ASCE MONTANA SECTION

2014 Report Card for MONTANA'S INFRASTRUCTURE

What You Should Know About Montana's Infrastructure

Montana's aging infrastructure is approaching a critical state of disrepair. In this **2014 Report Card for Montana's Infrastructure** it earned a mediocre cumulative grade of C-. From neighborhood roads and community schools to safe drinking water, from dams that produce energy and prevent flooding to waterways that irrigate our fields, this infrastructure is used by all Montana residents and is essential to our economic future. All Montana citizens have an interest in solving our infrastructure problems, knowing regular maintenance and improvements will keep them working longer and ultimately save taxpayers money. This Report Card shows us better stewardship is needed by our leaders to ensure that public health, safety, economic mobility, and welfare are maintained in the Big Sky State.

Our infrastructure and economy are linked together. A great example of this is our transportation system, which moves Montana's commodities such as grains, minerals, and lumber from producer to consumer. The basic delivery of commodities is jeopardized when transportation networks are disabled and inefficient, resulting in a cascading effect of unmet demands, increasing consumer prices, reduced producer incomes, and a falling GDP. All of these impacts can come about by ignoring something we take for granted every day when we jump in the car, but addressing them is essential to our state's economy.

Over the course of 2014, the Montana Section of the American Society of Civil Engineers (ASCE) compiled a team of more than 30 civil engineers from the public, private and non-profit sectors with wide-ranging industry expertise to prepare a school-style report card for Montana's Infrastructure. Using a familiar A to F grading system, the Report Card takes stock of eight specific infrastructure types in Montana – Schools, Wastewater, Dams, Drinking Water, Irrigation Canals and Waterways, Transportation, Transit, and Solid Waste. Not a day goes by when we don't each rely on these systems to maintain our quality of life.

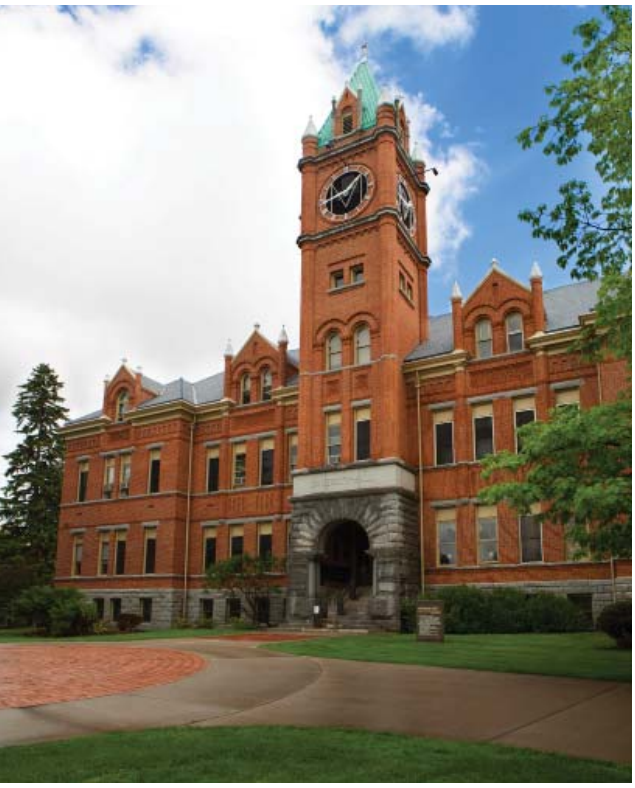
This Report Card was prepared specifically for Montana's citizens and policy-makers to make sure everyone knows how our infrastructure is maintained and what its condition is today. We expect our infrastructure systems to work when we need them, and we hope this Report Card will help us make good decisions about maintaining and upgrading our infrastructure so Montana will remain a viable home for future generations.

While current infrastructure conditions are concerning, we can find solutions. As civil engineers, we are obligated to share our knowledge and provide critical information about Montana's infrastructure deficiencies in a way that everyone understands. We are committed to protecting the health, safety, and welfare of the public, and it is our hope that this Report Card will help build support to address the state's infrastructure needs.

Montana's health, safety, economy, and environment are at stake.

D- SCHOOLS

Montana has over 2,000 school buildings that 144,129 students attend. 68% of these schools were built prior to 1970, 40% have fewer than 50 students, and others range from remote, one-room schoolhouses to larger community schools that are stretched to capacity. A 2008 assessment reported that $903M was needed to bring all Montana facilities to good condition. A bottom-to-top, statewide school facilities review revealed that 66% of schools showed signs of damage and wear, and had environmental issues such as HVAC, roof, and electrical problems. Recent energy conservation efforts have begun to curb some energy costs. However, available grant funding has not been enough to address incomplete exterior wall insulation and incomplete roof insulation, a deficiency in 43% and 48% of schools, respectively. Montana's children deserve safe, healthy schools in which they can focus their efforts on learning.



School Recommendations

The 2008 *State of Montana, K-12 Public Schools Facility Condition Assessment A/E Project* was the first step in identifying needs for schools across the state. The following recommendations are included so we can build on that momentum.

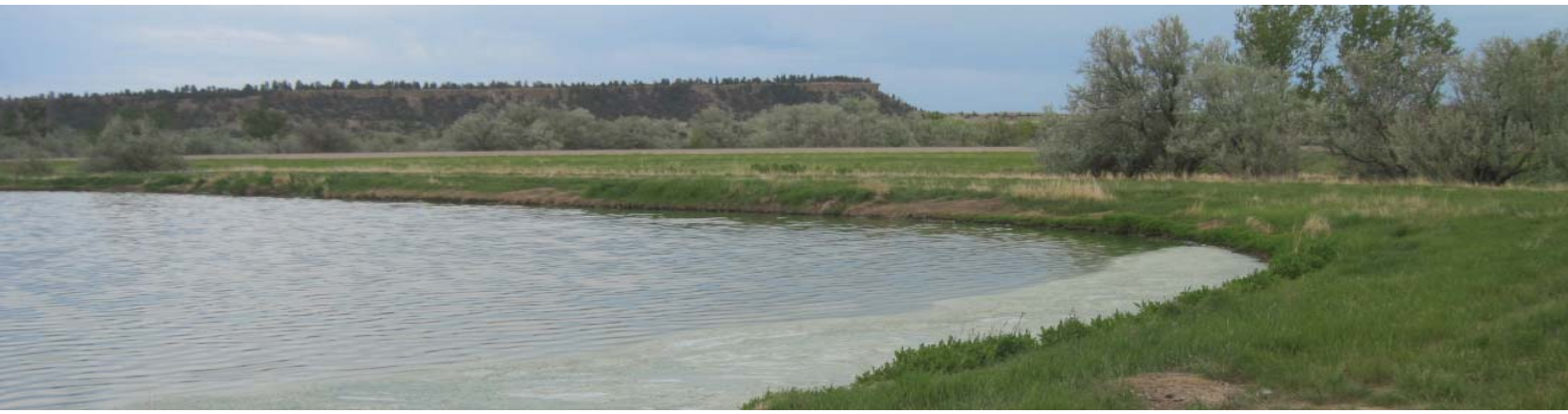
- **Develop a Capital Plan**: A capital plan should be developed to determine how to improve schools by using a life-cycle analysis. The plan should identify a method for determining if renovation or replacement is necessary for each school.
- **Review Existing Funding Methods**: Programs, such as Quality Schools, have been helpful in preventing some schools from deteriorating, but these programs have not been large enough to affect the statewide system. A committee should be formed to review other state methods for funding school systems.
- **Review New Funding Mechanism**: A formal funding program similar to the state of Montana's Treasure State Endowment Program, which funds public water, wastewater, storm water, solid waste, and bridge infrastructure projects, should be reviewed to determine if a similar mechanism could assist with the need for schools.

D+ WASTEWATER

Montana has approximately 180 public wastewater treatment systems. Of those, 20% of the publicly owned wastewater treatment facilities have significant effluent violations and another 20% are under formal enforcement actions to correct system deficiencies to achieve compliance. Many of the collection systems date back to the early 1900s, and some of this original piping has never been replaced. It is not uncommon for the pipelines in originally established areas to have vitrified clay tile pipe that has cracked or failed. The majority of agencies report replacing little or no wastewater piping on an annual basis. Based on the current rate of replacement, it could take 70 to 90 years to replace Montana's water and wastewater infrastructure. Many communities have completed system additions since the 1950s, but over 60% reported a remaining capacity of less than five years. Current estimates to completely replace Montana's entire water and wastewater infrastructure are estimated to range between $12 billion and $15 billion.

Wastewater Recommendations

Montana's wastewater treatment and collection systems are in fair to slightly poor condition, have limited capacity, and do not have sufficient budgets. A higher level of reinvestment in wastewater infrastructure is necessary to sustain reliability and improve the level of service. Wastewater infrastructure can be improved by the communities and agencies that oversee and use it by creating and properly funding capital replacement plans.



C- DAMS

Montana's 3,316 dams hold approximately 34.5 million acre-feet of water - roughly the amount of water it would take to cover the states of Maine, New Hampshire, and Vermont in water one foot deep. Yet Montana averages only 35% of the average dam safety state budget per dam. The majority of Montana's dams were constructed between 1930 and 1970, and many have reached the end of their design life. The overall condition of Montana's dams is difficult to track because 75% do not have periodic engineering inspections and are not required to have operation permits. Overall, dams designated high hazard are in significantly better condition than dams designated low hazard, as they are inspected and routinely maintained. Montana's Dam Safety Program is allocating the limited resources available to the dams that would have the greatest impact on public safety, but as all dams continue to age, the unknown risk and need for maintenance and rehabilitation will continue to increase. Currently, the funding available for dam maintenance and rehabilitation is not adequate to continue to ensure dam safety.

Dam Recommendations

As Montana's dams continue to age, the need for maintenance and rehabilitation will continue to increase. There are several things Montana can do to plan for the future.

- **Continue Dam Owner Outreach Programs**: Knowledge is one of the most important assets the Dam Safety Program can provide to dam owners and to the general public.
- **Continue to Support the National Dam Safety Program**: This program provides financial assistance to the states for strengthening their dam safety programs (www.fema.gov/grant-assistance-states). Montana uses National Dam Safety Program funds for owner outreach and emergency action awareness.
- **Create Funding Mechanisms for Private Dams**: Currently, there are few programs to help private dam owners pay for engineering inspections, dam maintenance, or dam rehabilitations. Yet, many of these private facilities provide public benefits. Funding programs that bring public and private groups together to develop innovative ideas and maximize available resources benefit not only private dam owners, but the state of Montana as a whole.

C- DRINKING WATER

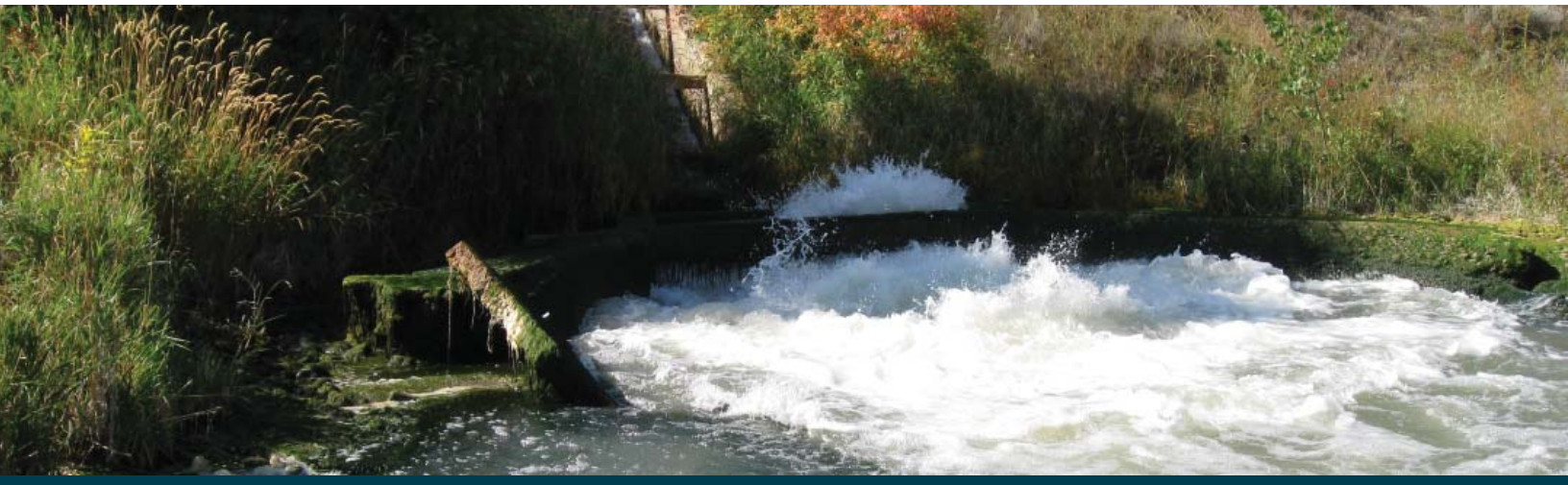
Montana has over 5,300 miles of water distribution and transmission piping, a longer stretch than driving roundtrip from Billings to Miami. Montana has approximately 700 public water systems consisting of those in the seven largest cities, about 60 serving communities larger than 1500 people, and the remaining 630 being cities, towns, districts, associations, and private systems. Some systems have piping dating back to the late 1800s and early 1900s, with many systems including pipe that is 75 to 100 years old. Most systems, without regard for size, experience major leaks on an annual basis that waste valuable water. Over 50% reported that the capacity of their distribution system is five years or less. In 2011, the Montana Department of Environmental Quality identified an immediate water system financial need of $885 million. Of the 700 public water systems, more than 1 in 5 are currently not compliant with monitoring requirements and other regulatory requirements.

Drinking Water Recommendations

Montana's water treatment and distribution systems are aging but continue to serve their communities well. However, they have limited capacity and are supported by limited budgetary resources. These systems are beginning to show their age with reduced levels of service (fire flow, pressure, sanitary condition) and increased levels of failure. Water infrastructure can be improved by the communities and agencies that oversee and use it by creating and properly funding capital replacement plans. A higher level of reinvestment is necessary to sustain and improve water system reliability and level of service.

C IRRIGATION CANALS & WATERWAYS

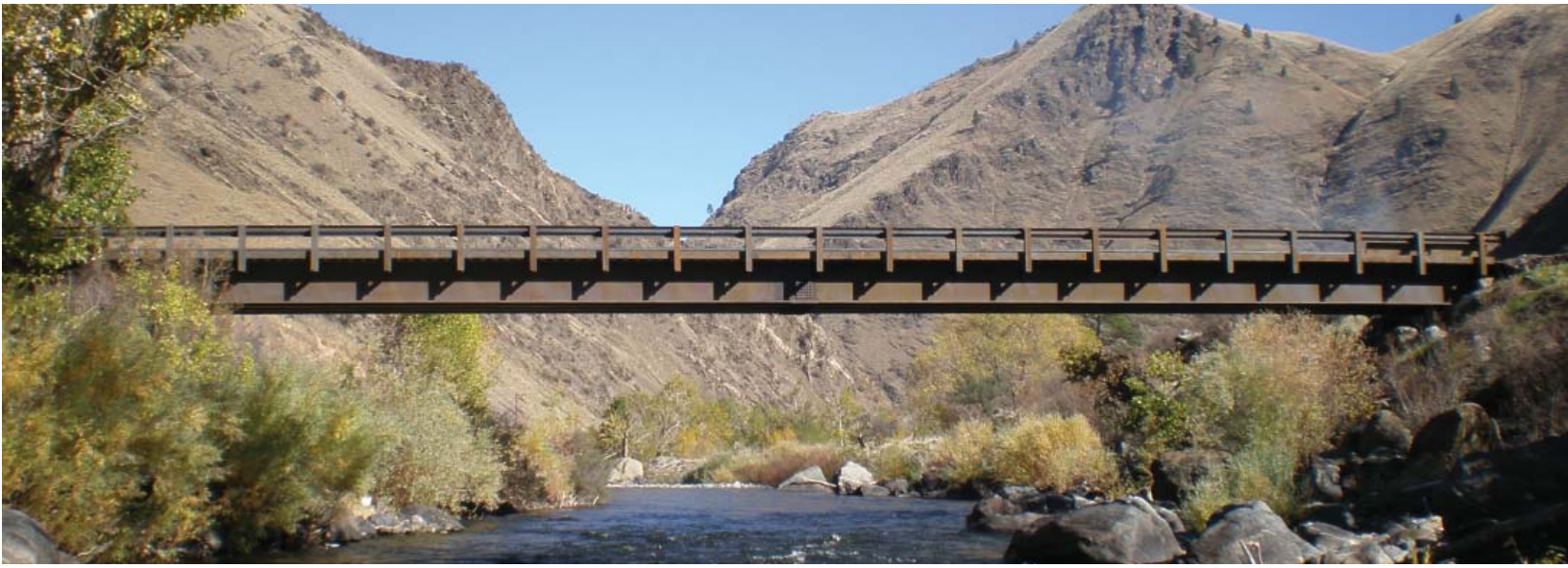
Montana has over 2 million acres of irrigated land, an area almost double the size of Glacier National Park. 60% of this acreage receives some or all of its water from a canal. Suppliers include 20 state water projects, 17 U.S. Bureau of Reclamation facilities, and approximately 246 private irrigation organizations. 32% of owners identified their structures as notably impaired, with more than half reporting impairments due to infrastructure age of greater than 50 years. There is strong support for government facilities, but this is offset with the challenges of non-government facilities that have limited funding and a lack of assistance for facility operation. As Montana's irrigation systems continue to age and deteriorate, maintenance and repair demands increase, and operators should act now to better address these looming concerns.



Irrigation Canals & Waterways Recommendations

As Montana's irrigation systems continue to age and deteriorate, maintenance and repair demands will increase. Montana irrigation system operators should act now to better address these looming concerns.

- **Assess and Plan**: Montana irrigation system operators should assess their current situation and make realistic plans for future operations. For example, the United States Bureau of Reclamation requires their facilities to maintain reasonable financial reserves. This would be a prudent step to sustain all irrigation and waterway systems.
- **Educate About Assistance**: State and federal agencies should focus energy on educational efforts to inform operators of funding and technical assistance available.
- **Emphasis Innovation**: Efforts in innovation should be emphasized to improve efficiency of existing systems. Innovation often comes at a lower cost than full reconstruction.
- **Document System Information**: We need to document institutional knowledge about our systems before it is lost. Many non-government systems are run by long-time operators and ditch riders, people who have a wealth of knowledge about the history and operations of systems that is not recorded anywhere, valuable information that is needed to adequately care for our infrastructure.



C TRANSPORTATION

Montana has the third highest fatality rate in the nation, with a backlog of transportation projects waiting for available funding. 46% of major roads are in poor to mediocre condition and 40% of gravel roads are in poor or failed condition. These rough roads cost each Montanan approximately $292 to $484 per year in extra maintenance costs depending on their area's roads. 59% of the $60 billion in goods shipped within Montana travel by truck across the state's vast highway infrastructure, further emphasizing the vital role of the Montana transportation network. It is estimated that $14.8 billion is needed to take care of Montana's roadway system and bridges, but projected funding can only meet 25% of those needs. Despite being under funded, the state's highways are in fair to good condition and 92% of the state highway bridges are in good condition, a system that efficiently moves its citizens and goods from place to place. The overall lack of adequate funding cripples the effectiveness and lowers the overall rating to a C.

Transportation Recommendations

Even as the state's highways perform efficiently and safely, the aging infrastructure will inevitably require ongoing maintenance. The following recommendations have all either been rolled out in other states or are being investigated.

- **Capitalize on New Technologies**: New technologies can advance the overall design, construction, and O&M of out transportation network. This includes embracing the use of building information modeling (BIM)-inspired CAD software for road design and construction, and using remote sensing technologies and automated systems to accurately and efficiently obtain data for all aspects of transportation network operation.
- **Use Alternative Project Delivery/Funding Methods**: When appropriate, Montana should encourage agencies to use alternative project delivery methods, such as design/build. Utilizing innovative project financing for roadway construction could include public/private partnerships. New financing methods allow for the private sector to be more assimilated into traditional construction projects.
- **Implement a State Infrastructure Bank**: A state infrastructure bank can help increase the funding available for all infrastructure projects, including roadways. The "bank" would be backed by the State of Montana and provide an avenue for lending money to agencies responsible for funding construction. The FHWA estimated that state banks could leverage almost $4 of private investment for every $1 in taxpayer investment.
- **Index State Gas Tax to Inflation**: As discussed on a national level, Montana should consider indexing state gas tax to inflation. Inflation continually increases construction costs, causing existing taxes to lose their value over time. Linking taxes to inflation would cause taxes to retain their intended value without any political interference.
- **Determine Critical Connections & Plan Accordingly**: Montana should continue to analyze the roadway network to determine critical connections, areas where unusable roads will cause the most economic damage. Those routes should be evaluated for likelihood of natural disasters and analyzed for ways to improve their resilience. Highway routes that are especially susceptible to closure should have viable detour routes in good condition.

C+ TRANSIT

In Montana, 65 different rail, bus, and van services provide rural and urban transit service; 36 of these are public transit systems. While Montanans who have access to transit have increased their ridership over the past decade, it is estimated that statewide, only 17% of transit needs are being met. Several agencies benefited from over $15 million in Federal recovery investments in 2009, which essentially doubled short-term transit funding in the state, although future maintenance efforts will fall to Montana. 31% of Montana transit agencies responded to a survey that funding levels are "Inadequate" or "Not at All Adequate" to meet future needs. When asked, "What should public transit/public transportation in Montana look like in 20 years?" the single word answer was "more."

Transit Recommendations

So how do we achieve "more" when it comes to public transit/public transportation?

- **Include Transit in the Process**: Transit should be included in state and local project development processes and metrics to track performance of transportation systems. This would support adequate funding of maintenance of transit vehicles and facilities to keep systems in state of good repair and reduce life-cycle costs.

- **Continue to Invest**: Federal investment in transit through a robust surface transportation program (authorization and appropriation) and a solvent Highway Trust Fund should continue. Local, regional, and state government entities – especially in smaller urban and rural areas – should prioritize transit investments that can enhance sustainable land-use decisions.
- **Develop Management Systems**: Transit systems should be required to adopt comprehensive asset management systems to maximize investments.

B- SOLID WASTE

Of the 1.6 million tons of solid waste generated annually in Montana, approximately 1.3 million tons are landfilled. Since municipal solid waste rules changed in 1993, significant improvements have occurred within Montana's solid waste infrastructure and operations, including a reduction from over 300 facilities statewide to just 31. The state has approximately 38 years of landfill capacity currently permitted. Most of the municipal landfills were either constructed or have received significant upgrades within the last 25 years, providing good to excellent environmental protection. In addition, the support infrastructure, including roads, stormwater controls, and equipment buildings are in relatively good condition. One exception is rural container sites and some transfer facilities, which are generally older and in fair to poor condition, posing significant public safety issues. Montana has improved the percentage of material diverted from its landfills, but needs to continue to make progress towards increasing waste diversion through reuse and recycling. Overall, Montana's solid waste infrastructure is in relatively good condition and solid waste rates are reasonably affordable.

SOLID WASTE RECOMMENDATIONS

We need to keep Montana's solid waste infrastructure on the right track.

- **Increase Waste Diversion & Recycling**: Local governments and private organizations should continue to develop measures to increase waste diversion and recycling percentages in their communities. This will increase landfill life and improve environmental protection.
- **Educate**: Efforts should be made to educate the public, businesses, and institutions on ways to reduce, reuse, and recycle their waste stream. In addition, Montana should continue to encourage education of landfill operators and managers to improve operations practices.
- **Improve Access Control & Safety**: Local governments need to improve access control and install safety measures at container sites, particularly those in rural areas. This should include limited, regular hours of operation with staffing for oversight of the public using these facilities.
- **Continue to Enforce Regulations**: Montana should continue to enforce solid waste regulations and work with operators to ensure full compliance.
- **Pursue More Landfill Capacity**: Local governments should continue to pursue additional landfill capacity, because landfills will continue to be the single largest component of solid waste management for at least the next 30 years.

MONTANA'S GRADES

D-	Schools
D+	Wastewater
C-	Dams
C-	Drinking Water
C	Irrigation Canals & Waterways
C	Transportation
C+	Transit
B-	Solid Waste

Montana's GPA:

C-

RAISING THE GRADES

4 KEY SOLUTIONS

1. Have a Plan and Fund For the Future: All infrastructure owners and operators should create and fund capital replacement plans for both immediate and long-term needs.
2. Support Federal Programs That Are Good for Montana: Montana should support federal efforts that provide direct financial assistance to the state for safe and efficient infrastructure, like the Highway Trust Fund and National Dam Safety Program.
3. Keep Up Infrastructure Education Efforts: State agencies should continue and encourage participation in education and outreach programs provided to infrastructure owners and operators.
4. Innovate As We Replace: Montana should support and encourage innovative solutions to infrastructure funding and capacity-building, including design/build project delivery and measures to increase waste diversion and recycling.