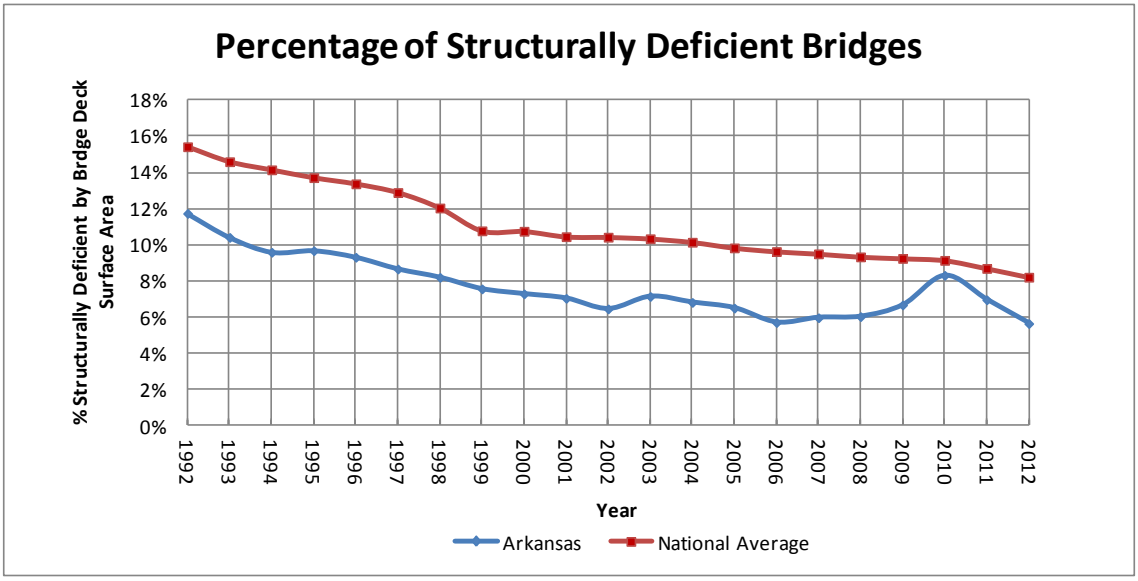
**Table 4. Deficient Bridges by Owners in Arkansas[1]**

| Owner | Number of Bridges | Number of Bridges Structurally Deficient | Percentage of Bridges Structurally Deficient | Number of Bridges Functionally Obsolete | Percentage of Bridges Functionally Obsolete |
|---|---|---|---|---|---|
| State | 7,249 | 314 | 4% | 865 | 12% |
| Counties | 4,306 | 500 | 12% | 760 | 18% |
| Cities | 968 | 46 | 5% | 173 | 18% |
| **Total** | **12,523** | **860** | **7%** | **1,798** | **14%** |

Note: The "10 Year Rule" was applied in the determination of deficiency status within these data tables.

Figure 2 shows the annual percentage of structurally deficient bridges in Arkansas during the last 20 years. Arkansas has made tremendous effort to decrease the percentage of structurally deficient bridges. In 1992, 12% of Arkansas bridges were considered structurally deficient. As of 2013, 7% of the bridges were considered structurally deficient. Similar efforts for improvement are also reflected in the national statistics. Arkansas percentage of structurally deficient bridges remains below the national percentage of structurally deficient bridges.

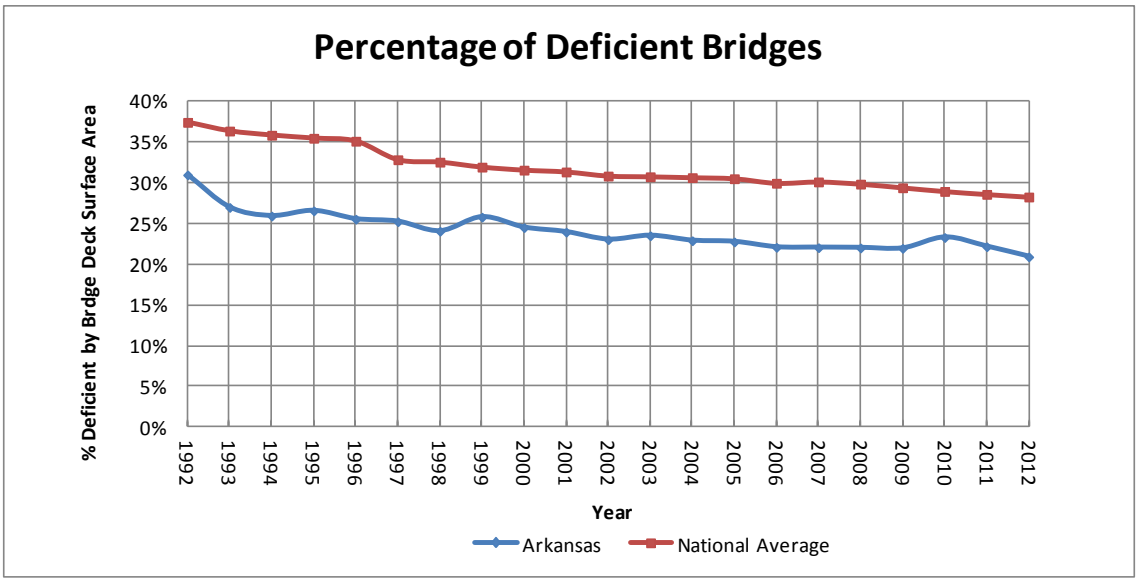
**Figure 2. Structurally Deficient Bridges – Arkansas vs. National Average[2]**




*Note: The deficiency status of the data has been calculated by not taking into consideration the year built or the year reconstructed.*

The total percentage of deficient bridges continues to decrease in Arkansas and the nation. Figure 4 shows the percentages of all deficient bridges in Arkansas compared with the national average. The overall condition of Arkansas bridges is trending at a rate similar to the national average.

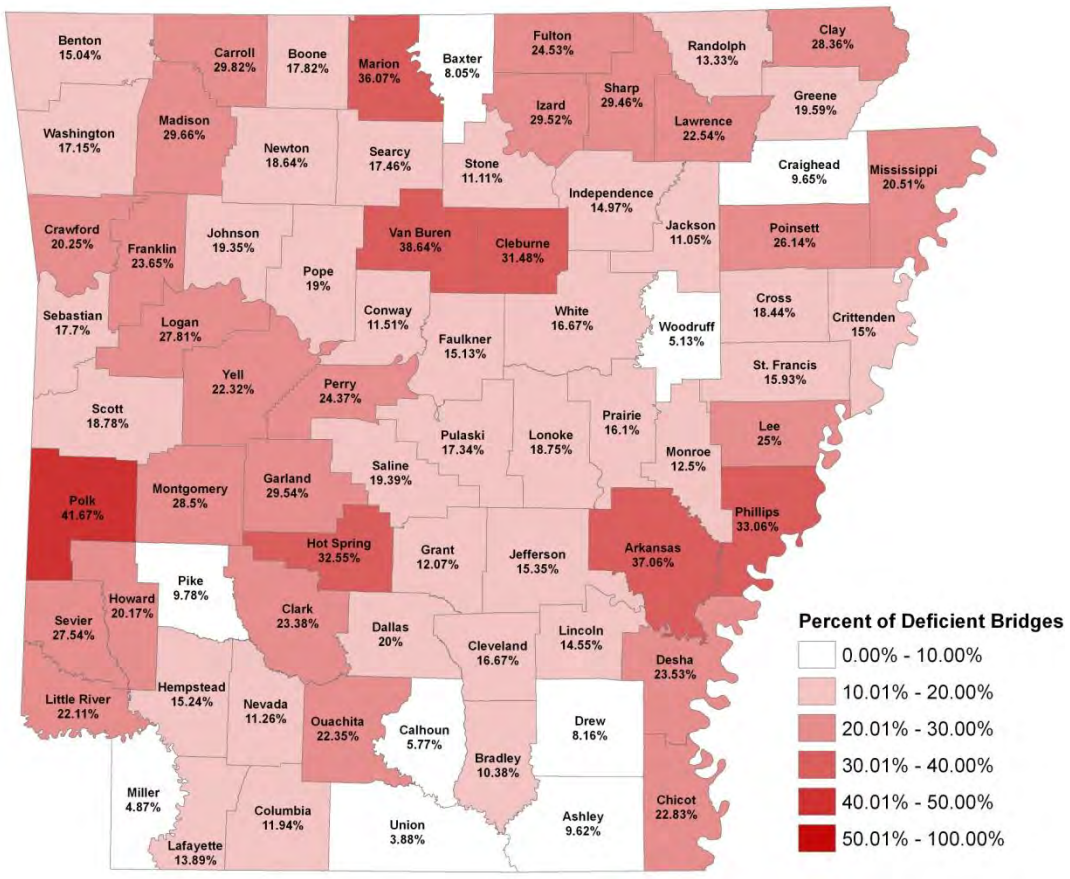
**Figure 4. Bridge Deficiencies – Arkansas vs. National Average[2]**




*Note: The deficiency status of the data has been calculated by not taking into consideration the year built or the year reconstructed.*

Figure 5 illustrates percentages of deficient bridges in Arkansas by county. Seven Arkansas counties have a percentage deficiency greater than 30%. Polk County has the highest percentage deficient bridges at more than 39%.

Figure 5. Percentage of Deficient Bridges in Arkansas' Counties[1]




*Note: The "10 Year Rule" was applied in the determination of deficiency status within these data tables.*

# Funding Needs

The average cost for bridge replacement and widened structures is $120 per square foot, and the average bridge in Arkansas is 485 square feet. The estimated cost to repair or replace all structurally deficient bridges in Arkansas is $1.14 billion. In 2012, Arkansas spent approximately $7.2 million on bridge maintenance. This figure only consists of structure inspection, bridge repair, and bridge cleaning. Bridge replacement is not included. Investments to preserve transportation systems have not kept pace with transportation demands.

# Sources

Arkansas State Highway and Transportation Department, http://arkansashighways.com

FHWA Bridge Programs NBI Data. Retrieved March 2013, From U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/bridge/nbi/disclaim.cfm?nbiYear=2012&nbiState=AR12

FHWA Bridge Programs NBI Data. Retrieved March 2013, From U.S. Department of Transportation Federal Highway Administration, http://www.fhwa.dot.gov/bridge/owner.cfm

# D+ TRANSIT

## Summary

Residents in 60 of the 75 counties in Arkansas have access to some type of public transportation service, and ridership estimates imply that nearly half a million people are in need of public transportation at some time. Two urbanized areas in the State have established transit service on a fixed route—Little Rock and Fayetteville. Due to the location of the ridership, only 36% of the estimated potential 13 million transit trips in the State are being met. This need is projected to grow to 9.6 million trips and 560,000 people by 2020.

## Current Conditions

The 2012 Arkansas Statewide Public Transportation Needs Assessment was conducted in an effort to identify and address the public transportation needs in each of the state's 75 counties. The purpose of this study was to develop statewide, regional, and county-level assessments of public transportation needs, develop service recommendations to address those needs, and identify financial means to implement those services.

Detailed data on the 2010 population of each county was used to estimate the need for public transit system and human service agency program-related transportation. Need was determined both in terms of "total need" (the needs of the transit-dependent population whether or not they are currently able to make the trip) and "unmet need" (transit dependent people that are not currently being served by transit providers). For a predominantly rural state such as Arkansas, there is a need to segregate urban and rural public transportation, as well as Human Service provided transportation, when discussing existing services and potential ridership. Potential ridership identifies people who are in need of public transportation at some time.

Residents in 60 of the 75 counties in Arkansas have access to some type of public transportation service, whether it is a rural demand-responsive, an urban fixed route, or a Human Services provider. There are two urbanized areas in the state that have fixed route systems—Little Rock and the Fayetteville Metropolitan area. In terms of population served, the population of those 60 counties comprises 88% of the State's population who have access to public transportation services which represents a good level of access to public transportation.

The Arkansas Statewide Public Transportation Needs Assessment further estimates unmet need for public transportation services as a function of proximity to those services. While 88% of the population is located within counties which are served by public transportation, depending on the location of the ridership it was estimated that only 36% of the estimated potential ridership of 13 million transit trips in the State are being met. The difference in the level of service for the various regions in the state varies based on the mix of urban and rural populations. The following table displays the unmet potential need for Public Transportation in Arkansas.

While some specific local needs were identified during the study, most of the needs identified were general in nature and apply statewide. The major needs for public transportation can be generally grouped by trip purpose into a three categories:

- ***Transportation to Medical Services*** – These trips tend to be infrequent but are critical. These trips may be short trips to a doctor, but many are trips to Little Rock for care from all areas of the State.
- ***Transportation to Employment or Training*** – Many individuals with low incomes, disabilities, or age-related issues lack access to a private automobile and therefore need public transportation for employment or training. Those who are employed need transportation to access their jobs on a daily basis, often late at night or early in the morning.
- ***Transportation for Independent Living*** – Arkansans who live independently, seniors and others without access to an automobile, may need to travel to banks, government offices, and transportation to employment or training. Many

individuals with low incomes, disabilities, or age-related issues lack access to a private automobile and, therefore, need recreational/social/cultural facilities. These trips may be on a regular schedule, but may have travel to many varied destinations.

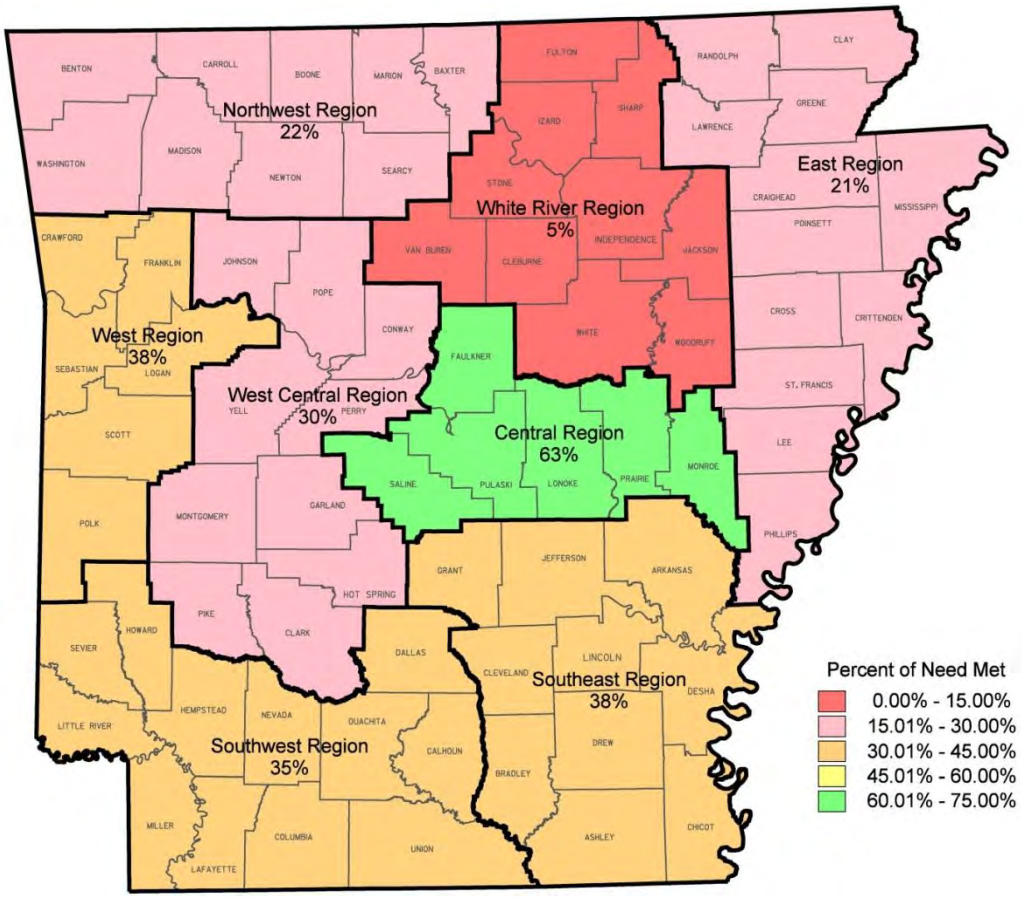
**Potential Ridership for Public Transportation in Arkansas**

*Note: Regions are defined in the following figure*

| Region | 2010 Population | Annual Trips | | | Percent of Need Met | Additional Vehicles Required | Annual Additional Vehicle Cost (X$1,000) |
|---|---|---|---|---|---|---|---|
| | | Total Need | Current Riders | Unmet Need | | | |
| Central Region | 688,323 | 3,386,668 | 2,138,905 | 1,247,763 | 63% | 266 | $ 2,600,000 |
| East Region | 390,274 | 2,030,269 | 432,198 | 1,598,071 | 21% | 435 | $ 4,039,985 |
| Northwest Region | 579,161 | 2,135,234 | 474,663 | 1,660,571 | 22% | 376 | $ 3,587,547 |
| Southeast Region | 213,808 | 968,576 | 363,958 | 604,618 | 38% | 176 | $ 1,608,997 |
| Southwest Region | 232,526 | 1,062,286 | 373,435 | 688,851 | 35% | 184 | $ 1,663,142 |
| West Region | 260,065 | 1,105,336 | 418,249 | 687,087 | 38% | 198 | $ 1,803,426 |
| West Central Region | 313,917 | 1,356,834 | 406,452 | 950,382 | 30% | 255 | $ 2,309,284 |
| White River Region | 237,844 | 1,056,873 | 50,259 | 1,006,614 | 5% | 313 | $ 2,817,000 |
| **Arkansas Total** | **2,915,918** | **13,102,076** | **4,658,119** | **8,443,957** | **36%** | **2,203** | **$ 20,429,381** |

This potential ridership needs implies that nearly half a million people are in need of public transportation at some time. This need is projected to grow to 9.6 million trips and 560,000 people by 2020.

**Figure 1. Arkansas Transit Service Regions**




# Funding Needs

According to the Arkansas Statewide Public Transportation Needs Assessment, the current cost to meet all of the potential ridership needs in the State is approximately $20.5 million. This figure only represents the cost to serve the currently unmet or potential ridership needs and does not include the cost of continuing to provide and maintain existing services and replace existing fleets.

# Sources

Arkansas State Highway and Transportation Department, http://arkansashighways.com

Arkansas Statewide Public Transportation Needs Assessment, Statewide Summary Report, ftp://ftp.arkansashighways.com/Outgoing/Public_Transportation_Section/2010Needs%20Study/Final%20Statewide%20Transit%20Needs%20Report.pdf

Arkansas Public Transportation Directory, http://arkansashighways.com/public_transportation/2013_PT_Directory_Update_Final2.pdf

# D+ Drinking Water

## Summary

Arkansas' public water supply accounts for approximately 404 million gallons per day to serve 2.6 million people. For the next 20 years, an estimated $6.1 billion dollars of funding will be necessary to keep up with the State's growing drinking water needs. Arkansas' water transmission and distribution system, which consists mostly of buried pipes, represents 72% of the capital needs of drinking water facilities in the State. Of the 2,615 miles of water transmission and distribution lines that will require replacement or rehabilitation within the next 20 years, 14% of these projects need attention now. A state-wide 2014 Arkansas Water Plan is currently under development by the Arkansas Natural Resources Commission to evaluate the state's water needs until 2050.

## Current Conditions and Capacity Needs

Arkansas Natural Resources Commission (ANRC) and the U.S. Geological Survey (USGS) prepared a report, Water Use in Arkansas in 2005. According to the report, the amount of water withdrawn from ground water and surface water sources was 11,455 million gallons per day (MGD) in 2005. Supported by multiple aquifer systems throughout the state, 65.5% of the total water use was from ground water. About 98% of the water was withdrawn from the Mississippi River Valley alluvial aquifer and the Sparta-Memphis aquifer. However, due to spatially limited reporting locations and reporting requirements for smaller uses, available use data in the state includes estimations based on various population and average use rate data.

Among the total water withdrawal in Arkansas, public water supply accounts for approximately 404 MGD serving 93% of the population (2.6 million people). Most of the surface and groundwater withdrawal is used for irrigation and thermoelectric use. For domestic use, 66% was withdrawn from surface water sources. Total domestic use of water was 18 MGD.

A state-wide 2014 Arkansas Water Plan is currently under development by the Arkansas Natural Resources Commission. This planning evaluates the state's water needs to the year 2050 for all water demand sectors. The last time Arkansas has completed this comprehensive water plan was in 1990. For the next 20 years, $6.1 billion dollars of funding will be necessary to keep up with the fast growing drinking water needs in the state.

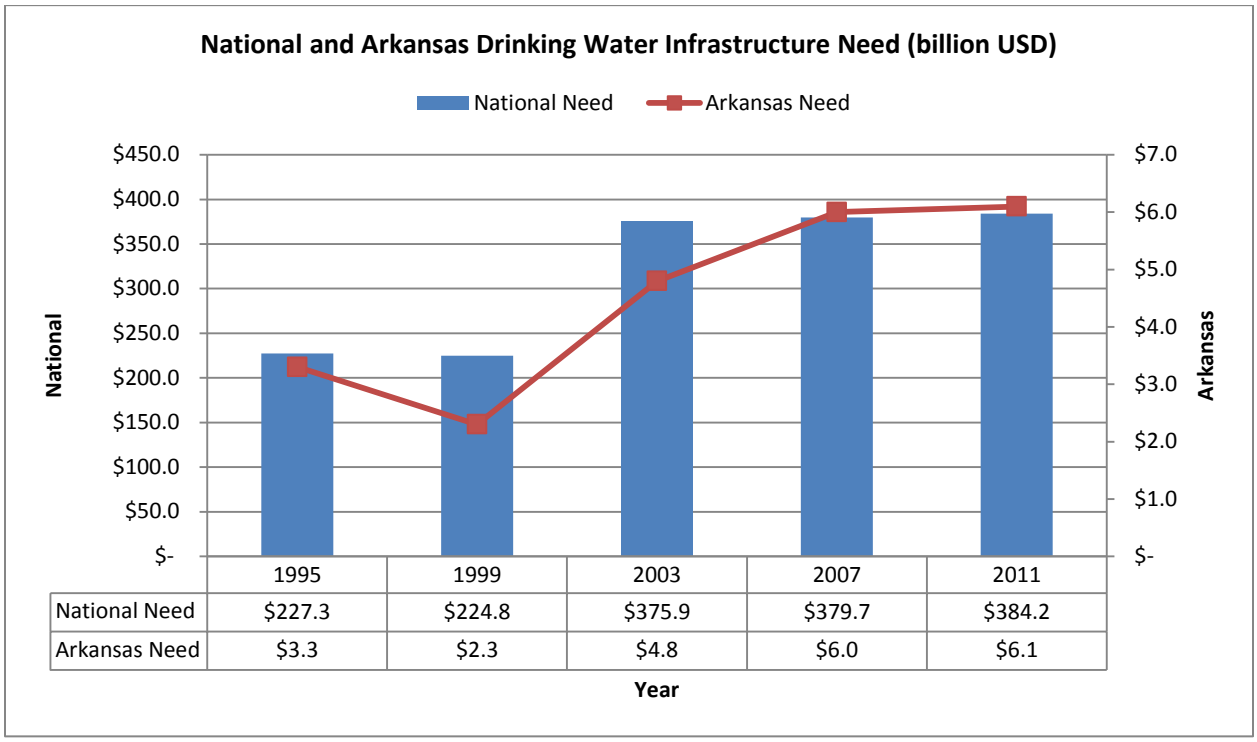
Arkansas' growth over the past several decades has placed increased pressure on infrastructure. The highlight of the increasing water needs stated in Water Use report from USGS is summarized in Table 1. The statewide average for per-capita residential use from public supply systems was 157 gallons per day and increased about 35% between 1965 and 2005. However, this number significantly varies by counties, and the highest use in the state was 365 gallons per day in Carroll County.

**Table 1. Increase of Water Usage in Arkansas**

| | 1965 (Mgal/d) | 2005 (Mgal/d) | Increase (%) |
|---|---|---|---|
| Population | 1.9 M | 2.6 M | 35 |
| Per capita use | 116 gal/d | 157 gal/d | 36 |
| Public water | 127 | 404 | 218 |
| Groundwater | 1,231 | 7,510 | 510 |
| Surface water | 911 | 3,945 | 333 |

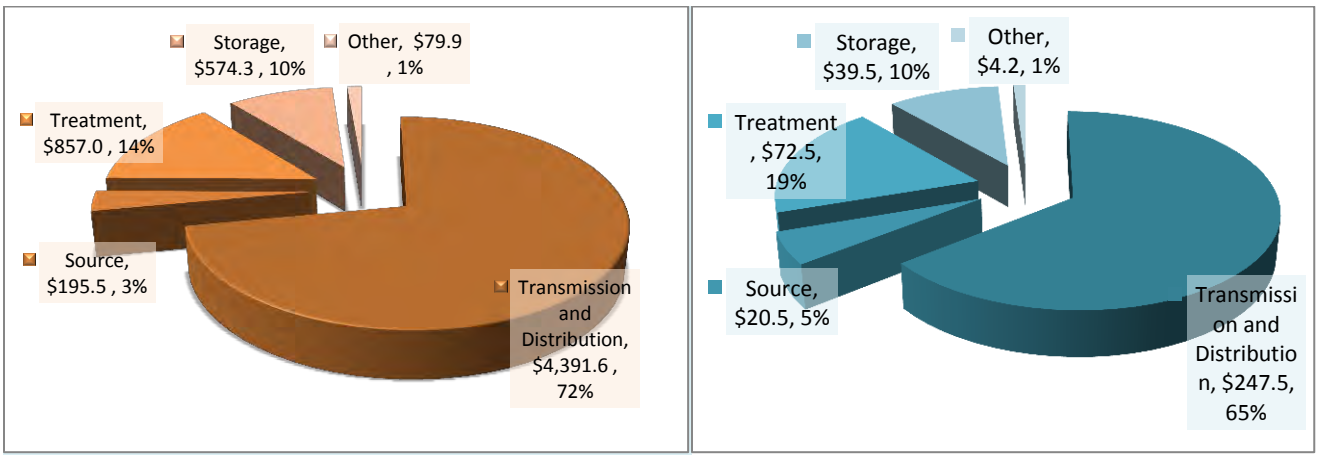
National 20-year needs for drinking water infrastructure have not been changed for the past three EPA surveys from 2003. This steady assessment (after lower estimation until 1999) of needs is likely a result of successful capture of previously

underreported longer term need for infrastructure rehabilitation and replacement. Similar trend is observed in Arkansas, which made the infrastructure needs in 2007 and 2011 reports quite similar. However, this continuing long-term need implies that much drinking water infrastructure in Arkansas might be reaching to the end of its useful life.




Similar to national assessment, transmission and distribution system represents 72% of the capital need in drinking water facilities in Arkansas. Transmission and distribution system consists mostly of buried pipes, which is an invisible part of the entire drinking water infrastructure. Over time, buried pipes need maintenance and replacement. Due to rapid water use increase in Arkansas, new connections and pipe installation will continue to make this type of capital need the largest category in the future.

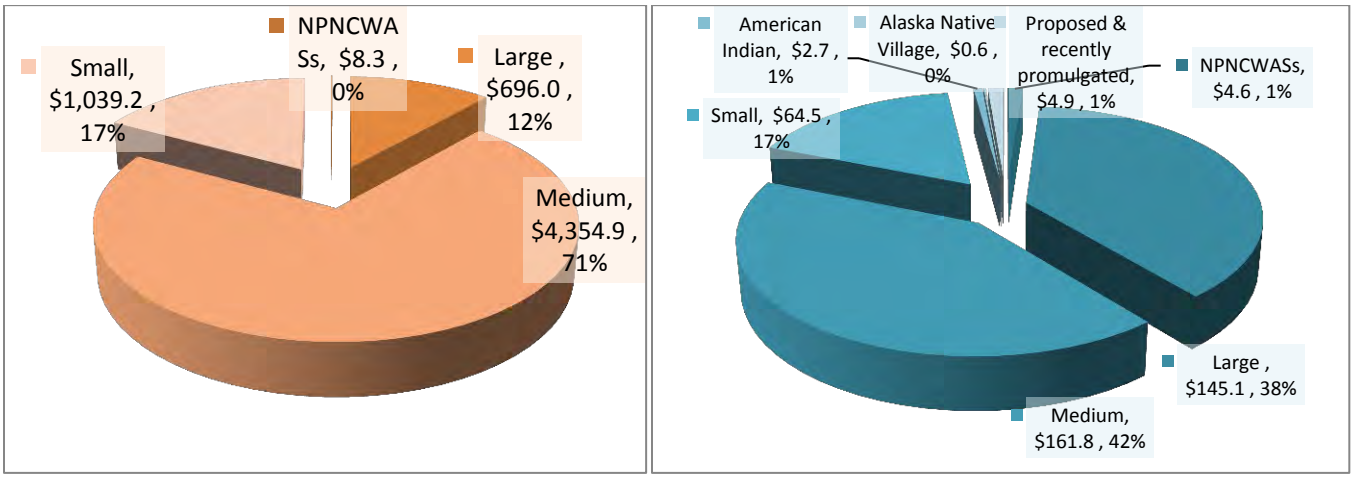
**Figure 1. 20-year drinking water infrastructure need by project type: (a) Arkansas, (b) Nation.**




(a) (b)

A majority of infrastructure needs (71%) in Arkansas is from medium-size systems (serving from 3,301 to 100,000 persons in each system). Much of the infrastructure update is required in transmission and distribution category, which is usually required regardless of the system size.

**Figure 2. 20-year drinking water infrastructure need by system size: (a) Arkansas, (b) Nation.**




(a) (b)

Drinking water infrastructure status is determined based on the cost and urgency of over 2000 capital improvement projects for the next 20 years. This infrastructure needs include replacement, rehabilitation, expansion, and new installations.

Based on the state's data on 2011 EPA Drinking Water Needs Survey, 26 out of 2091 state projects correct a deficiency in source water quantity due to the current user demand. Also, only 49 out of the state's 2091 projects correct a deficiency storage capacity caused by the current user demand. The need for new facilities or expansions is highlighted and shows 136 out of 2091 requiring expansion.

The 2011 Needs Survey also states that approximately 2614.5 miles of transmission and distribution lines would require replacement, rehabilitation or installed as new within the next 20 years. Of these, 14% of projects were identified as needing attention now. This is the type of projects needs to be started immediately even if the required funding hasn't secured. In other words, majority of the project requested in the survey can be planned and executed near year 2030. Existing infrastructure replacements were anticipated for 753 out of 2091 (36%) projects, and rehabilitations were anticipated for 828 out of 2091 (40%).

Arkansas has significant amount of long-term wastewater infrastructure needs. Mainly because of the significant increase of water withdrawal for the past 40 years and expected population in the state (projected between 3.5 million to 4 million), a large number of projects is requested due to the facility improvements and maintenance to meet the expected increasing demand for the next 20 years.

# Sources


U.S. Environmental Protection Agency, 2011 Drinking Water Infrastructure Needs Survey and Assessment

U.S. Environmental Protection Agency, 2007 Drinking Water Infrastructure Needs Survey and Assessment

USGS, Water Use in Arkansas, 2005, Scientific Investigations Report 2007-5214.

U.S. Environmental Protection Agency, State Allotment Percentages for the Drinking Water State Revolving Fund Program, FRL-9823-7, Federal Register /Vol. 78, No. 116, 2013.

# C+ Wastewater

## Summary

Wastewater infrastructure is important to all modern societies to keep the water unpolluted and able to naturally replenish. EPA's Clean Watersheds Needs Survey from 2008 and 2012 shows that the investment needs for wastewater facilities for the next 20 years in Arkansas have jumped from $470 million to $763 million. The 2012 Survey found that 214 wastewater treatment facilities in Arkansas needed facility upgrades and improvements over the next 20 years, and water treatment systems needed doubled the improvements compared to 2008. There was also a ten-fold increase for secondary treatment facilities from $15M to $126M. Although most of the facilities are currently reasonably maintained and normally operated below design capacities, the future needs of Arkansas' wastewater systems will need a significant amount of capital investment.

## Current Conditions and Capacity Needs

Wastewater infrastructure is important to all modern societies to keep the major water resources from being polluted beyond their native replenishing capability. Water pollution can occur through different foreign contaminations to the natural water bodies such as domestic sewage, industrial wastewater, leakage from landfills, wash-offs from streets, etc. The Environmental Protection Agency (EPA) holds the main role in establishing standards, regulations, and guidelines. Arkansas is a part of EPA Region 6 that serves the states of Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and 66 Native American tribes.

Wastewater infrastructure in Arkansas is largely dependent upon available funding from federal and state resources for improving treatment capacity and quality as well as implementing new techniques and management strategies. In addition to all 'treatment' related capital need, installation, and maintenance-related need for the collection system will continue to be one of the major parts of future infrastructure need due to increasing water demand in Arkansas. According to the EPA's 2012 Clean Watershed Needs Survey, a total of 214 wastewater treatment facilities in Arkansas are in need of facility upgrades and improvements over the next 20 years.

In general, a sample survey shows that current wastewater treatment facilities are adequately running below design capacity. Treatment facilities are all equipped with emergency backup systems for unscheduled incidents such as a power outage. All facilities report that there are contingency plans for emergency system failure. However, due to the importance of 20-year infrastructure needs and the state's ability to meet those needs in the future, assessing the wastewater infrastructure is heavily based on future infrastructure needs versus available funding. Although most of the facilities are currently reasonably maintained and normally operated below design capacities, over 200 facilities are in great need of system upgrades, expansion, improvements, and continuing maintenance for the next 20 years, and this will need a significant amount of capital.

## Funding Needs

EPA's Clean Watersheds Needs Survey from 2008 and 2012 shows that the capital need for wastewater facilities for the next 20 years in Arkansas has been increased from $470 million to $763 million.

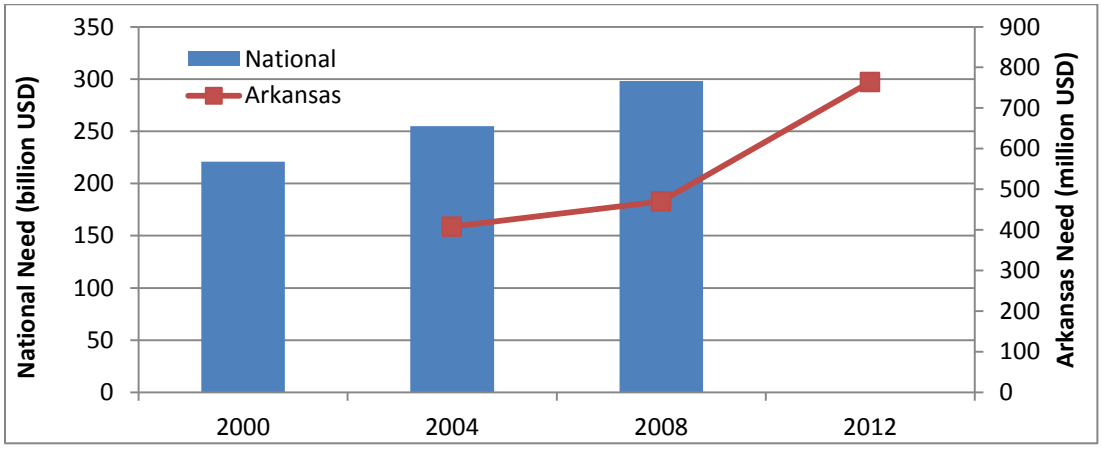
**Table 1. 20-year Wastewater infrastructure Need in Arkansas**

| Category | Category Description | 2008 Needs | 2012 Needs | Increased Needs |
|---|---|---|---|---|
| I | Secondary Treatment | 15,000,000 | 126,479,158 | 111,479,158 |
| II | Advanced Treatment | 130,000,000 | 183,383,983 | 53,383,983 |
| III-A | I/I Correction | 72,000,000 | 124,895,349 | 52,895,349 |
| III-B | Sewer Replacement | 64,000,000 | 104,628,501 | 40,628,501 |
| IV-A | New Collectors | 101,000,000 | 102,480,642 | 1,480,642 |
| IV-B | New Interceptors | 88,000,000 | 116,166,618 | 28,166,618 |
| VI-C | Stormwater Green | | 4,918,339 | 4,918,339 |
| VI-D | Stormwater General Mgmt | | 593,613 | 593,613 |
| | **Totals (in 2012 dollar)** | **470,000,000** | **763,546,203** | **293,546,203** |

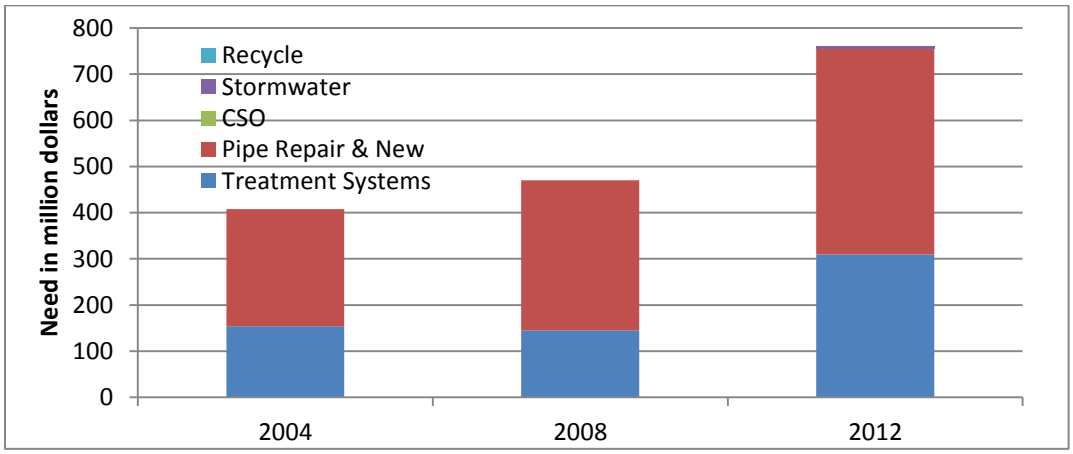
20-year Infrastructure need projection in Arkansas has increased over time (2012 national survey results have not been released as of March 2014) similarly to the national statistics. In Arkansas, treatment systems need doubled in the 2012 survey compared to that in 2008. Among this big change, the need for conventional (secondary) treatment facilities has a tenfold increase (from $15 M to $126.5 M), while advanced treatment (typically for nitrogen and phosphorus removal) need shows mostly steady increase since 2004. Considering that the secondary treatment is a standard and required treatment stage, overall population and water use growth in the state could have been the major contributing factor for this dramatic increase in conventional treatment need. On the other hand, increasing advanced treatment facility need is mainly due to new regulations and change in water quality standards.

**Figure 1. Wastewater facility need for the next 20 years.**

**(a) National and Arkansas need**



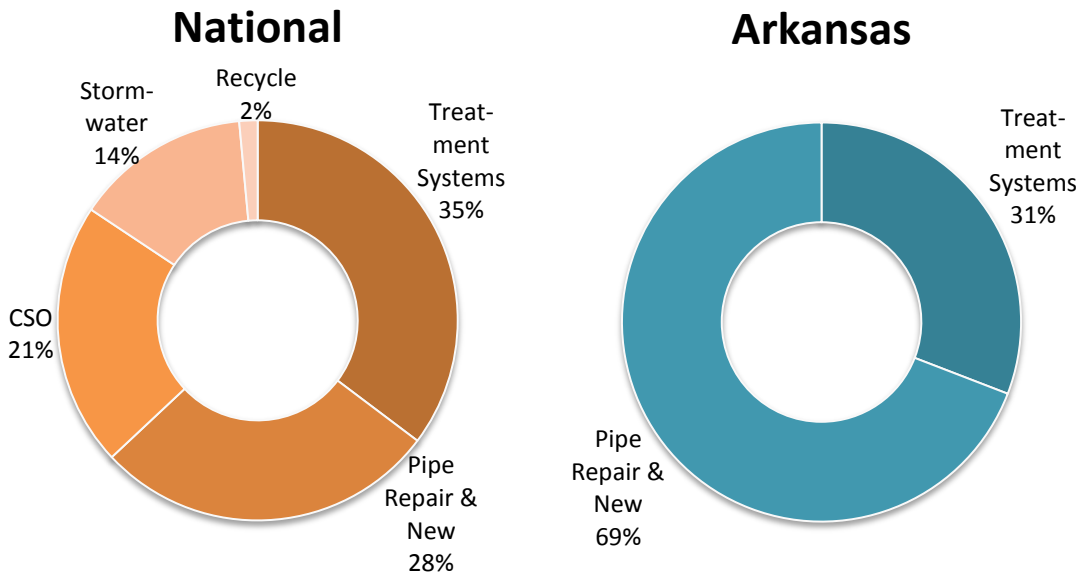
**(b) Categorical need for Arkansas (2012).**




Wastewater infrastructure need in Arkansas is mainly of two categories – i) Treatment Systems and ii) Pipe Repair and New Pipes. Although no cost related to combine sewer overflow (CSO) is listed in Arkansas' need, a small amount stormwater management cost is newly added to the infrastructure need in the 2012 survey. However, only one facility requested the cost in 'Stormwater Green' category (shaded rows in Table 1). Due to the growing interests in the improving stormwater management practices (for both stormwater control and treatment), the needs for this area will likely be significantly increased in future EPA surveys (14% in 2008 national need, Fig 2.).

Pipe related cost has been the largest portion of infrastructure need in the past. Regular monitoring and repair is essential for wastewater collection systems due to continuous chemical attack and the resulting possible contamination of the surrounding environment. Large-scale inflow and infiltration to wastewater systems also causes poor performance of treatment facilities and increased treatment cost. This part of capital need will continue to be a significant portion in future surveys due to new installation, expansion, and maintenance need in Arkansas.

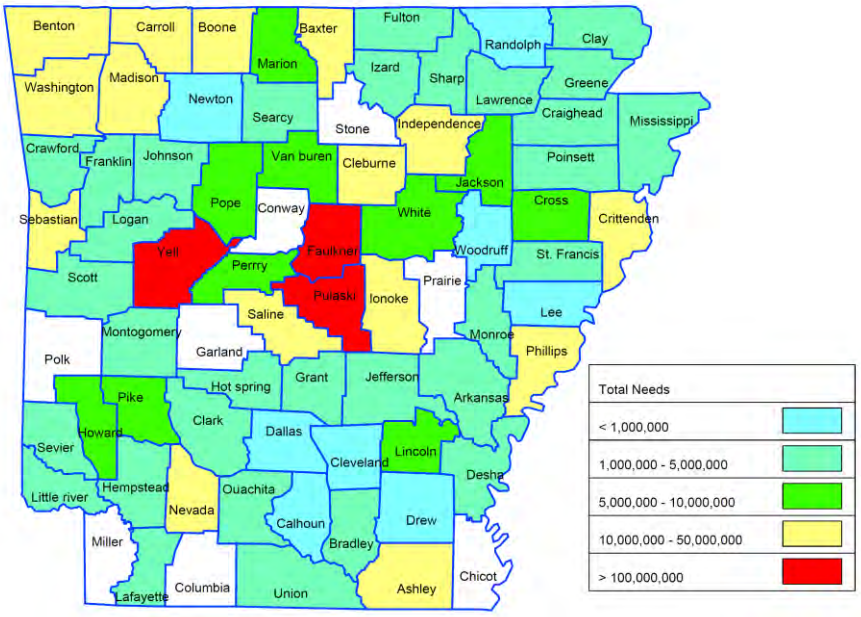
Figure 2. Categorical Infrastructure Need for the Nation and Arkansas (2008 Survey).




Wastewater infrastructure need varies greatly by counties. It is noticeable that the counties with larger cities (Little Rock, Fayetteville, Fort Smith, etc.) have greater future capital need in general. Additionally, it is worth pointing out that there is

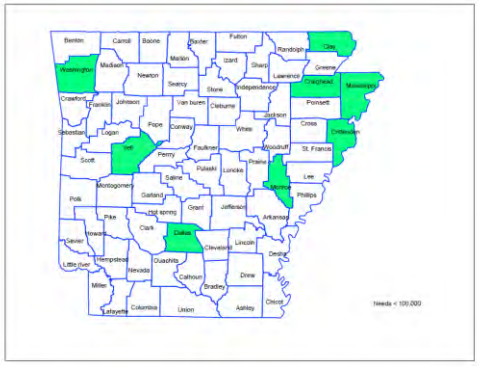
significant amount of capital need from the counties with population of less than 25,000, too. However, some moderately populated counties like Craighead County's need is substantially smaller than other comparably sized counties.

**Figure 3. Wastewater infrastructure need by county in Arkansas (USD).**

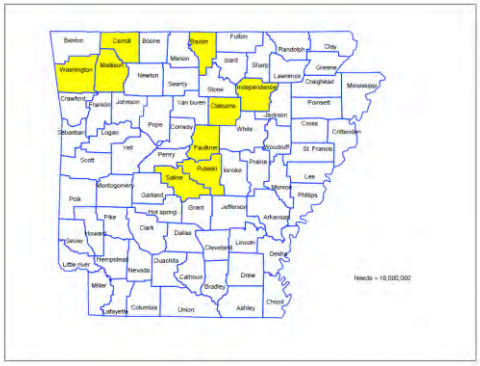



Similar to the map of total infrastructure need above, individual wastewater facilities with largest infrastructure need are mostly located in highly populated counties (Figure 4).

**Figure 4. Location of smallest (< $100,000) and largest (> $1,000,000) systems in terms of infrastructure need (USD).**



(a)



(b)

In summary, Arkansas' wastewater related need for the next 20 year period has been increased from $408M in 2004 and $470M in 2008 to $763.5M in 2012 (EPA survey data). Net increase between 2008 and 2012 is $293M. This increase is mainly due to fast growth and continuing wastewater infrastructure installation and maintenance in Arkansas.

# Funding

There are four major funds (Clean Water Revolving Loan Fund, General Obligation Bond Fund, Water, Sewer and Solid Waste Fund, and Water and Environmental Program) that Arkansas Natural Resources Commission has to provide resources for managing wastewater projects;

- Clean Water Revolving Loan Fund : $9.6 - $10.8 million each year.
  This fund is partially funded by the federal government through EPA.

- General Obligation Bond Fund : $60 million (maximum) *can be* issued in a two year biennium.
  It is a state program that raises funds by selling bonds, and is backed by the State of Arkansas. During 2002 and 2012, average $5.9 million each year was used.

- Water, Sewer and Solid Waste Fund : $1 - $2 million each year is available.
  This is a state program that receives funds from the legislature and the repayments of previous loans.

- Water and Environmental Program (WEP) from USDA Rural Development ; average $5.8 million each year (2011-2013) provided in grant funds. (FY13 - $18,848,000 in loan funds and $6,294,000 in grant funds, FY12 - $9,009,000 loan and $5,922,800 grant, FY11 - $47,899,000 loan and $5,219,800 grant).
  This program is designed to fund water and wastewater projects in cities/towns with a population of 10,000 or under and in rural areas - In this report card, only 'grant' money was counted towards the source of infrastructure projects.

Total estimated funding available for infrastructure need during the next 20 years is $491.8 M, and currently available funding will cover only 64% of needed $763.5 M infrastructure need.

# Sources

U.S. Environmental Protection Agency, Clean Watershed Needs Survey, 2008.

U.S. Environmental Protection Agency, Clean Watershed Needs Survey, 2012.

# D Levees

## Summary

Levee systems are built to prevent flooding by piling earth along rivers. In Arkansas, there are 106 levee systems, and of them, 90 are federal levees and 16 are non-federal levees. Less than 70% of the systems have adequate flood protection or added safety height to the levee design. Currently more than 50% of systems in Arkansas are 'inactive' in the USACE Rehabilitation and Inspection Program due to poor inspection ratings. Of the 13 major levees in Arkansas longer than 25 miles in length, inspection ratings show that no levee system was rated as acceptable; 4 out of the 13 systems are rated as minimally acceptable, and nine out of the 13 are rated as unacceptable.

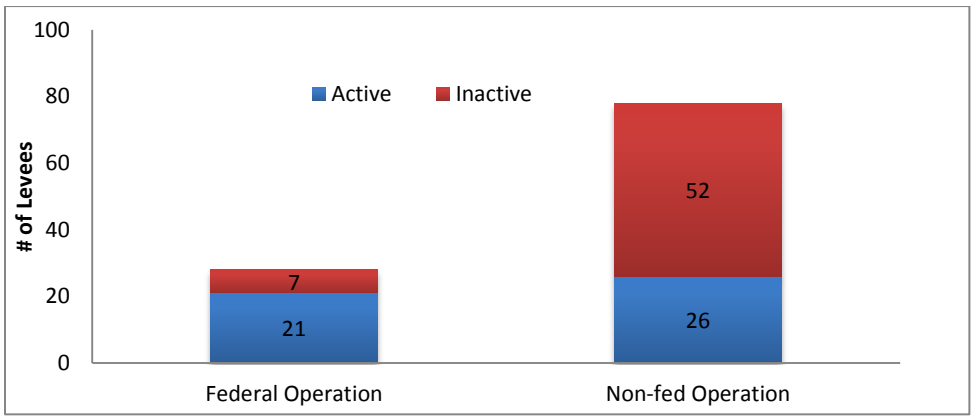
## Current Conditions and Capacity Needs

Levee systems are built to prevent flooding commonly by piling earth along rivers. Continuous interaction between the river and such artificial structure leads to various changes because the constructed levee system alters the direction and water level of natural flow. Typically, levee systems should be routinely inspected and maintained to ensure the integrity of the systems against erosion, changing vegetation, structural failure, mechanical malfunction, animal activities, etc.

In Arkansas, there are 106 levee systems with 22 bordered with Missouri, Texas, and Louisiana. Among them, 13 levee systems are longer than 25 miles in length, and the total length of these 13 levee systems is 1418.3 miles. This levee length includes some segments outside Arkansas, because the levee works as continuous systems. US Army Corps of Engineers (USACE) provides routine inspections annually and periodic inspections every 5 years.

The evaluated levee systems in Arkansas were constructed by USACE between 1930 and 1967, and are under continuing inspection by USACE. Out of 106 levees in Arkansas, 90 are federal levees, and 16 are non-federal levees. However 62 of the federal levees were turned over to public sponsors for operations and maintenance. USACE maintains control over 28 major levees. In fact, only approximately 10% of the nation's entire levee systems are operated and maintained by USACE. This doesn't mean USACE isn't involved in maintenance and repair of most of levee systems. Through the USACE Rehabilitation and Inspection Program, federal rehabilitation assistance is available to protect the area behind the levee systems against flooding depending upon regular levee inspections. USACE Rehabilitation and Inspection Program (RIP, in accordance with Public Law (P.L.) 84-99) provides federal rehabilitation assistance for eligible flood risk reduction structures. However, currently 59 out of 109 (or 54%) systems in Arkansas are 'inactive' in the RIP due to poor inspection ratings.

**Figure 1. Active and Inactive Levees in Arkansas**



For this report card, only the longest 13 levee systems are considered, due to significant variation in levee length. There are two main categories – capacity and condition - examined to evaluate the status of the state's levee system. This part of the analysis does not evaluate the available funding to meet future infrastructure needs, due to the lack of data regarding the operations and maintenance costs or current funding situations. Instead, the results shown here is entirely depending on USACE's current levee inspection ratings. It is also important to note that the inspection rating is not explicitly given by states, but rather reported by levee systems. This implies that the ratings of some levee systems used in this report card are affected also by the levee conditions *outside* the Arkansas state line. Equal weights are used for the two categories to calculate the final grade of the levee systems.

# Capacity

Levees should be built and maintained to provide protection from at least the 1% annual chance flood (equivalent to the size of a flood that would be observed every 100 year or less) for the area immediately behind them. This may be accredited by Federal Emergency Management Agency (FEMA), and the area of all flood risk zones are identified on the Flood Insurance Rate Map (FIRM) for a community participating in the National Flood Insurance Program (NFIP).

According to the USACE National Levee Database, 3 out of the 13 longest systems in Arkansas are NOT certified to provide protection for 1% annual chance flood (greater than 100-year flood). Addition to the size of the flood magnitude used for levee design, levee system design should provide added height to the calculated height as an extra safety measure (freeboard). Among the longest 13 systems in Arkansas, regardless of flood size, freeboard is specified only in 4 systems. Less than 70% of the systems have adequate flood protection or added safety height to the levee design.

### WHAT IS 1% ANNUAL CHANCE FLOOD?

*This is the size of flood that an area would experience once in about 100 years (1 in 100 is 1%). In other words, a flood larger than this would happen less often than every 100 years.*

*This does **NOT** mean that an area will be immune to the risk of similar flood for the next 100 year after a large flood event this year. Consider a bag of balls with 1 red and 99 blues. At first, your chance to draw a red ball is 1%. As long as we put the red ball back in the bag, you'll still have 1% chance to draw the red ball (flood) at your second draw (next year)!*

# Condition

Conditions of the 13 largest levee systems are entirely based on USACE Rehabilitation and Inspection Program rating. USACE conducts levee inspections to provide this rating, which is important for further federal assistance decision. **Routine Inspection** is a visual inspection to verify and rate levee system operation and maintenance. It is typically conducted each year for all levees in the USACE Levee Safety Program. **Periodic Inspection** is a comprehensive inspection conducted by a USACE multidisciplinary team that includes the levee sponsor and is led by a professional engineer. USACE typically conducts this inspection every five years on the federally authorized levees in the USACE Levee Safety Program. Periodic inspection also includes the examination and evaluation of levee embankments, floodwalls, interior drainage system, pump station & drainage structures, flood damage reduction channels, emergency action plans, compliance with project agreement, and other special consideration may have. Based on the inspections, levee systems are given inspection ratings (Table 1).

**Table 1. Levee System Inspection Ratings (USACE)**

| | |
|---|---|
| **Acceptable** | All inspection items are rated as Acceptable*. |
| **Minimally Acceptable** | One or more inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event. |
| **Unacceptable** | One or more inspection items are rated as Unacceptable and would prevent the segment/system from performing as intended, or a serious deficiency noted in past inspections (previous Unacceptable items in a Minimally Acceptable overall rating) has not been corrected within the established timeframe, not to exceed two years. |

* Acceptable, minimally acceptable, unacceptable ratings are based on Flood Damage Reduction Segment / System Inspection Report. Detailed explanations for the standards are listed for each inspection categories.

Levee inspection results are shown in Figure 1 and Table 2. Based on this inspection rating, there is no levee system rated as acceptable. Four out of the 13 systems are rated as minimally acceptable, and nine out of the 13 are rated as unacceptable.

Figure 2. Levee inspection results for major systems.

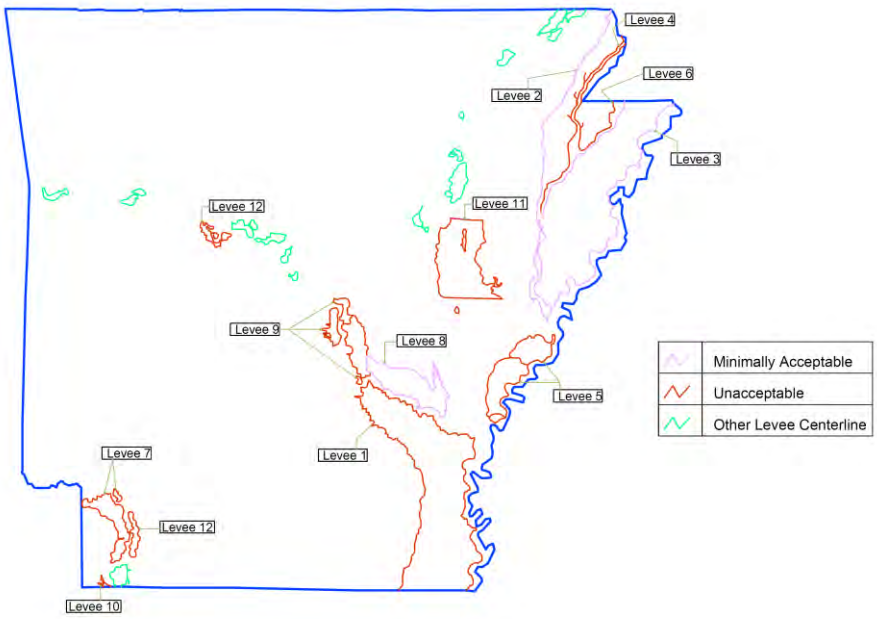


**Table 2. Levee inspection details of 13 major systems in Arkansas.**

| No. | System Name | # of Segment(s) | Length (Miles) | Inspection Rating |
|---|---|---|---|---|
| 1 | AR-LA MS River | 5 | 359.64 | Unacceptable |
| 2 | Commerce MO - St. Francis River System | 8 | 277.29 | Minimally acceptable |
| 3 | Big Lake and St. Francis Floodway East System | 1 | 119.50 | Minimally acceptable |
| 4 | West Bank St. Francis Floodway System | 5 | 118.05 | Unacceptable |
| 5 | Mississippi and White Rivers Below Helena System | 6 | 114.62 | Unacceptable |
| 6 | St. Francis East to Big Lake West System | 5 | 112.75 | Unacceptable |
| 7 | RR RB Miller-Garland | 2 | 62.59 | Unacceptable |
| 8 | AR River North Bank | 4 | 56.16 | Minimally acceptable |
| 9 | North Little Rock to Gillette | 3 | 53.28 | Unacceptable |
| 10 | Caddo North LA | 1 | 48.20 | Unacceptable |
| 11 | White River Levee System | 2 | 39.31 | Unacceptable |
| 12 | Dardanelle Levee/Carden Bottom Levee | 2 | 28.84 | Unacceptable |
| 13 | Red River LB AR | 1 | 28.09 | Unacceptable |

# Funding Needs

For more accurate evaluation of levee systems in Arkansas, current and future capital cost need for operations and maintenance should be thoroughly examined in the future. Further study also requires detailed federal and local funding availability (sources and future plan) for levee systems by close communications with USACE.

# Sources

National Levee Database, USACE, online, http://nld.usace.army.mil/egis/f?p=471:1:

Policy Guidance Letter – Periodic Inspection Procedures for the Levee Safety Program, Memorandum for Commanders, Major Subordinate Commands, USACE, 2008.

Flood Damage Reduction Segment / System Inspection Report, USACE.

# D Dams

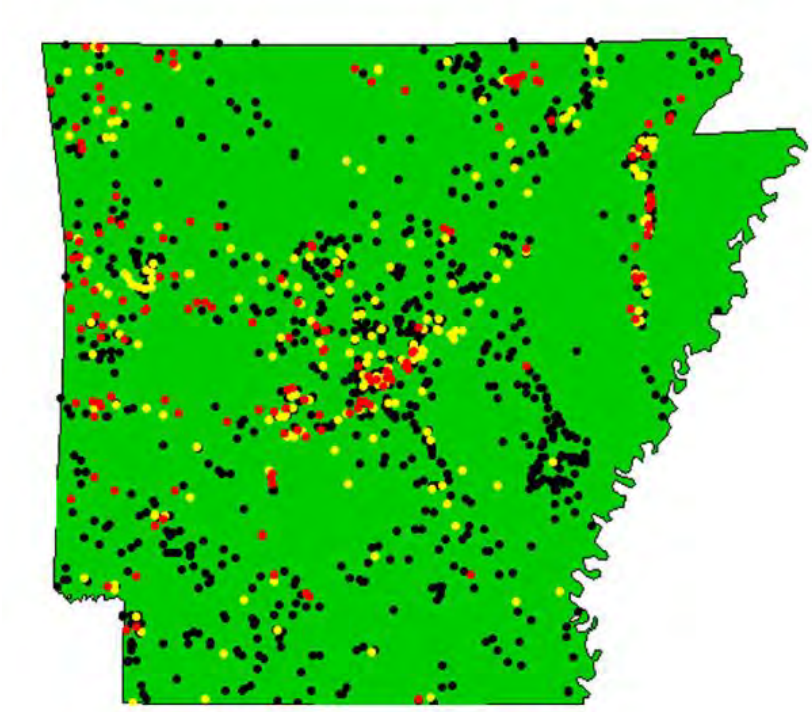
## Summary

Dams in Arkansas are designed and built primarily to provide flood risk management, water supply, recreation, hydropower, and transportation. Arkansas has 1,193 state regulated dams across the state, and approximately 1 in every 5 of these dams have either high-hazard or significant hazard potential. The number of high hazard dams is 144 or 12% of regulated dams, and the number of significant hazard dams is 92 or 8% of regulated dams. While on an upward trend previously, the 2013 State Dam Safety budget has declined. When the budget is compared in context of the number high hazard potential dams, Arkansas does not meet the national average.

## Current Conditions

Arkansas has 1,193 state regulated dams across the state, and 366 of these dams have high-hazard or significant hazard potential. The number of high hazard dams is 144 or 12% of regulated dams, and the number of significant hazard dams is 92 or 8% of regulated dams. A dam is defined as, "any barrier, including one for flood detention, designed to impound liquid volumes. This shall not include highway, railroad, or roadway embankments, including low water crossings that may temporarily detain floodwater, levees designed to prevent inundation by floodwater, or closed dikes to temporarily impound liquids in the event of emergencies and those barriers not exempt by Sections 701.3 or 701.4 of this title" according to the Title VII Arkansas Natural Resources Commission Rules Governing Design and Operation of Dams Effective October, 1993. Dams in Arkansas are designed and built primarily for the purposes of providing flood risk management, water supply, recreation, hydropower, and transportation. Owners, operators, governing bodies, and the general public must work together to guarantee the safety of the state's dams.

**Figure 1. Dam Locations in the State By Hazard Level**



*RED DOTS*
*"High-hazard potential dam" is typically defined as a dam whose failure or mis-operation will cause loss of human life and significant property destruction.*

*YELLOW DOTS*
*"Significant hazard potential dam" is typically defined as a dam whose failure or mis-operation will cause significant property destruction.*

*BLACK DOTS*
*"Low-hazard potential dam" is typically defined as a dam whose failure or mis-operation will cause minimal property destruction.*

Arkansas Natural Resource Commission, ANRC, is Arkansas' dam safety program as authorized by Arkansas Code Annotated Section15-22-201 through 15-22-222. Regulations are found in Rules and Regulations Governing the Arkansas Dam Safety Program adopted November 20, 1990. ANRC is the agency responsible for the regulation of dams, among other duties, in the state. ANRC ensures public safety, health, and welfare by developing and enforcing rules and regulations governing the design and operation of dams in Arkansas. A permit for construction and operation of dams with water heights of 25 feet or more and storages of 50 acre-feet or more at normal pool is required from ANRC. This excludes dams owned and operated by the U.S. Government.

Dams are classified by the height of the dam or its maximum storage. The ANRC classifies dams by size:

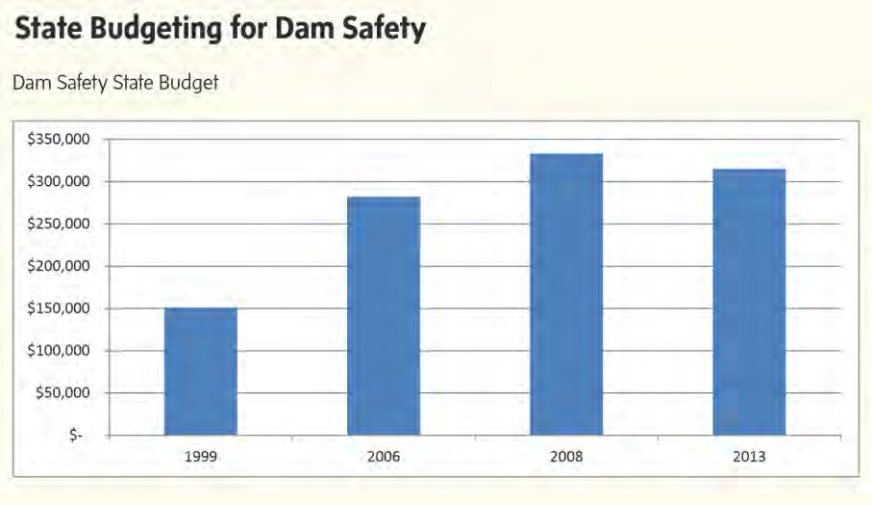
- "Small" dams have heights of 24 to, but not including 40 feet and maximum storages of 50 to, but not including 1,000 acre-feet.
- "Intermediate" dams have heights of 40 to, but not including 100 feet and maximum storages of 1,000 to, but not including 50,000 acre-feet.
- "Large" dams have a height of 100 or more feet and a maximum storage of 50,000 acre-feet or more.

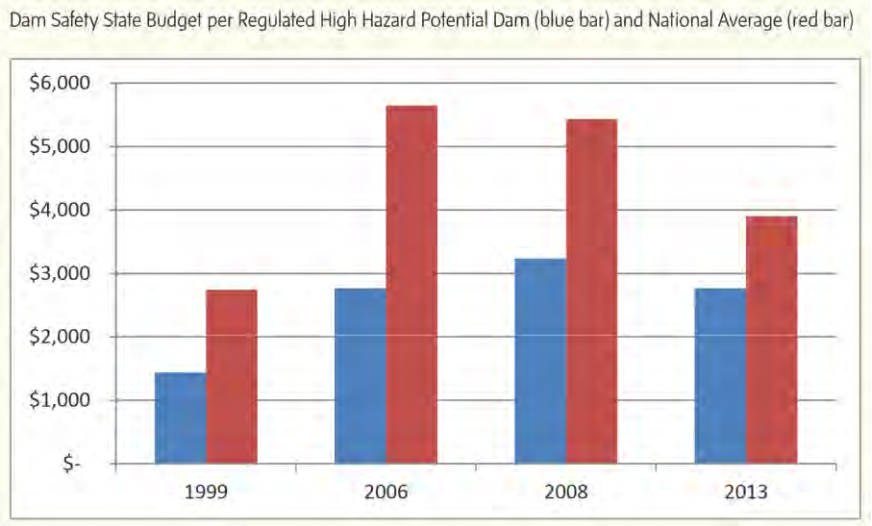
Dams under the state's jurisdiction are to be inspected either annually or triennially by ANRC based upon hazard classification (high and significant-annually, low-triennially). ANRC oversees the production of emergency action plans for high hazard dams. According to ANRC's classifications, a "low hazard" dam is one with no foreseen loss of human life and affected land characterized by largely undeveloped land that would result in an economic loss of less than $100,000 in the event of a dam failure. A "significant hazard" dam is defined as one with no loss of human life and industrial development, commercial development, or cropland that would be affected to the economic loss of $100,000 to $500,000. "High hazard" dams will result in human loss or the destruction of inhabitable structures and greater than a $500,000 loss of industrial, commercial, or farming development. The classification will be based on the more stringent of either loss of human life or economic loss and does not reflect the physical integrity of the dam.

According to the NDSPA of 2000, a dam may be a danger to lives and property if "overtopping, seepage, settlement, erosion, sediment, cracking, earth movement, earthquakes, failure of bulkheads, flashboard, gates on conduits, or other conditions which exist or which might occur in any area in the vicinity of the dam" are imminent. To ensure safety, ANRC can take action when a deficiency is discovered. Should the deficiency not present an immediate threat to the safety of the dam, ANRC Staff will seek, a consent order to specify the remedial actions to be taken and a timeline over which they will be carried out. In the case of a deficiency that does immediately threaten the safety of the dam the Executive Director of the Arkansas Natural Resources Commission will issue an Emergency Remedial Order to protect lives and property. Noncompliance may be subject to a fine of up to $10,000.

# Funding

State dam safety programs inspect existing dams, oversee remediation of deficient dams, and work with local officials and dam owners on emergency preparedness. Therefore, funding for dam safety departments represents a critical safety and funding statistic. While on an upward trend previously, the 2013 State Dam Safety budget has declined. When the budget is compared in context of the number high hazard potential dams, Arkansas does not meet the national average.




# Sources

American Society of Civil Engineers, 2013 Report Card for America's Infrastructure, www.infrastructurereportcard.org/a/#e/eap-dams

Living with Dams: Know Your Risks, www.livingneardams.org

Association of State Dam Safety Officials, Arkansas, http://www.damsafety.org/map/state.aspx?s=4

# ASCE Grading Methodology

## Grading Criteria

The *2014 Report Card for Arkansas' Infrastructure* was modeled after the national ASCE Report Card for America's Infrastructure. A committee of civil engineers was established to collect, review and evaluate data, and develop grades and recommendations. Members of the Committee review and assess all relevant data and reports, consult with technical and industry experts, and assign grades according to the following eight criteria:

- **Capacity** – Evaluate the infrastructure's capacity to meet current and future demands.
- **Condition** – Evaluate the infrastructure's existing or near future physical condition.
- **Funding** – Evaluate the current level of funding (from all levels of government) for the infrastructure category and compare it to the estimated funding need.
- **Future Need** – Evaluate the cost to improve the infrastructure and determine if future funding prospects will be able to meet the need.
- **Operation and Maintenance** – Evaluate the owners' ability to operate and maintain the infrastructure properly and determine that the infrastructure is in compliance with government regulations.
- **Public Safety** – Evaluate to what extent the public's safety is jeopardized by the condition of the infrastructure and what the consequences of failure may be.
- **Resilience** – Evaluate the infrastructure system's capability to prevent or protect against significant multihazard threats and incidents and the ability to expeditiously recover and reconstitute critical services with minimum damage to public safety and health, the economy, and national security.
- **Innovation** – Evaluate the implementation and strategic use of innovative techniques and delivery methods.

## 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 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.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