State Examples From AASHTO's *Bridging the Gap* Report

State	Locality	Type of Example	Example	Report Page #
Alaska	None	Innovative Technology	In Alaska, the DOT is testing a new method of "seismic retrofit" on the substructure of the 1,250-foot-long Kodiak Harbor Channel Bridge.	48
Arizona and Nevada	None	Innovative Technology	In the arid canyons surrounding the Hoover Dam between Arizona and Nevada, a roadway was built on top of the dam when it was constructed in the 1930s. It has since become a major traffic bottleneck. The new Hoover Dam Bypass is made possible by the elegant Colorado River Bridge. The first 1,060-foot concrete arch is the centerpiece of a 2,000-foot-long bridge, which will span the Black Canyon about 1,600 feet south of the dam. When completed in 2010, the bridge and bypass will save significant travel time and expedite trade throughout the region.	64
California	Oakland	Responses to Bridge Emergencies	On April 29, 2007, the driver of a tanker, truck carrying 8,600 gallons of fuel lost control on a freeway overpass in Oakland, California, and the vehicle flipped onto its side and exploded. The deck section buckled and fell. The overpass was part of a freeway complex that leads to and from the heavily used San Francisco – Oakland Bay Bridge. The fire-destroyed section, known as the 580 connector, and the roadway it crashed onto, the Highway 880 connector, had to be checked for safety and possible reconstruction. A state of emergency allowed the use of streamlined contracting and environmental procedures. Officials estimated that it would take 50 days to reopen the 580 connector, but 26 days later the section was back in service. Caltrans promised a bonus of $200,000 — to be capped at $5 million — for every day earlier that the project was brought to completion. The job was awarded to C.C. Myers Inc., which put in a bid for $867,075—the lowest bid—and won the full $5 million bonus by getting the work done so quickly.	29-30
California	San Diego	Innovative Technology	On the campus of the University of California at San Diego, the California Department of Transportation plans to construct a 450-foot-long cable-stayed bridge using carbon-fiber, reinforced-polymer composites. It will include two lanes for motor vehicles as well as two bike lanes, a walkway, and utility tunnels.	48
California	King Stormwater Bridge	Innovative Technology	The advancement of bridge building is a combination of caution and innovation. One good example is the Kings Stormwater Channel bridge on California State Route 86. The bridge on the highly traveled NAFTA truck corridor is innovative in that it uses carbon-fiber-reinforced epoxy tubes fi lled with concrete instead of traditional concrete and steel piers. It also has a carbon-fiber deck, which is lighter and faster to construct than a concrete deck. The University of California at San Diego researchers tested full-scale models of the bridge in the laboratory before the California DOT authorized construction. Today, it is wired with nearly 100 gauges, which are monitored by researchers to meticulously track its performance.	50
California	San Fernando	Innovative Technology	The California DOT pursued a comprehensive seismic retrofit program following the 1971 San Fernando Earthquake. As a result, during the 1994 Northridge Earthquake in southern California, which had a magnitude of 6.7, almost all seismically retrofitted structures were undamaged or only sustained minor damage that was quickly repaired.	50
California	Oakland	Rising Costs	In Oakland, California, the Oakland Bay Bridge connecting with San Francisco actually was a complex network of bridges and a tunnel originally built for $77 million in 1936. Today, more than 270,000 vehicles per day use the route, which carries Interstate 80. Because of a much larger structure, the need for seismic protections, and other reasons, the new main span was bid at $1.43 billion. Construction currently is underway.	58
District of Columbia	Washington	Rising Costs	The Woodrow Wilson Bridge on the I-95/I-495 beltway is the lifeline around Washington. This original bridge across the Potomac River was constructed with four lanes in 1961. The structure was planned to carry 75,000 vehicles daily within 20 years but exceeded that volume within its first eight years. The new bridge consists of 12 lanes, with eight of them as general purpose and the remainder as high occupancy vehicle lanes. Because of its close proximity to adjacent interchanges, four nearby interchanges also needed to be reconstructed to flow into the wider bridge. The overall cost was projected to be $2.524 billion.	57-58
District of Columbia	Washington	Preserving Historic Bridges	In the historic Georgetown section of Washington, DC, the Federal Highway Administration worked with other federal agencies to preserve the 1831 Wisconsin Avenue Bridge. The stone arch still carries daily traffic but was deteriorating under the load. An innovative solution of inserting stainless steel rebar into the structure without altering its appearance provided a safe and historically compatible solution.	63
Florida	None	Innovative Technology	In Florida, the DOT is experimenting with several strategies to combat rusting and corrosion of the "rebar" or the strengthening structural steel that runs through concrete bridge decks and piers. They are using stainless steel-clad rebar, and fiber-reinforced polymer composites in the pilings and bridge decks to prevent future corrosion damage.	48

State Examples From AASHTO's *Bridging the Gap* Report

State	Locality	Type of Example	Example	Report Page #
Florida	Tampa	Safety	Bridges built today are more protected from collisions than in the past. Barriers are built around piers in navigable channels to ensure that ships cannot reach them. The Sunshine Skyway in Tampa, Florida, replaced an earlier steel structure that collapsed when struck by a barge. The new bridge's piers are surrounded by 52 "dolphins," the so-called large, low barriers that protect its piers. They are designed to withstand the impact of a ship and keep the bridge safe.	51-52
Iowa	None	Innovative Technology	The Iowa DOT has used a variety of electronic devices to test bridge conditions and to provide an analytical comparison to the field observations of its own engineers. It has used strain gauges, "accelerometers" which measure vibrations, and displacement transducers to measure the "flex" or deflection of the bridges under truck loadings. It also utilizes a Scour Watch system which uses real-time rainfall and stream-flow data. This data is automatically used to measure and predict stream flow and to compare that flow against the safe amounts that its bridges can accommodate. If the volume of water reaches certain levels, the system automatically warns the engineers, who then visit the bridge for an immediate assessment. Any potential danger can result in immediate closure of the bridge and inspection after the flood waters recede.	43
Iowa	None	Innovative Technology	In Iowa, the DOT is testing fiber-reinforced polymers to replace deteriorated concrete decks as well as to build entire new bridges. In addition, it is using high-performance concrete and steel to build new structures that will be carefully monitored for their cost, strength, and durability.	48
Iowa	Madison County	Innovative Technology	Engineers at the Iowa Department of Transportation worked with researchers from Iowa State University to study the use of remote sensing to protect the "Bridges of Madison County." They installed flame detection devices, infrared cameras and fiber-optic strain gauges on one of the covered bridges.These will monitor the bridges for fire or other potentially damaging events and immediately notify law enforcement of suspicious activity. Similar technology protects covered bridges in Illinois.	62
Iowa and Illinois	Quad cities	Rising Costs	The Quad Cities region of Iowa and Illinois is separated by the Mississippi River. The existing bridges are too narrow for the traffic volumes and have become an impediment to the development and convenience of the region's population. The citizens and DOTs from both states have agreed upon a state-of-the-art new arch bridge but are uncertain when the $1 billion will be available to construct it.	28
Kentucky	Louisville	Rising Costs	In Louisville, Kentucky, two new bridges across the Ohio River into Indiana have been estimated at $4.1 billion and will take until 2024 to complete, according to current schedules. Upstream in Cincinnati, the Brent Spence Bridge carries both I-71 and I-75 over the Ohio River between Cincinnati and northern Kentucky. Originally built in two levels with three lanes in each direction, the new bridge will need to have at least five additional lanes in each direction. The costs are estimated between $2 billion and $3 billion depending upon the alternative chosen.	58
Louisiana	None	Innovative Technology	The Louisiana Department of Transportation and Development deploys a scour monitoring device that uses temperature sensors in a pile driven adjacent to a pier. Any changes in the temperature can automatically alert them to the potential that the bridge foundation is threatened by exposure through scouring.	43
Maine	None	Rising Costs	Maine recently forecast that if it does not increase bridge investment by $50 million to $60 million annually, it will face an increasingly deteriorated bridge inventory. "Even at this level of investment, it is anticipated that bridge closures would need to occur on some low-priority, redundant bridges," says the Maine report.	25
Maine	None	Rising Costs	The Maine Department of Transportation can replace only 14 bridges annually and between 30 and 40 bridges need replacement each year. "Though Maine has programs and processes in place to assure bridge safety, they are more of a 'safety net'—not a sustainable solution," according to a report Keeping Our Bridges Safe, published by the Maine DOT. "The age and deterioration of our bridge infrastructure is becoming critical, and without a significant infusion of funding, MaineDOT will be forced to post and close an increasing number of bridges, which will significantly impact the economic vitality of the state. With over 2,000 bridges in fair or poor condition, Maine's economy cannot afford to have the highway network become unconnected, nor can we allow unsafe bridges to stay open." The Maine DOT estimates that it must increase its bridge expenditures from the current $70 million annually to between $120 million and $130 million to prevent a continuing progression of bridge closures.	34
Maine	Mexico	Innovative Technology	In Maine, the DOT is wrapping fiber-reinforced polymer composites around old, un-reinforced concrete abutments on the Androscoggin River Bridge in the town of Mexico.	48

State Examples From AASHTO's *Bridging the Gap* Report

State	Locality	Type of Example	Example	Report Page #
Mississippi	Biloxi	Economic Impacts	Katrina unleashed more than $1 billion in damages to Mississippi's transportation infrastructure alone. Two main bridges, the Biloxi Bay and Bay St Louis, were lost, impacting the daily lives of thousands people in and around the communities they served. Traffic congestion became a nightmare as vehicles were forced to detour around the destruction to reach jobs, schools, and grocery stores. People like Mayor Chipper McDermot of Pass Christian, Mississippi, had to drive 55 miles round trip to get his children to school and back. Both bridges reopened last year and McDermot says "We've been reconnected to our past and our future." Bridge festivals were held to mark the opening of the bridges, and thousands of people from the newly re-linked communities came out to celebrate this milestone in the recovery of the Gulf Coast. "I never thought a chunk of concrete would look so good. It brings tears to my eyes." Chuck Breath, a Bay St. Louis resident, said of the new bridge.	22
Missouri	None	Innovative Financing	In Missouri, of the 10,240 bridges on the state bridge system, some 1,093 are rated in serious or poor condition. Through a "Safe and Sound" bridge initiative, MoDOT Director Pete Rahn grouped 800 bridges into one package of projects which a contractor must not only build but finance. "The team will bring all the bridges up to good condition by the end of 2012 and will maintain them in good condition for at least 25 years," said Rahn. Although the total construction cost of the program will be between $600 million and $800 million, the contractor will provide the financing through private activity 25 bonds. Through this approach, the state will be able to fix 800 bridges in five years, while it normally could afford to fix only 40 per year.	24 - 25
Missouri	Jefferson City	Responses to Bridge Emergencies	On November 27, 2007, a fiery tanker crash and explosion near the Jefferson Street Bridge on US 54 Eastbound closed one of three major arteries in Central Missouri. A detour was established immediately. Within two days, damaged signs, pavement, striping, and guardrails that had been damaged by the extreme heat from the fuel fire were replaced. But the bridge suffered major damage—warped bridge railings, severe damage to concrete, fractures in underdeck and columns. On November 29, the decision was made to replace the structure. That same day design plans were started for the new bridge and were completed in six calendar days. On December 5, eight days after the explosion, an emergency contract was awarded to the Pace Construction Company of St. Louis, with incentives to encourage completion by January 7, 2008. Total project cost $1.2 million. Construction began on December 7 and on January 3, four days ahead of schedule, the bridge was opened.	31
Nevada	None	Innovative Technology and Rising Costs	Sparsely populated and dry Nevada has only 1,045 state bridges, one of the lowest numbers in the nation. Despite the state's relatively strong economy, sound bridge inspection history and its relatively young infrastructure, the Nevada DOT still is very concerned about the long-term health of its bridge inventory. It uses the state-of-the-art Pontis® bridge management system to assess its inventory and predict needed investment levels.The state DOT has a $134 million backlog of bridges needing repair or replacement, despite the overall health of its inventory. It knows that it needs to increase its average level of expenditure incrementally each year through 2019 in order to keep its inventory in its current condition. Despite sound planning and diligent inspection, the ability to make these needed investments will depend on many factors beyond its control. Affecting its available funds will be the impact of inflation, declining fuel tax receipts caused by high fuel prices, uncertain federal funding, and competition for resources for needed pavement and safety projects.	35
Nevada	None	Innovative Management	Nevada DOT is taking a forward look by using its bridge management system to develop a mix of funding strategies to keep this $1.7 billion worth of bridge assets in good condition indefinitely. These strategies include: Replace or rehabilitate structurally deficient bridges before they become hazardous or need to be posted for load limits to a point they inconvenience the user; replace or rehabilitate functionally obsolete bridges before they become an impediment to users; seismically retrofit bridges that do not meet earthquake resistance standards; and apply timely repairs to structures as deficiencies are identified. This approach has led to the following budgeting and investment recommendations for the state over the next 10 years. Nevada has followed the path of many states and laid out a logical, long-term series of options for how it can manage its bridge inventory given various financial scenarios.	44-45
New Mexico	None	Rising Costs	New Mexico estimates it has some $220 million in bridge needs, but can fund only about $13 million per year.	39
New Mexico	None	Innovative Technology	New Mexico has deployed three fiber-optic strain gauges on concrete beams to test the technology.	43
Ohio	None	Preserving Historic Bridges	In 2005, a $1 million enhancement project provided by the Ohio DOT repaired the 1828 stone arch Blaine Bridge, one of a handful of stone "S" bridges remaining in Ohio from the original National Road, which was built from Cumberland, Maryland to the then-western frontier in Illinois. They were called "S" bridges because they actually curve to bring the road to a crossing perpendicular to the stream below.	61

State Examples From AASHTO's *Bridging the Gap* Report

State	Locality	Type of Example	Example	Report Page #
Ohio	Toledo	Innovative Technology	In 2007, citizens of Toledo jogged and strolled across the newly opened Veterans Glass City Skyway. Their new $234 million cable-stayed bridge represented the largest and most complex project ever undertaken by the Ohio DOT. It was a concrete segmental bridge, which meant it was built from pre-cast concrete sections, which were hoisted up and tied together with internal cables. Its tower rises 380 feet above the Maumee River and is lit with colored, low-energy LED lighting, which can change color to celebrate the seasons.	62
Oklahoma	Webbers Falls	Responses to Bridge Emergencies	On May 26, 2002, the Interstate 40 Bridge near Webbers Falls, Oklahoma, was destroyed when an Arkansas River barge went off course and struck its support columns. Each day the bridge was out of service cost the regional economy $430,000. Traffic had to be detoured 57 miles eastbound and 12 miles westbound, and motorists several states away were warned to avoid the area. Getting the bridge back in service would normally have taken six months. Instead, Oklahoma DOT Director Gary Ridley used an incentive contract to get the bridge back in service just 65 days after it was struck and 47 days after construction began.	32
Oklahoma	None	Rising Costs	Oklahoma estimates that $2.5 billion would be necessary to replace 626 bridges on the state system. That is currently not funded.	39
Oregon	None	Rising Costs	The Oregon DOT is in the midst of a $1.3 billion program to replace nearly 300 critical bridges after a series of emergency repairs in the early 2000s alerted the public to the looming needs.	25 and 28
Pennsylvania	Philadelphia	Responses to Bridge Emergencies	On March 17, 2008, inspectors for the Pennsylvania Department of Transportation discovered a widening crack in the pier of a bridge carrying Interstate 95 through Philadelphia. Immediately, they closed the interstate and began two days of emergency repairs. “For those two days, 184,000 vehicles a day were forced on to side streets, and the national media carried pictures of the multi-lane interstate completely devoid of vehicles while nearby streets were jammed,” PennDOT Secretary Allen Biehler later told Congress.	23
Pennsylvania	North Central Pennsylvania	Responses to Bridge Emergencies	A rural bridge in north central Pennsylvania, the Route 53 Irvona Bridge, was closed for a week after a routine inspection showed the steel beams needed immediate repairs.	24
Pennsylvania	Pittsburgh	Innovative Financing	In February 2008, the Birmingham Bridge which crosses the Monongahela River in Pittsburgh had to be closed for just over three weeks after two spans moved because of problems with the bridge’s rocker bearings. During the closure, 23,000 vehicles a day had to find alternate routes. Biehler told a Congressional committee that PennDOT has tripled its annual bridge investment since 2003 for a total of $3.8 billion in repairs on 1,381 bridges. Despite this investment and because of the system’s age, the number of structurally deficient bridges has grown, from 5,587 to 6,034. In July 2008, Pennsylvanian leaders authorized a $350 million bond issue to repair 411 bridges. Clearly, Secretary Biehler and his counterparts are struggling to hold together an aging inventory of bridges.	24
Pennsylvania	None	Innovative Financing	Pennsylvania has asked the federal government for authorization to toll Interstate 80 to generate funds for highways and bridges, and Governor Edward G. Rendell has asked the Legislature to approve a proposed $12.8 billion, 75-year lease of the Turnpike to a private entity to generate a new annual funding stream for transportation.	25
Pennsylvania	None	Rising Costs	Pennsylvania has estimated it would cost $14 billion to repair just its structurally deficient bridges, not including bridges that need to be widened for increasing traffic.	39
Pennsylvania	Chester County	Preserving Historic Bridges	The Pennsylvania DOT is helping to preserve the 1913 Chester Spring Road stone arch in Chester County. The greater Philadelphia area has the country’s largest collection of stone arches. PennDot has developed a management plan to preserve and protect these arches whenever possible.	63
South Carolina	Charleston	Innovative Technology	The Cooper River Bridge in Charleston, SC, is another example of strength, safety and aesthetics made possible by modern materials and technology. The diamond towers rise 575 feet into the air thanks to high-performance concrete. The towers anchor 128 steel cables, each of which can hold 500 tons. The Cooper River Bridge is the longest cable-stayed bridge in America and has replaced the old, narrow truss seen in the background.	64
Tennessee	None	Innovative Management	The Tennessee Department of Transportation reports, “We have been impacted by rising materials costs and fewer federal revenues than anticipated as well as relatively flat state revenue returns. This requires us to look at the most cost-effective way of addressing our structurally deficient bridges. There are three key areas of our bridge management program that we look at with these bridges: repairs, rehabilitation, and replacement. In some instances, it is possible to extend the life of the bridge by rehabilitating the structure and we have opted to rehabilitate rather than replace it due to the limited funds. Those bridges are still scheduled for replacement. However, by rehabilitating the bridge we are able to safely extend the life of the structure in lieu of the more expensive total replacement. We also elevate some bridges to annual inspections rather than inspecting them every two years. No projects have been cancelled due to a lack of funding, however some projects have been delayed until a new fiscal year because of funding concerns.	34-35

State Examples From AASHTO's *Bridging the Gap* Report

State	Locality	Type of Example	Example	Report Page #
Tennessee	None	Rising Costs	Tennessee estimates $1 billion is needed to remedy the structural deficiencies on state bridges, with another $741 million needed for locally owned bridges.	39
Tennessee	Williamson County	Innovative Technology	The Natchez Trace Bridge in Williamson County, Tennessee, used a first-of-its kind concrete arch design to reduce piers and other impacts across the scenic mountain valley. The use of the new design allowed the construction impacts to be minimized while also creating a new landmark that complements its beautiful surroundings.	64
Texas	Corpus Christi	Rising Costs	In Corpus Christi, the Texas Department of Transportation is conducting an environmental impact statement to help determine how to replace the aging 50-year-old steel bridge which exists there. It estimates that a new structure could cost $500 million to $600 million and take as long as 2015 to open, once funding is determined.	28
Texas	None	Innovative Technology	In Texas, the Department of Transportation is building two completely prefabricated bridges over Interstate 35. The full superstructure of the bridge will be built and then rolled into place for nearly immediate use by the public. The bridge system will allow replacement of the structure in a few days instead of months.	49
Washington	None	Innovative Technology	In Washington State the DOT is measuring miniscule changes in bridge height to detect any settlement on bridges, gathered through Global Position System data that is bounced off satellites.	43
Washington	Nisqually	Responses to Bridge Emergencies	Washington State DOT completed its seismic retrofit program prior to the 2001 Nisqually Earthquake, which had a magnitude of 6.7. Again, many retrofitted structures were undamaged or sustained only minor damage that was quickly repaired.	51
Wisconsin	Milwaukee	Rising Costs	In Milwaukee, the Marquette Interchange handled nearly a third of all the state's truck volume when measured by the value of shipments. The major routes in Wisconsin funnel through Milwaukee, the state's largest city, and down into Chicago. The interchange of I-94, I-43, and I-794 carried a disproportionate share of the state's traffic and truck volumes, with daily volumes exceeding 300,000 vehicles daily. To separate these movements, add interchange capacity and alleviate congested ramps, a much more complex four-level interchange was necessary at a total cost of $810 million. The original interchange built in 1968 cost $33 million.	58