2009 Ohio Infrastructure Report Card

American Society of Civil Engineers
Ohio Council of Local Sections
May, 2009
INTRODUCTION

The American Society of Civil Engineers (ASCE) released its first Report Card for America’s Infrastructure in 1998, and released new, updated report cards in 2001 and 2005. ASCE released its latest update, the 2009 Report Card for America’s Infrastructure\(^1\) in January, 2009. These report cards were designed to provide a grade for the current condition of components of America’s crumbling infrastructure, raise public awareness, stimulate debate, and propose, highlight, and promote solutions. ASCE has been giving special attention to improving America’s infrastructure on several fronts, including championing the need for investments in infrastructure renewal with policy makers at the national, state and local level.

As part of this effort, and to broaden the dialog on infrastructure renewal, ASCE has been encouraging its Sections and Branches to develop and promote Infrastructure Report Cards for their region, state, and city or county. Sections and Branches can localize the national Report Card by focusing on infrastructure that is relevant to their region, state, or local area. ASCE published a resource guide entitled Regional Report Cards: A Guide to Grading Your Community’s Infrastructure\(^2\) to aid Sections and Branches in this effort. This guide was used in the preparation of this report.

The Ohio Council of Local Sections of ASCE is the body that addresses statewide issues and shares ideas and practices from the six ASCE Sections in Ohio. The Ohio Council is composed of delegates elected annually from each of the six Sections: Akron-Canton, Central Ohio, Cincinnati, Cleveland, Dayton, and Toledo. The Ohio Council decided in 2008 to form a committee to prepare this Infrastructure Report Card for the State of Ohio. The Ohio Council solicited for volunteers from the Section membership with expertise in the areas to be assessed. The committee members gathered data, determined the ratings, and prepared the individual sections of the report. The committee reviewed the recommendations and prepared the report for release to the public. An Advisory/Review Panel consisting of volunteers with broad expertise and years of experience in the areas covered in the report provided comments to the committee. Those comments were considered and incorporated into the committee’s work. This report is the result.

Sources

\(^1\) American Society of Civil Engineers (ASCE), 2009 Report Card for America’s Infrastructure, January, 2009

\(^2\) ASCE, Regional Report Cards: A Guide to Grading Your Community’s Infrastructure
Table of Contents

Introduction ................................................................. 2
Table of Contents ........................................................... 3
Methodology ....................................................................... 4
Report Card ....................................................................... 5
Aviation .............................................................................. 6
Bridges .............................................................................. 10
Dams .................................................................................. 16
Drinking Water ................................................................. 22
Electricity .......................................................................... 29
Parks and Recreation ......................................................... 36
Railroads ............................................................................. 41
Roads ................................................................................ 46
Schools .............................................................................. 51
Wastewater ........................................................................ 57
Acknowledgements ............................................................ 65

Note that figures, tables, and sources are numbered by section rather than continuously throughout the report. This was done so that each section could be separated from the report and used as a self-contained fact sheet.
METHODOLOGY

To develop this Report Card, the committee decided to follow the guidelines in the ASCE resource guide entitled \textit{Regional Report Cards: A Guide to Grading Your Community's Infrastructure}.\footnote{American Society of Civil Engineers (ASCE), \textit{Regional Report Cards: A Guide to Grading Your Community’s Infrastructure}} The committee adopted the same criteria that were used for the \textit{2005 Report Card for America’s Infrastructure}.\footnote{ASCE, \textit{2005 Report Card for America’s Infrastructure}, 2005} These criteria were infrastructure condition, performance, funding, and capacity versus need.

The committee determined which infrastructure categories were appropriate for assessment in Ohio and began the process of gathering data from federal, state, and local government agencies to support the assessment. Where the agencies had already evaluated these data, the evaluations were considered in the development of the grades in this report. Committee members developed an initial grade and consulted with other experts in the field to reach consensus on the final grade for each area.

Grades generally were assigned by following a traditional A through F grading scale, with A being highest and F lowest. Where possible, quantitative grades were developed using a ten-point scale with A being equivalent to grades of 91 to 100, B from 81 to 90, etc. For example, if 77\% of our roads are in good condition or better, that would earn a grade of C. In some sections, grades were assigned using methods derived from source documents (e.g., the Dams Section uses the National Inventory of Dams rating system but with the final letter grade aligned with the grading system used in this report card). In these instances, the methodology is explained within the section. The initial grades by section were then reviewed by the Advisory/Review Panel and adjusted, where necessary, usually with a plus or minus. Grades were developed and adjusted to reflect positive or negative trends or the critical consequences should a catastrophic failure occur. For example, the failure of a bridge or dam could have much more immediate economic and possibly life-threatening consequences than a park or recreation facility falling into disrepair.

The infrastructure grades presented in the following table and sections of this report are the result of the collaborative process described above. Inherent in this process was the application of engineering judgment by individuals with expertise and experience in the areas being graded. The resulting grades are not absolute measures, and can and should be debated by other engineers and members of the public. The goal of this effort was to stimulate that debate and to generate action to address Ohio's most pressing infrastructure issues. The committee welcomes comments on the contents of the report, and encourages the public to engage in a dialog on the issues addressed in the report. The committee can be contacted through the Ohio Council of Sections Website at \url{www.ohioasce.org}. Most importantly, the committee urges the public to contact their federal, state, and local officials and ask them to support infrastructure renewal.

Sources

\footnotetext[1]{American Society of Civil Engineers (ASCE), \textit{Regional Report Cards: A Guide to Grading Your Community’s Infrastructure}}

### 2009 OHIO INFRASTRUCTURE REPORT CARD

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation</td>
<td>C-</td>
<td>Ohio ranks third in the nation with 124 paved and lighted general aviation airports. Only 58% of runways, 57% of taxiways and 62% of aprons meet the satisfactory condition index. These percentages are below ODOT Office of Aviation established goals. Ohio’s commercial service airports are meeting capacity requirements.</td>
</tr>
<tr>
<td>Bridges</td>
<td>B-</td>
<td>Bridges in Ohio are crucial components of one of the largest transportation systems in the country. Ohio has the second largest inventory of bridges in the United States. It is estimated that it would cost $3.6 billion to replace all the structurally deficient bridges and the most urgent two-thirds of the functionally obsolete bridges in Ohio.</td>
</tr>
<tr>
<td>Dams</td>
<td>C</td>
<td>There are more than 2,600 dams in the State of Ohio. Nearly 70% of Ohio dams are privately owned. There were 1,597 state-regulated dams in Ohio in 2007. Of the state-regulated dams, 33% are deficient. It is estimated that the repair cost for Ohio’s deficient dams is approximately $300 million.</td>
</tr>
<tr>
<td>Drinking Water</td>
<td>D+</td>
<td>Approximately 90% of Ohioans receive water for daily needs from one of the more than 6,000 public water systems. An estimated 99% of the burden for funding public water supply systems is borne by local government. It is estimated that Ohio has $9.68 billion in drinking water infrastructure needs.</td>
</tr>
<tr>
<td>Electricity</td>
<td>C+</td>
<td>Electric generation, transmission and distribution systems in Ohio are satisfactory, reliability problems are relatively few, and those that exist are being addressed by system improvements. However, mandates related to alternative energy and environmental protection may pose problems for Ohio’s electric utilities in the future.</td>
</tr>
<tr>
<td>Parks and Recreation</td>
<td>C-</td>
<td>Park systems in Ohio provide a crucial economic element in terms of jobs and financial impact. An additional $26.5 million is needed each year to properly operate the state parks and other divisions, and an additional $29.9 million annually is needed to eliminate the maintenance backlog over the next 10 to 20 years.</td>
</tr>
<tr>
<td>Railroads</td>
<td>C-</td>
<td>Railroads provide critical services to industries important to Ohio’s economy, hauling raw materials, parts, and finished products. Railroads are an important industry, employing more than 8,000 workers and paying approximately $500 million in wages. ODOT estimated that the cost to improve thirty railroad choke points is $1.19 billion.</td>
</tr>
<tr>
<td>Roads</td>
<td>D</td>
<td>With over 125,000 miles of roads, Ohio has one of the largest and most utilized roadway networks in the United States. 43% of Ohio’s roads are in critical, poor, or fair condition. It is estimated that by the year 2014, Ohio will have a highway budget shortfall of more than $10 billion at the state government level alone.</td>
</tr>
<tr>
<td>Schools</td>
<td>C</td>
<td>The quality of schools in Ohio is crucial to the state’s long-term viability and ability to compete in the global marketplace. The American Federation of Teachers estimated in 2008 that Ohio schools require $9.32 billion in infrastructure investment. This ranks Ohio 6th in the country for total funds needed.</td>
</tr>
<tr>
<td>Wastewater</td>
<td>D+</td>
<td>Aging systems discharge billions of gallons of untreated wastewater into U.S. surface waters each year. An estimated 95% of the burden for funding municipal wastewater treatment systems is borne by local government. It is estimated that Ohio has $11.16 billion in wastewater infrastructure needs.</td>
</tr>
</tbody>
</table>
Aviation

The current economic issues in the airline industry and the general downturn in the United States economy are having an impact on aviation in Ohio. Airlines have reduced the number of flights, and 2008 passenger departures and arrivals have decreased. This has resulted in decreased revenues that result from landing and gate fees at the major commercial airports in the state. The impact on smaller airports is similar due to a decrease in general aviation. Despite this, major projects at several airports are underway that will improve the state’s aviation infrastructure once completed.

Background

Ohio, as the birthplace of aviation, has a long history in the field of aviation and history of support to the aviation industry. Ohio’s system of publicly owned airports and non-system airports generate $10.5 billion in economic activity and create thousands of jobs.\(^1\)

The aviation system has gone through extraordinary changes over the last ten years. First were the increases in security and decrease in traffic due to the 9/11 terrorist attacks, then came increases in competition from low cost carriers, increases in use of regional jets, the spike in oil prices of 2008 and, most recently, the economic downturn. While there have been some failures during that time, overall air traffic has increased. And, while air traffic may be temporarily down due to the economy, it is expected to bounce back.

Airports typically fund infrastructure projects from four sources: cash flow, bonds, grants (federal/state/local), and passenger facility charges (PFCs). PFCs, which are airport use fees airlines pass along to the consumer as part of the ticket cost, are only used at commercial service airports.

Ohio Airport and Aviation Facts and Issues

The aviation infrastructure in Ohio is extensive. Ohio ranks third in the nation with 124 paved and lighted general aviation airports. The core of Ohio’s aviation system is composed of 170 public use airports ranging from commercial passenger airports to general aviation airports used for business, law enforcement, emergency medical response, state and local government services, instructional, and recreational purposes.

Ohio has seven commercial airports, which include four hub airports (Cleveland Hopkins, Port Columbus, Akron-Canton, and Dayton) and three non-primary airports (Toledo, Youngstown-Warren, and Rickenbacker). These seven airports accounted for 11,694,000 passenger enplanements.\(^2\) Enplanements at these airports between 2002 and 2007 increased more than 14%.\(^2\) While all airports had fewer enplanements in 2008 than in 2007, and are likely to again experience a decrease in 2009, the industry forecasts enplanements to continue to increase over the long term at approximately 2.9% annually.\(^3\)

Generally, Ohio’s commercial service airports are in a position to accept the additional enplanements. Cleveland Hopkins has invested significant resources in recent years, including replacement of Runway 5L/23R with new Runway 6L/24R and the uncoupling of Runway 6R/24L and Runway 10/28. Cleveland Hopkins has also recently received funds from the
American Recovery and Reinvestment Act to construct taxiways and a holding apron, which will allow the airport to proceed with the construction of a new air traffic control tower. These improvements will allow Cleveland Hopkins to safely handle the expected increase in traffic. Port Columbus and Akron-Canton also have runway replacement and runway extension projects, respectively, that they anticipate will be completed within the next five years. With the completion of these improvements, Ohio appears to be positioned to handle increased capacity needs at its commercial service airports.

Ohio’s commercial airports currently have adequate capacity to handle the number of scheduled airline arrival and departure flights. However, since the national airport system is so closely linked, delays at other airports have a trickle down effect and delays still occur at an increasing rate at Ohio airports.

To alleviate delays, the Federal Aviation Administration (FAA) has developed a plan to increase capacity at other airports that are routinely plagued by delays that affect the entire system. Additionally, the FAA is in the process of implementing the NextGen, GPS-based air traffic control system. The air traffic control system is based largely on 1950’s technology and the current volume of air traffic has exceeded its limits to maintain efficient and safe operation. The full implementation of NextGen will open up airspace and reduce congestion in the air between airports.

The four largest public use cargo airports in Ohio (Cleveland Hopkins, Dayton, Toledo and Rickenbacker) handled approximately 2.2 billion pounds of air cargo in 2007 compared with 3.8 billion pounds in 2002. While all four airports have seen up and down fluctuations over that time, the significant drop is due primarily to Emory Air’s closure of its facility at Dayton in 2006.

To meet the state system’s goals, the Ohio Department of Transportation (ODOT) Office of Aviation has identified $117 million of improvements at general aviation airports. This number does not include costs for maintenance, rehabilitation, or reconstruction of existing infrastructure. It has been estimated that approximately $9.8 million a year is needed to maintain these airports at their existing condition. ODOT’s proposed additions to Ohio’s general aviation system will allow these airports to provide effective support for business, law enforcement, emergency medical response, state and local government services, instructional, and recreational purposes.

The FAA’s Airport Improvement Program (AIP) grant program expired in 2007 and has since been operating under short-term continuing resolutions. These short-term continuing resolutions have made it difficult for airports to complete larger multiyear projects, since funding cannot be guaranteed for more than three to six months.

Aviation activity generates annual tax revenues of approximately $22 million for Ohio. Ohio reinvests a portion of these proceeds into infrastructure through the Ohio Airport Grant Program. The Ohio Airport Grant Program provides financial assistance to publicly-owned airports that do not receive FAA passenger or air cargo entitlements. Grants are typically used for airport pavement resurfacing, obstruction removal, and marking. While the amount of the program has varied year to year, it has typically been between $1.5-1.8 million annually over the last few years. However, the program is facing possible funding cuts beginning in FY2010. Even if the program funds are not decreased, Ohio’s grant program is significantly smaller than the grant programs of states of similar size.
The FAA sets a performance goal of ensuring that 93% of National Plan of Integrated Airport Systems (NPIAS) airport runways are maintained in good or fair condition. Based on data from 2007, the FAA rated 79% of Ohio’s NPIAS runways as good, 18% as fair, and 3% as poor. At commercial service airports, the runways faired slightly better, with 80% good, 18% fair, and 2% poor.\(^3\)

The ODOT Office of Aviation has established goals that 85% of all runways, 80% of all taxiways and 75% of all aprons have a satisfactory pavement condition rating. Based on the most recent data available, only 58% of runways, 57% of taxiways and 62% of aprons meet the satisfactory condition index.\(^2\)

Ohio residents have good access to commercial service airports, with 87% living within a 60-minute drive to a commercial service airport and 98% living within a 90-minute drive (these figures factor in out-of-state airports, including the Cincinnati Northern Kentucky International, Pittsburgh International, Tri-State, and Mid-Ohio Valley Regional airports). 90% of Ohio residents live within a 30-minute drive to an advance service airport (commercial airports and general aviation airports capable of serving larger business/corporate jet aircraft).\(^4\)

**Policy Options**

The national aviation system faces a number of major challenges in the coming years. To meet these challenges, the national aviation infrastructure must become more flexible, and we must ensure that the necessary expenditure of capital to meet the infrastructure need is available.

ASCE supports the permanent extension and increase of user fees as necessary for continued funding of AIP through the Airport and Airway Trust Fund. All monies collected from these user fees should be deposited in the Airport Trust Fund, and the Airport Trust Fund should be removed from the unified federal budget. Revenue Aligned Budget Authority (RABA), which allows for the allocation of all trust fund revenues, should be established in the airport trust funds. Additionally, Congress must provide continued, but separate, non-AIP and non-PFC funding for security operations.

There is general consensus that maintaining the integrity of the national airport system requires continual updates and a steady and predictable flow of capital. Federal and state funding at current levels is not sufficient to maintain the integrity of existing airports and address the capital improvements identified. For Ohio’s airports to fully serve the residents, business and government interests, additional funding needs to be acquired. The passage of a new federal AIP program, including an increase in PFC caps, would be an important step in continuing this important program. Additionally, Ohio should increase the state grant program. The additional state funding could be generated from existing aviation fees and taxes that currently go into the general revenue fund.
Specific ASCE Ohio Council Recommendations

- Reauthorization of the FAA’s AIP grant program
- Removal of the Airport Trust Fund from the federal budget
- Increase the cap on PFCs
- Support the modernization of Air Traffic Control Systems
- Utilize state aviation fees and taxes exclusively for aviation purposes, including increased funding to the Ohio Airport Grant Program

Sources

2 Federal Aviation Administration, Department of Transportation, *CY 2002-2007 Passenger Boarding and All Cargo Data*, September, 2008
4 Office of Aviation, ODOT, *Ohio State Airport System Plan*, May, 2006

The following sources provided additional information considered in the preparation of this section of the report card:

5 Ohio Aviation Association
7 ASCE Policy Statement 149, “Intermodal Transportation Systems,” 2008
8 ASCE Policy Statement 434, “Transportation Trust Funds,” 2006
Bridges

Bridges in Ohio are crucial components that make up one of the largest transportation systems in the United States. Ohio’s economy is directly linked to its ability to move goods and services through the 5th largest interstate highway system,\(^1\) 2nd largest inventory of bridges, and 10th largest highway network in the nation.\(^2\) Many of the state’s bridges have reached their expected service life and are in need of rehabilitation or replacement. State and local agencies are now dealing with the problem of programming this needed work in the wake of the downturn in the economy and the sharp increase in cost of construction materials. On top of this, many sources of revenue have become stagnant, which puts even more stress on fragile budgets. It is estimated that it would cost $3.6 billion to replace all the structurally deficient bridges, as well as rehabilitate the most urgent two-thirds of the functionally obsolete bridges in Ohio. The estimate does not include any design, roadway nor right-of-way costs associated with these projects.

Background

In 1967, the Silver Bridge (U.S. 35) over the Ohio River collapsed and killed 46 motorists. This brought attention to the need for National Bridge Inspection Standards (NBIS). Ohio was instrumental in establishing its own standards in the wake of this catastrophe. NBIS states that a bridge, defined as a structure with a length of at least 20 feet,\(^3\) needs to be inspected at least once every two years.\(^4\) The Ohio Revised Code (ORC) defines a bridge as having a span length of at least 10 feet\(^5\) with a requirement that the bridge be inspected annually.\(^6\) Generally the agency that owns the bridge is responsible for having the structure inventoried and inspected by a professional engineer and must submit the results, which is called a general appraisal (GA), to the state. This is then reported to the Federal Highway Administration (FHWA).

Ohio has the second largest inventory of bridges in the United States, 27,999, based on the federal definition of a bridge and 2007 data.\(^7\) Based on the ORC definition of a bridge, the inventory in the Ohio Department of Transportation (ODOT) Bridge Management System as of February 2009 is 44,245 bridges. These structures are owned and maintained by the state, counties, municipalities, townships, and other state and local agencies.

NBIS also requires every bridge to have a load rating performed to determine its safe live load-carrying capacity. The safe live load-carrying capacity is the additional amount of load from vehicles, pedestrians and other forces a bridge can withstand above the weight of the bridge itself. NBIS also requires an underwater inspection be performed every five years to check structural integrity and/or potential scour problems.

The inspections, evaluations, and inventory of data are also used to determine if a structure is deficient. Deficiency is divided into two categories: bridges considered structurally deficient (SD) or functionally obsolete (FO). A structurally deficient bridge is one that has inadequacies which may limit its ability to carry legal loads. These structures may have a reduced vehicle weight limit. A functionally obsolete bridge is one that does not meet current geometric requirements such as shoulder widths and clearances, or one that has roadway approach inadequacies. It should be noted that a bridge defined as SD or FO does not necessarily indicate that the bridge is unsafe, but merely acts as an indicator for the agency to consider programming a project to upgrade the bridge to meet current guidelines. These factors, along
with the GA rating, are used to determine the sufficiency rating of the bridge. Again, a low sufficiency rating (0 is low, 100 is high), does not necessarily indicate an unsafe condition, just that the bridge has inadequacies in structural soundness and/or geometrics.

**Ohio Bridge Facts and Issues**

Ohio is a crucial link for moving goods and services across the country and region because of its large highway network, which includes over 44,000 bridges. Logistical distribution centers along the Ohio River, at the Ports of Toledo and Cleveland, and the Rickenbacker Global Logistics Facility in central Ohio, rely on a safe and efficient highway system.

Ohio has the second largest inventory of bridges in the country. While the overall condition of bridges in Ohio is slightly better than average, Ohio has the fifth highest number of deficient local bridges in the country.\(^8\)

The following tables indicate the condition of bridges in Ohio based on primary maintenance responsibility as defined by the ORC.\(^9\)

### Inventory of Ohio Bridges by maintenance classification and percent Structurally Deficient (SD) or Functionally Obsolete (FO)

<table>
<thead>
<tr>
<th>Maintenance Responsibility</th>
<th>Total number of Bridges</th>
<th>SD</th>
<th>Percent SD</th>
<th>FO</th>
<th>Percent FO</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOT</td>
<td>14,001</td>
<td>761</td>
<td>5.4%</td>
<td>1,784</td>
<td>12.7%</td>
</tr>
<tr>
<td>Other state agencies (i.e. Ohio Turnpike)</td>
<td>559</td>
<td>16</td>
<td>2.9%</td>
<td>204</td>
<td>36.5%</td>
</tr>
<tr>
<td>County</td>
<td>26,061</td>
<td>3,098</td>
<td>11.9%</td>
<td>2,838</td>
<td>10.9%</td>
</tr>
<tr>
<td>Municipalities and other local agencies</td>
<td>2,375</td>
<td>281</td>
<td>11.8%</td>
<td>212</td>
<td>8.9%</td>
</tr>
<tr>
<td>Railroads</td>
<td>714</td>
<td>17</td>
<td>2.4%</td>
<td>17</td>
<td>2.4%</td>
</tr>
<tr>
<td>Other</td>
<td>535</td>
<td>40</td>
<td>7.5%</td>
<td>26</td>
<td>4.9%</td>
</tr>
<tr>
<td><strong>Total in Ohio</strong></td>
<td><strong>44,245</strong></td>
<td><strong>4,213</strong></td>
<td><strong>9.5%</strong></td>
<td><strong>5,081</strong></td>
<td><strong>11.5%</strong></td>
</tr>
</tbody>
</table>

Table 1.

### Deck Area, in millions of square feet (MSF), of Ohio Bridges by maintenance classification and percent Structurally Deficient (SD) or Functionally Obsolete (FO)

<table>
<thead>
<tr>
<th>Maintenance Responsibility</th>
<th>Total Deck Area (MSF)</th>
<th>Deck Area SD (MSF)</th>
<th>Percent SD</th>
<th>Deck Area FO (MSF)</th>
<th>Percent FO</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOT</td>
<td>103.39</td>
<td>6.04</td>
<td>5.8%</td>
<td>23.50</td>
<td>22.7%</td>
</tr>
<tr>
<td>Other state agencies (i.e. Ohio Turnpike)</td>
<td>6.04</td>
<td>0.12</td>
<td>2.0%</td>
<td>1.64</td>
<td>27.2%</td>
</tr>
<tr>
<td>County</td>
<td>31.85</td>
<td>3.76</td>
<td>11.8%</td>
<td>2.93</td>
<td>9.2%</td>
</tr>
<tr>
<td>Municipalities and other local agencies</td>
<td>7.15</td>
<td>1.15</td>
<td>16.1%</td>
<td>1.31</td>
<td>18.3%</td>
</tr>
<tr>
<td>Railroads</td>
<td>4.06</td>
<td>0.09</td>
<td>2.2%</td>
<td>0.06</td>
<td>1.5%</td>
</tr>
<tr>
<td>Other</td>
<td>1.54</td>
<td>0.10</td>
<td>6.5%</td>
<td>0.50</td>
<td>32.5%</td>
</tr>
<tr>
<td><strong>Total in Ohio</strong></td>
<td><strong>154.03</strong></td>
<td><strong>11.26</strong></td>
<td><strong>7.3%</strong></td>
<td><strong>29.94</strong></td>
<td><strong>19.4%</strong></td>
</tr>
</tbody>
</table>

Table 2.
From tables 1 and 2, the number of bridges listed as SD or FO is 21.0% based on number of bridges and 26.7% based on deck area. The biggest deficiency for the bridges maintained by ODOT is the percent of deck area for bridges classified as FO, 22.7%. The challenge for counties, who maintain almost 60% of the bridges in Ohio by number, is the high percentage of SD and FO bridges by number and deck area.

As stated earlier, a bridge classified as either SD or FO does not necessarily indicate a safety concern. The state uses the annual inspection by a professional engineer that results in the GA to assess the condition of the bridge. Bridges are given a GA rating from “9”, excellent condition, to “0”, failed condition. A “6" rating, satisfactory condition, indicates that structural elements are showing signs of minor deterioration. A “4" rating, poor condition, indicates advanced deterioration and section loss of structural elements. A rating of “4" or less is classified as SD if the bridge carries highway traffic.

### Table 3.

<table>
<thead>
<tr>
<th>Maintenance Responsibility</th>
<th>GA &lt;= &quot;4&quot; Total</th>
<th>Deck Area (MSF)</th>
<th>GA &quot;5&quot; or &quot;6&quot; and FO Total</th>
<th>Deck Area (MSF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOT</td>
<td>565</td>
<td>3.13</td>
<td>1,057</td>
<td>14.99</td>
</tr>
<tr>
<td>Other state agencies (i.e. Ohio Turnpike)</td>
<td>7</td>
<td>0.05</td>
<td>139</td>
<td>1.11</td>
</tr>
<tr>
<td>County</td>
<td>2,854</td>
<td>3.45</td>
<td>2,034</td>
<td>1.75</td>
</tr>
<tr>
<td>Municipalities and other local agencies</td>
<td>287</td>
<td>1.31</td>
<td>115</td>
<td>0.49</td>
</tr>
<tr>
<td>Railroads</td>
<td>184</td>
<td>0.94</td>
<td>12</td>
<td>0.03</td>
</tr>
<tr>
<td>Other</td>
<td>50</td>
<td>0.12</td>
<td>15</td>
<td>0.42</td>
</tr>
<tr>
<td><strong>Total in Ohio</strong></td>
<td><strong>3,947</strong></td>
<td><strong>9.00</strong></td>
<td><strong>3,372</strong></td>
<td><strong>18.79</strong></td>
</tr>
<tr>
<td><strong>Percent of Total in Ohio</strong></td>
<td><strong>8.9%</strong></td>
<td><strong>5.8%</strong></td>
<td><strong>7.6%</strong></td>
<td><strong>12.2%</strong></td>
</tr>
</tbody>
</table>

Table 3 lists bridges by number and deck area that are classified as having a GA of “4” or less and those with a GA of “5” or “6” and that are rated as FO for each of the agencies with primary maintenance responsibility. The information in this table eliminates all of the FO bridges with a GA of “7”, good condition or higher, and focuses more on bridges that would receive a higher probability of being programmed for replacement or rehabilitation. If you assume that bridges that are SD or have a GA of “5” or “6” and are FO should be programmed for replacement or rehabilitation, the percentages are 17.1% (9.5% Table 1 and 7.6% Table 3) for number of bridges and 19.5% (7.3% Table 2 and 12.2% Table 3) for deck area.

One final piece of information to consider is the sufficiency rating (SF) of a bridge. This is important because for any agency to receive federal funding for a project, a bridge has to meet certain criteria for replacement (SF<50 and SD or FO) or rehabilitation (SF< 80 and SD or FO). Sufficiency ratings can range from a high of 100% to a low of 0%. The sufficiency rating is calculated based on numerous factors, which include the general condition of the bridge, the geometrics of a bridge and other elements. States are required to submit annually to the Federal Highway Administration all required information based on general condition and
inventory. The FHWA then uses this number to determine the sufficiency rating. This rating does not necessarily indicate that a bridge cannot support certain loading conditions. Table 4 lists the number of bridges based on SF ranges:

<table>
<thead>
<tr>
<th>Maintenance Responsibility</th>
<th>SF &lt; 50</th>
<th>50 &lt;= SF &lt; 80</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODOT</td>
<td>300</td>
<td>3,319</td>
</tr>
<tr>
<td>Other state agencies (i.e. Ohio Turnpike)</td>
<td>10</td>
<td>229</td>
</tr>
<tr>
<td>County</td>
<td>2,631</td>
<td>6,543</td>
</tr>
<tr>
<td>Municipalities and other local agencies</td>
<td>170</td>
<td>559</td>
</tr>
<tr>
<td><strong>Total in Ohio</strong></td>
<td><strong>3,111</strong></td>
<td><strong>10,650</strong></td>
</tr>
</tbody>
</table>

* Does not include railroads or other agencies

Table 4.

Many counties and local agencies do not have the manpower to perform the annual inspections and load ratings that are mandated by the state. As a result, they are forced to hire consultants to help them meet these requirements. This takes away valuable funds from their capital improvement programs (CIP) which could be used to replace or repair deficient bridges.

With project costs continuing to rise, more and more agencies are applying for funding. Most of the time, to receive federal funds requires the local agency to provide a 20% match of the funds received. For every $1 million in federal funds received for a project, a county would have to match it with $200,000 in local funds. For many smaller counties and municipalities, 20% of the project cost could exceed their entire CIP budget for the year. In addition, the process to assemble bid documents is very costly in terms of effort and time. This results in higher fees for right of way acquisition and design fees by consultants. Many agencies cannot afford to apply for federal aid. The County Local Bridge Program (LBP), Highway Safety Improvement Program, County Surface Transportation Program (STP), Regional Planning Commission Bridge Programs, and Ohio Public Works Commission (OPWC) Programs are a few other sources for agencies to acquire funding. When applying for federal funds, most projects are scheduled for five years out or more. Since a bridge has to have a lower SF rating and be defined as SD and FO to qualify for federal funding, agencies are left with the often expensive task of maintaining these structures in the interim.

According to the County Engineers Association of Ohio, Ohio has one of the lowest base license plate fees in the country that has not been adjusted for decades. This is an important source of revenue for counties and municipalities.

According to information in an ODOT report, only 6.2% of local bridges, which include counties and municipalities, with a GA of “4” or less, have programmed federal aid through 2013. The amount of funding programmed for federal aid through 2013 is $208.3 million.

ODOT has budgeted $1.4 billion each year in 2010 and 2011 on all construction projects. This includes repairs and replacements of roads and bridges.
The 88 county engineer budgets in Ohio range from $2.5 to $40 million each year. The county budgets include all costs associated with personnel, maintenance, administration, and construction of roadways and bridges.

While counties have a majority of the maintained bridges in Ohio, ODOT has over 66% of the total deck area to maintain in the entire state. This means that ODOT maintains the large majority of bridges considered “Major, High Cost”. These are bridges at least 1000 feet long, have a deck area over 81,000 square feet, or are a suspension or draw-type bridge. Currently only 38% of “Major, High Cost” bridges with a GA less than “4” that ODOT maintains are programmed for replacement or rehabilitation. Current projects that are challenging ODOT’s budget include the I-90 Cleveland Central Viaduct, the I-71/I-75 Brent Spence Bridge in Cincinnati, and the Ironton-Russell Bridge over the Ohio River.

- ODOT has recently reduced the number of traffic-carrying lanes on the I-90 Cleveland Central Viaduct Bridge and re-routed truck traffic through the city. The addition of a new westbound span, the first step in the viaduct replacement, is estimated to cost approximately $400 million.
- The Brent Spence Bridge over the Ohio River in Cincinnati is a crucial Interstate link where I-75 and I-71 convene. The bridge is classified as FO. Construction costs for all the necessary work to reconstruct the bridge and approach work were estimated at $1.2 to $1.8 billion in 2008 dollars. Work is not expected to begin until 2015, which means costs could increase by an estimated 50-60%.
- The Ironton-Russell Bridge was recently bid for replacement. The low bid was $110 million, which far exceeded the budgeted amount. Bids were rejected and the project will be reprogrammed for 2014.

Policy Options

Ohio’s economic future depends on maintaining and improving its aging transportation infrastructure. Sources, such as SAFETEA-LU, Federal Highway Trust Fund, OPWC, STP, and LBP, are critical in providing funding for state, county, and local agencies. Ohio’s elected officials at all levels must constantly look for ways to fund and improve one of the largest highway networks and bridge inventories in the country. Government transportation agencies should focus their attention on replacing all of their structurally deficient and most critical functionally obsolete bridges. Many transportation departments, however, are left with the challenge to maintain their existing bridges while trying to balance budgets based on existing funding levels for all of their expenditures.
Specific ASCE Ohio Council Recommendations

- Increase funding levels for federal aid programs, such as the Local Bridge Program, Highway Safety Improvement Program, Surface Transportation Programs, and Regional Planning Commission Programs
- Congress must enact the National Highway Bridge Reconstruction and Inspection Act
- Increase funding for "Major, High Cost" bridges
- Allow counties to increase their permissive license plate fees, which have not been adjusted for decades
- Support environmental streamlining of transportation projects
- Increase funding for long-term fundamental highway research efforts at the national level
- Provide funding sources to assist local agencies in performing annual bridge inspections
- Encourage the use of life-cycle cost analysis principles to evaluate the total cost of projects

Sources


2 Ohio Department of Transportation, *Ohio’s Road and Bridge Infrastructure, A Report on Conditions, Condition Trends and Funding Requirements*, September 1, 2007

3 Federal Highway Administration, Code of Federal Regulations [23 CFR 605.305]

4 Federal Highway Administration, Code of Federal Regulations [23 CFR 605.311]

5 Ohio Revised Code, Section 5501.47

6 Ohio Revised Code, Sections 5501.47, 5543.20 and 723.54


8 County Engineers Association of Ohio, *Legislative Program for the 127th Ohio General Assembly*, 2008

9 Ohio Department of Transportation, *Bridge Management System Data*, updated February 9, 2009

10 Ohio Department of Transportation, Testimony on the 2010-2011 State Transportation Budget, February 12, 2009

11 Brent Spence Rehabilitation Project Website, [www.brentspencebridgecorridor.com](http://www.brentspencebridgecorridor.com)
Dams

There are more than 2,600 dams in the State of Ohio. The Ohio Department of Natural Resources, Division of Water, Dam Safety Section is responsible for inspection of Ohio’s dams. Of the Ohio Dam Safety regulated dams, 33% are deficient. Nearly 70% of Ohio dams are privately owned. The 2007 Dam Safety Section budget was $1,353,000, an average of $847 per regulated dam, which ranked 26th in funding out of the 50 States. Dam Safety Section staffing has been reduced by 15% since 2007 due to budgetary constraints. Staff work load has increased to approximately 150 dams per full time equivalent (FTE) staff member. By comparison, the national average in 2007 was 202 dams per FTE staff member. It is estimated that the repair cost for Ohio’s deficient dams is nearly $300 million.

Background

Dams provide tremendous benefits, including water supply for drinking, irrigation, and industrial uses, flood control, hydroelectric power, recreation, and navigation. However, dams also represent one of the greatest risks to public safety, local and regional economies, and the environment. Historically, some of the largest disasters in the United States have resulted from dam failures. One early and well-known disaster was the failure of the South Fork Dam above Johnstown, Pennsylvania in 1889, which killed more than 2,200 people. In the next 110 years, 284 dams failed and 1,340 lives were lost. Since 2000, more than 45 dam failures have been documented throughout the U.S., including the Kaloko Dam in Kauai, Hawaii, which killed seven people.1 These are recent reminders of the potential consequences of unsafe dams.

Dams in Ohio, with the exception of federally owned dams, are subject to regulations administered through the Ohio Dam Safety Program in the Ohio Department of Natural Resources (ODNR), Division of Water. The approximate ownership breakdown of dams in Ohio is 2% federal government, 7% state government, 23% local government, and 68% private (individuals, groups, companies, etc.).2 There were 1,597 state-regulated dams in Ohio in 2007. Of that total, 375 are classified as High Hazard Class I dams whose failure would result in probable loss of human life or collapse of at least one residence or commercial/industrial
building, 543 are classified as Significant Hazard Class II dams whose failure would disrupt a public water supply or wastewater treatment facility, or damage major roads or the only access to critical facilities such as hospitals, and 679 are classified as Low Hazard Class III dams whose failure effects would be limited to rural buildings or local roads. There are nearly 1,000 additional Class IV dams included in the ODNR inventory of Ohio dams that are exempt from the regulatory requirements affecting Class I, II, and III dams because their failure would only result in property damage to rural lands and the dam itself.

An unknown number of dams for coal mining ponds are regulated by the Ohio Department of Natural Resources, Division of Mineral Resources Management (DMRM). At the time of this report it could not be determined how many dams are permitted or their hazard class. Based on information from the DMRM, it is understood that most of these dams are small (less than 20 feet in height) and are usually decommissioned (usually removed) after the mining permit has expired. Of those dams that have not been removed, jurisdiction is transferred to the Dam Safety Section.

**Ohio Dams Facts and Issues**

Like all man-made structures, dams deteriorate. Deferred maintenance accelerates deterioration and causes dams to be more susceptible to failure. As with other critical infrastructure, a significant investment is essential to maintain the benefits and assure the safety that society requires. To provide safe, continuing service, dams also require ongoing monitoring, frequent safety inspections, and rehabilitation. Aging dams often require major rehabilitation to assure their safety. Downstream development in areas below dams is increasing dramatically. New findings from scientific research of dam failure mechanisms, such as major flood events or earthquakes, frequently demand repairs to dams constructed decades before such scientific research was first conceptualized.

One-third (524 dams) of the state-regulated dams in Ohio have some deficiencies, based on 2007 data tabulated by the Association of State Dam Safety Officials (ASDSO) for all state dam safety programs. This is significantly greater than the national average of 5%, ranking in the top quartile as shown by the thumbnail bar graph in Figure 2.

In 2008, ODNR prepared a Condition Rating for all their High Hazard Class I dams, as requested by the US Army Corps of Engineers for the National Inventory of Dams (NID). The Condition Ratings provide a quantitative basis for assigning an overall grade to dams in this report. Approximately 8% of the Class I dams were not given a rating, typically because they had not been inspected recently. Of the 342 dams that were rated, 1% was considered Unsatisfactory, 33% Poor, 26% Fair, and 40% Satisfactory. For this report card, dams that were rated Unsatisfactory and Poor were considered to represent those with deficiencies (34%), which compares very well with the 2007 statistics that had near uniform deficiency percentages for Class I, II, and III dams (31%, 33% and 33%, respectively).
To compute an overall grade for dams in Ohio, a common four-point scale was used as follows: Unsatisfactory rating = F = 0.0 points, Poor rating = D = 1.0, Fair rating = C = 2.0, and Satisfactory rating = B = 3.0. While there are certainly some dams in Ohio that are in full compliance with all the ODNR requirements, there were no provisions in the NID Condition Rating Guidance for a rating that could be considered an A. The resulting composite score for the condition of state regulated dams in Ohio is a grade point average of 2.05, or a C.

No detailed estimate of the cost to rectify the deficiencies at all 524 state-regulated dams rated as deficient is available. There was a general estimate made in 2008, using 2004 data, of almost $88 million for repairs to 240 high hazard public dams in Ohio.\(^2\) Using the U.S. Army Corps of Engineer’s cost indices,\(^6\) trending that cost to 2009 and prorating it to all 524 dams gives an approximate estimate of $236 million. Another approximation of $309 million for the 524 deficient dams was made this year by using some of the general methodologies established in ASDSO’s October 2003 report *The Cost of Rehabilitating our Nations Dams.*\(^7\) It is estimated that some 22% of that amount, or $68 million, is necessary just for rehabilitation of the 117 deficient Class I dams.

There are very few funding assistance programs specifically for dams in Ohio. Dams owned by state and local government bodies may need specific funding for repairs or rehabilitation from the Legislature as has sometimes occurred in the past. Similarly, privately owned dams may have to rely on below-market loans through the Ohio Water Development Authority’s Dam Safety Linked Deposit Program. New funding initiatives are needed.

Ohio inspected 40% of its High Hazard Class I dams in 2007, in a focused effort to inspect the largest, most important dams. Similar focus on those dams has resulted in 43% of them now having Emergency Action Plans, a key measure in reducing the risk to the public. According to ASDSO\(^4\), the percentage of deficient regulated dams decreased from 49% in 2006 to 33% in 2007. Similarly the percentage of deficient high hazard dams decreased from 38% in 2006 to 31% in 2007.
Policy Options

Sufficient funding is needed to continue monitoring the condition of state-regulated dams to assure dam safety. Given Dam Safety Section budget decreases since 2007 and the current economic conditions in Ohio, it is doubtful that any state budget increase will be made in the near future. In January 2009, the Federal Emergency Management Agency did budget $10 million for the National Dam Safety Program, the source of federal funding assistance to state dam safety programs. This action also represents a decrease in funding for the ODNR Dam Safety Section, as it is not the full authorized level of $11.7 million for FY09.

Federal funding is also needed for the rehabilitation of dams, especially high hazard dams. The Dam Repair and Rehabilitation Act of 2009 was introduced in both the House and Senate on March 26, 2009. This bill would establish a program through the Federal Emergency Management Agency (FEMA) to provide grant assistance for the rehabilitation and repair of deficient state and locally owned high hazard dams. It would provide up to $200 million over five years to address deficiencies at the nation’s publically-owned, non-federal dams. Grant funds would be distributed through state dam safety agencies based on the number of high hazard publically-owned, non-federal dams in the state. This process should presumably benefit Ohio, which has 3.2 times the national average of deficient high hazard dams. This bill is endorsed by ASCE and ASDSO.

Unlike highways and other infrastructure, the general public doesn’t directly “use” a dam. Rather, the public uses the drinking water or recreational lake and shoreline made possible by a dam, or benefits from the flood protection or low cost energy provided by a dam. In many cases, the beneficiary of a dam may not even be aware of the presence of a dam or its complexity. As a result of the low public awareness of dams, the demand or “outcry” for dam rehabilitation is often limited until failure of such a facility puts the disaster into the headlines.

The result of dam inspections made by the Dam Safety Section is a written report, which contains a section entitled “required” repairs. If deficiencies are serious enough, the state has the power to enforce repairs. Ohio Revised Code 1521.062 provides enforcement authority against any deficiency, but does not stipulate how serious the deficiency has to be. The threat of enforcement/fines appears to be the most likely mechanism that results in the owner making necessary repairs to a dam.

Specific ASCE Ohio Council Recommendations

Since 1998, ASCE has issued report cards on the condition of America’s infrastructure, and America’s dams have consistently received a grade of D. The 2009 Report Card for America’s Infrastructure noted that nationally the number of deficient dams has risen to more than 4,000, including 1,819 high hazard dams, and that over the past six years, for every deficient high hazard dam repaired, nearly two more have been declared deficient. 8
The 2009 Report Card for America's Infrastructure identified five “Key Solutions” to help the country achieve higher grades. While directed at the nation's infrastructure as a whole, the “Key Solutions” are also applicable to dams, and may be summarized as follows:

- Increase Federal Leadership in Infrastructure – There needs to be a renewed involvement at the federal level with our critical infrastructure including dams. We need a national vision and strong federal leadership to be shared at all levels of government and private owners.
- Promote Sustainability and Resilience – America’s infrastructure must be able to meet the current and future needs of the nation while protecting and improving the environment. Both structural and non-structural methods need to be used to promote sustainability. Research and development should be funded at the federal level to develop new materials and more efficient methods for the construction and rehabilitation of the nation’s infrastructure.
- Develop Federal, Regional, and State Infrastructure Plans – Well conceived plans are needed to prioritize infrastructure investment to focus funding to solve the most pressing problems.
- Address Life-Cycle Costs and Ongoing Maintenance – Owners of infrastructure should perform life-cycle cost analysis, on-going maintenance, and planned renewal to provide more sustainable and resilient infrastructure.
- Increase and Improve Infrastructure Investment from All Stakeholders – There must be a renewed commitment to infrastructure investment by all levels of government, owners, and users of infrastructure. Significant funds will need to be invested to provide sustainable development and ongoing maintenance, and all available funding options need to be explored and debated.

Ohio can support ASCE’s “Key Solutions” by a variety of programs currently in place. This support should include:

- Continuing to offer low interest loans for dam repair through the Ohio Water Development Authority. In keeping with the American Recovery and Reinvestment Act of 2009, offer zero percent loans for dam rehabilitation.
- Promoting and supporting federal legislation to provide grants to Ohio’s Dam Safety programs. These grants are particularly needed to offset reduced state budgets.
- Supporting passage of the Dam Rehabilitation and Repair Act of 2009 to provide federal funds to correct deficiencies at non-federal publicly owned dams.
- Continuing to enforce the implementation of repairs to severely deficient dams. Strengthen state rules to provide greater enforcement of “required” repairs.
Sources

1 Association of State Dam Safety Officials (ASDSO), *State and Federal Oversight of Dam Safety Must Be Improved*, news media document, November 2008

2 ASDSO, *Dam Safety in Ohio*, fact sheet, 2008

3 Ohio Department of Natural Resources (ODNR), Division of Mineral Resources Management, telephone discussion, March 19, 2009

5 ODNR, *2008 Jurisdictional Dams by Classification with Class I Condition Ratings*


7 ASDSO, *The Cost of Rehabilitating our Nations Dams*, October 2003

8 American Society of Civil Engineers (ASCE), *2009 Report Card for America’s Infrastructure*, January, 2009

The following additional sources provided additional information for this section of the Dams section in this report card:


11 ASCE Akron-Canton Section, *2005 Infrastructure Report (Portage, Stark, and Summit County Governmental Entities)*, 2005

12 ASCE, *Failing Infrastructure Cannot Support a Healthy Economy*, news release, January 28, 2009
Drinking Water

Approximately 90% of Ohioans receive water used for bathing, cooking, and drinking from a public water system. There are more than 6,000 public water systems in Ohio. Much of the burden on funding for public water supply systems is borne by local government, estimated to be 99% local versus state funded during the period 1991-2005. It is estimated that Ohio has $9.86 billion in drinking water infrastructure needs.¹

Background

Water is a fundamental requirement to support human life. The need to have a source of clean drinking water influenced the early development of the country with population centers forming around sources of water. As the capability to supply water to expanding, urban areas improved, population centers grew larger and, in some cases, moved away from the source of water that supported human life. Today, although private wells and other means of supplying potable water still support a significant portion of the population, there are nearly 53,000 community water systems supplying the nation’s population with the water it needs every day.¹

Public water supply systems generally have two major components, the water supply and the system to treat and deliver water for daily use to the customer. This section of the report will primarily address the public water supply infrastructure needed to convey, treat, and deliver water. Included are water source facilities such as water intake structures, deep wells, spring water collectors, aqueducts and canals, and raw water pumping stations. Also included are the water treatment facilities, pipes, pumping stations, and other infrastructure (e.g. metering, testing, administration) needed by the public water supply system. Excluded are private systems, such as individual homeowner’s wells, and systems not attached to a public water supply system. Also excluded are surface waters, including reservoirs. Surface waters are addressed in the Wastewater section of the report. The section on Dams presents information applicable to water supply, when a dam provides the means to store water for the supply.

ASCE, in the 2009 Report Card for America's Infrastructure, states that drinking water systems provide a critical public health function and are essential to life, economic development, and growth. Disruptions in service can hinder disaster response and recovery efforts, expose the public to water-borne contaminants, and cause damage to roadways, structures, and other infrastructure, endangering lives and resulting in billions of dollars in losses. ASCE indicates that several organizations have released estimates of funding shortfalls on a national basis associated with the operation, maintenance, repair, upgrade, and/or construction of new water supply systems to meet current and projected demand. These statistics are useful in understanding the magnitude of the shortfalls and the difficulty in addressing infrastructure issues nationally and in Ohio.¹

In 2002, the U.S. Environmental Protection Agency (EPA) issued The Clean Water and Drinking Water Infrastructure Gap Analysis, which addressed whether or not there was a quantifiable gap between current levels of spending and projected clean water investment needs. The report estimated needed capital investments and operations and maintenance costs over the period 2000-2019 and identified potential funding gaps between projected needs and spending. The EPA indicated that uncertainty in the methods and assumptions used to generate the estimates warranted the presentation of a lowermost and uppermost extreme. The EPA also included a
point estimate that is an average of each possible combination of assumptions. Estimates of capital needs for drinking water investments ranged from $154 billion to $446 billion with a point estimate of $274 billion. Estimates for the capital needs gap for drinking water ranged from $0 billion to $267 billion with point estimates ranging from $45 billion to $102 billion, depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap. The EPA estimated the operations and maintenance gap for drinking water to be between $0 billion and $495 billion with point estimates ranging from $0 billion to $161 billion, depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap. 

Also in 2002, in response to a joint request from the 106th Congress, the Congressional Budget Office (CBO) reported that an annual investment estimated as between $11.6 billion and $20.1 billion would be needed for drinking water systems during the period from 2000-2019. The CBO also estimated that annual operations and maintenance costs during the same period, which are not eligible for federal aid under current programs, would average between $25.7 billion and $31.8 billion for drinking water systems. The CBO presented estimates in a range over what they consider to be the most likely possibilities based on low-cost and high-cost scenarios. They indicate that this is necessary because of the large uncertainty in the estimates of future costs.

ASCE estimates that, although America spends billions on infrastructure each year, drinking water systems face an annual shortfall of at least $11 billion in funding needed to replace aging facilities that are near the end of their useful life and to comply with existing and future federal water regulations. This does not account for growth in the demand for drinking water over the next 20 years. The aging infrastructure also contributes to the cost of operating and maintaining the systems. Leaking pipes lose an estimated 7 billion gallons of clean drinking water a day, placing an additional burden on the treatment and pumping facilities over what is required to satisfy public demand.

Although there are large variations in the estimates, it is apparent that the operations, maintenance, and capital investments in water supply systems are not keeping up with the decaying infrastructure and the increasing demand on these facilities. This is despite significant investments being made by local, state, and federal government.

Of the nearly 53,000 community water systems in the country, approximately 83% serve 3,300 or fewer people. These systems provide water to just 9% of the total U.S. population served by all community systems. In contrast, 8% of community water systems serve more than 10,000 people and provide water to 81% of the population served. All these systems face financial, technological, and managerial challenges in meeting a growing number of federal drinking-water regulations.

Much of the burden on funding for municipal water supply systems is borne by local government. The United States Conference of Mayors in a 2007 report cites statistics obtained from the U.S. Bureau of Census that indicate that the local government share of funding spent on water supply is over 99%. Table 1 presents Census Bureau data for the fiscal years 1991-1992 through 2004-2005 which compares the local government expenditures to the state expenditures.
Table 1. Local and State Water Supply Expenditures

The Census Bureau data indicate that local government spending has increased approximately 85% over the 14 years presented in Table 1, with a consistent trend of increased spending per year. State spending over this period also increased, but did not follow the consistent trend in local government spending. With the exception of the 2003-2004 fiscal year, the percent of local spending versus state spending exceeded 99% in all fiscal years. Despite the increased spending by local governments, the national statistics cited above indicate that additional operations, maintenance, and capital investment is required.

Ohio Drinking Water Facts and Issues

Approximately 90% of Ohioans receive water used for bathing, cooking, and drinking from a public water system. There are more than 6,000 public water systems in Ohio. The public water systems range from large-community systems, like the city of Cleveland’s, to non-transient non-community systems, such as schools and factories, to transient non-community systems such as campgrounds. While most of Ohio’s population is served by a relatively small number of large systems, most of the problems encountered and the work that must be done is for the medium and small systems.5

Nearly 800 schools serving nearly 170,000 people have their own water supply and are regulated by the Ohio Environmental Protection Agency (OEPA) as a public water system. Ensuring safe drinking water for students attending these schools, as well as students attending schools connected to community public water systems, is fundamental to ensuring a high quality education.5

As important as public water systems are to the quality of drinking water and therefore public health, the majority of water produced by public water systems is used by businesses and for
fire protection. Properly designed public water systems, including the distribution system, are essential to ensure adequate supplies of water are available for fire fighting. Ohio businesses need adequate supplies of good quality water for processing, cooling, and product manufacturing. The availability of adequate supplies of water is often a critical factor in attracting new industry to Ohio.\(^5\)

The OEPA, Division of Drinking and Ground Water (DDAGW) website provides information about programs administered in the state and gives useful information about current status and future plans. The DDAWG estimates that drinking water stimulus project funds will total approximately $58.5 million under the federal American Recovery and Reinvestment Act. As of April, 2009, OEPA has received project funding requests for 1,400 projects for a total of $3 billion through the www.recovery.ohio.gov Website.\(^5\)

The DDAWG administers the Ohio Drinking Water Assistance Fund (DWAF). Through grants from the EPA and matching funds provided by OEPA, the state is establishing financial and technical assistance programs under the DWAF to help Ohioans improve their drinking water systems. The main purpose of the DWAF is to provide financial assistance to eligible public water systems to attain and maintain their system. The primary sources of funds available during 2009 will come from capitalization grants and bonds.\(^6\)

The DDAWG has listed several short- and long-term goals for the DWAF. The short-term DWAF program goals are to continue the environmental assistance and disadvantaged community programs; provide opportunities for meaningful public involvement in the DWAF; promote the fund as an effective means to provide financial assistance to systems developing capital improvements projects to address new regulations; develop and implement sustainable infrastructure and planning initiatives for public water systems during 2009 and 2010; and award interest rate incentives for drinking water projects that include a conversion from gaseous chlorine to another acceptable, safe alternative, such as sodium hypochlorite during 2009 and 2010.\(^6\)

The long-term DWAF program goals are to maximize below-market rate loans to eligible public water systems to fund improvements to eliminate public health threats and ensure compliance with federal and state drinking water laws and regulations; provide technical assistance to public water systems serving less than 10,000 in population; provide financial assistance for completing source water and wellhead protection assessments to promote locally developed source water protection plans; improve the types and quantity of small and disadvantaged community assistance to reduce the financial impact of capital improvements projects on smaller systems and systems serving less affluent populations; promote the development of the technical, managerial, and financial capability of public water systems to maintain compliance with state and federal requirements and Ohio’s Capability Assurance Program; fund the construction of extensions to public water systems, or if extensions are not economically feasible, the construction of new public water systems to address areas of contaminated private water systems; and encourage the consolidation and/or regionalization of small public water systems so they may take advantage of economies of scale available to larger water systems.\(^6\)

Under the DWAF, the OEPA will continue development of sustainable infrastructure and planning initiatives for public water systems receiving a loan from the Water Supply Revolving Loan Account (WSRLA). Projects totaling approximately $190 million have submitted a pre-application to receive funds during 2009 through the WSRLA. Given past history, an average of
23% of projects that submitted pre-applications eventually apply for and receive loan funds. Therefore, the $120 million being made available should be sufficient to fund all projects requesting loan funds for this program year.\(^6\)

The DDAWG also administers the Ohio Capability Assurance Program (CAP). The CAP is designed to help public water systems improve their technical, managerial, and financial capabilities so they can provide safe drinking water consistently, reliably, and cost effectively. By enhancing system operations and ensuring the technical, managerial, and financial capacity of public water systems, Ohio can promote greater long term compliance with national primary drinking water regulations and public health protection for the citizens of Ohio.\(^7\)

For a system to have capacity, adequate capability is required in three distinct but interrelated areas: technical, managerial, and financial. Technical is the physical and operational ability of a water system to meet requirements, including the adequacy of physical infrastructure, technical knowledge and capability of personnel, and adequate source water. Managerial is the ability of a water system to conduct its affairs in a manner enabling the system to achieve and maintain compliance with requirements, including institutional and administrative capabilities, ownership accountability, staffing and organization. Financial is the ability of a water system to acquire and manage sufficient financial resources to allow the system to achieve and maintain compliance with requirements, including revenue sufficiency, credit worthiness, and fiscal management.\(^7\)

The Capability Assurance Strategy (CAS) for Ohio was approved by the EPA Region 5 Safe Drinking Water Branch on September 25, 2000. The primary objectives of the CAS are to:

- Identify and prioritize the public water systems most in need of improving technical, managerial, and financial capability
- Identify the institutional, regulatory, financial, tax or legal factors at the federal, state, or local level that encourage or impair capability assurance
- Use Ohio’s authorities and resources to assist public water systems in complying with national primary drinking water standards, encouraging the development of partnerships between public water systems to enhance the technical, managerial, and financial capacity of the systems, and assisting public water systems in the training and certification of operators
- Establish a baseline and measure improvements in capability with respect to national primary drinking water regulations and state drinking water law
- Identify persons that have an interest in and are involved in the development and implementation of the capability assurance strategy (including all appropriate agencies of federal, state, and local governments, private and nonprofit public water systems, and public water system customers) \(^7\)

Under Ohio’s CAS, all new public water systems must submit a capability assurance plan prior to approval and start-up of the system. A total of 20 plans were submitted and accepted for new systems from 2006 through 2008. In addition, capability assurance plans are required for existing systems applying for WSLRA planning, design and construction loans. Seventy-six systems received WSRLA loans in 2006 through 2008. All 76 systems had approved capability assurance plans.\(^7\)
Increasing costs to manage and operate water systems have made it increasingly difficult to maintain capable systems. Systems are mandated to make improvements due to new rules or public health issues, which result in high water rates. Unfortunately, some normal operations and maintenance items are delayed due to lack of funding, which can cause capability issues when system functions are not routinely maintained. With the downturn in the economy, rural systems have lost businesses, making it more difficult to operate and maintain their system with less user base and income received.

Systems are constantly trying to comply with new regulations. Over the past three years, the most notable rule changes affecting Ohio’s systems are arsenic, disinfection by-products, and long term enhanced surface water treatment rules. Often, the need for modifications results in undertaking a major capital improvement project to install new treatment equipment, build a new water treatment plant, or regionalize with another water system.

While Ohio continues to make strides by including additional methods to track and encourage capability assurance with existing water systems, the state lacks legislative authority to enforce system capability. Since Ohio lacks the authority to enforce capability assurance in existing systems that have issues, it is difficult for the state to prevent potential public health threats. OEPA has suggested language be added to the Ohio Revised Code to enhance OEPA’s authority to enforce capability assurance and prevent recognized public health threats. If the Revised Code language is added, rule language can be added to the Administrative Code giving OEPA the authority to require capability assurance measures at existing water systems.

Although Ohio, primarily through the OEPA, has made strides in developing programs to address public water system infrastructure, much remains to be accomplished. ASCE, in the 2009 Report Card for America’s Infrastructure, indicates that Ohio’s drinking water infrastructure needs an investment of $9.68 billion over the next 20 years. The fact that OEPA has received project funding requests for 1,400 projects for a total of $3 billion of stimulus funds underscores the immediate need for additional investment.

Policy Options

The CBO indicates that federal support for water system investment comes from several programs. In 1996, Congress enacted the clean water and drinking water State Revolving Funds (SRFs) under the Clean Water Act, which provide capitalization grants through appropriations to EPA, loan and grant programs of the Department of Agriculture’s Rural Utilities Service, and Community Development Block Grants administered by the Department of Housing and Urban Development. The federal government also supports water infrastructure through tax preference on municipal debt and qualified private activity bonds.

The SRF program authorizes the EPA to award annual capitalization grants to states. States then use their grants (plus a 20% state match) to provide loans and other assistance to public water systems. Communities repay loans into the fund, thus replenishing the fund and making resources available for projects in other communities. Eligible projects include installation and replacement of treatment facilities, distribution systems, and some storage facilities. Projects to replace aging infrastructure are eligible if they are needed to maintain compliance or to further public health protection goals.
ASCE indicates that federal funding under SRFs has remained flat for more than a decade, failing to keep pace with demand. Between 1997 and 2008, Congress appropriated approximately $9.5 billion for the SRF. This 11-year total is only slightly more than the annual capital investment gap for each of those years as calculated by the EPA in 2002.¹

Specific ASCE Ohio Council Recommendations

- Increase funding for water infrastructure system improvements and associated operations through a comprehensive federal program
- Create a Water Infrastructure Trust Fund to finance the national shortfall in funding of infrastructure systems under the Safe Drinking Act, including projects designed to improve the nation's water quality
- Retain traditional financing mechanisms, such as appropriations from general treasury funds, issuance of revenue bonds and tax exempt financing at state and local levels, public-private partnerships, state infrastructure banks, and user fees on certain consumer products
- Employ a range of financing mechanisms, such as appropriations from general treasury funds, issuance of revenue bonds and tax exempt financing at state and local levels, public-private partnerships, state infrastructure banks, and user fees on certain consumer products, as well as innovative financing mechanisms, including broad-based environmental restoration taxes to address problems associated with water pollution, wastewater management and treatment, and storm water management

Sources

¹ American Society of Civil Engineers, 2009 Report Card for America’s Infrastructure, January, 2009


⁵ Ohio Environmental Protection Agency, Division of Drinking and Ground Water Website, [http://www.epa.state.oh.us/ddaqw/](http://www.epa.state.oh.us/ddaqw/)

⁶ Ohio Environmental Protection Agency, Division of Drinking and Ground Water Website, Drinking Water Assistance Fund Fact Sheet, April, 2008, [http://www.epa.state.oh.us/ddaqw/](http://www.epa.state.oh.us/ddaqw/)

⁷ Ohio Environmental Protection Agency, Division of Drinking and Ground Water Website, Capability Assurance Strategy Triennial Report to the Governor, September 23, 2008, [http://www.epa.state.oh.us/ddaqw/](http://www.epa.state.oh.us/ddaqw/)
Electricity

The electric generation, transmission and distribution systems in Ohio are satisfactory to meet current needs in the state, reliability problems are relatively few, and those that exist are being addressed by system improvements in equipment and management. However, mandates related to alternative energy and environmental protection may pose problems for Ohio’s electric utilities in the coming years. Electricity in Ohio is provided by several investor-owned utility companies, Rural Electric Cooperatives, and municipally-owned electric systems. The physical system is composed of generation, transmission, and distribution components.

Electricity usage in Ohio was relatively stable during the period from 1995-2005, which followed a 15-year period of significant growth in usage. Transmission and distribution outages have been cause for concern in Ohio due to weather-related disruptions of the transmission and distribution system. Recent experience may warrant review of design standards. In 2008, the Ohio legislature passed a bill that requires that 12.5% of energy be from alternative energy sources (including renewable, conservation and clean thermal) by 2024. Of this amount, half must be from renewable sources, such as wind, hydro, solid waste, and solar.

Background

Ohio is served by several electric utility systems that are interconnected and exchange and purchase electricity from each other in various ways. Major investor-owned utilities are: American Electric Power (AEP – Ohio Power and Columbus Southern) serving approximately 1.4 million of the state’s customers, mostly in central and southeast Ohio; First Energy (FE) in northern Ohio serving approximately 2.2 million customers; Duke Energy in southwest Ohio serving approximately 650,000 customers; and Dayton Power and Light (DPL) in the Dayton area serving approximately 500,000 customers. Some rural areas are served by Rural Electric Cooperatives under the statewide Buckeye Power Cooperative (BPC), and over 80 cities are served by municipally-owned electric systems. All of the investor-owned utilities have their own generation facilities, primarily coal-fired power plants. There are two nuclear plants in Ohio in the FE system, several smaller gas-fired generators, as well as one hydropower plant in the AEP system. Three of the systems, AEP, FE, and Duke, have major additional generation facilities outside of Ohio. The municipalities buy a substantial portion of supply from the investor-owned utilities in Ohio or from outside the state, but these municipal systems have recently increased their generation capacity through an association, American Municipal Power – Ohio (AMP-OH). This municipal-based system includes coal, gas and hydroelectric power plants that are owned in shared-ownership arrangements through AMP-OH. In addition, some 20 municipalities have their own generating facilities. The municipal and rural co-op system rates are not regulated by the Public Utility Commission of Ohio (PUCO), but the state does have authority over their construction of new generation facilities. The rural co-ops and municipals each serve between 5 and 10% of the state’s total customers. Table 1 shows the total capacities of plants in Ohio owned by the various generating entities, with broad categories of generation technologies.\(^1\,^2\)
Table 1. Utility System Generating Capacity in Ohio - January, 2009

Table 2 shows the percentage in each type of generation for Ohio electric utilities.

Table 2. Utility System Generating Percentage by Type - January, 2009
Ohio Electricity Facts and Issues

The physical system is divided into generation, transmission, and distribution for regulatory and planning purposes. Ohio has gone through a process of revising its electric rate regulation system over the past several years, first establishing a program to go to an unregulated (or less-regulated) rate system in the 1990s, then, when Senate Bill 221 (SB 221) passed in 2008, moving to options for utilities to use either a regulated or a market approach in setting rates. Standards for reliability are separate from the rate regulation.

Ohio is involved with two Regional Transmission Organizations (RTOs); the Pennsylvania-New Jersey-Maryland (PJM) system, which includes AEP and DPL, and the Midwest Independent System Operator (ISO), which includes the other utilities in Ohio.

Electricity use in Ohio has been relatively stable in recent years, falling in the range of 150,000 to 165,000 million KWH per year, from 1995 to 2005. There was significant growth in usage from 1980 to 1995 (about 37% total growth over the 15 year period, or about 2.1% per year), but there is no indication of when or if such growth might resume in the future, given the decade of no-growth since the mid-90s. These data do not imply a near-term need for added generation capacity.

Usage by customer sector is fairly evenly divided, with 29% commercial, 37% industrial, and 34% residential. The industrial sector has been a lagging market due to reduced industrial production in Ohio in recent years.

Generation facilities are typically classified into two broad groupings: base load plants that run continuously and supply the majority of needs, and peaking plants that are operated only during periods of high demand. There have been no major additions to base load generation capacity in Ohio in the past 20 years, only gas-fired peaking plants and hydroelectric power plants have been built. The only base load facility planned at present is proposed by the municipal electric system, AMP-OH, which has proposed to build a 1000 megawatt (MW) coal-fired power plant. AEP is proposing a 550 MW gas-fired plant, and FE is planning a 544 MW gas-fired plant, both of which would primarily meet peak needs.

Because the sources of electricity for Ohio include not only the in-state generating facilities noted in Table 1, but also imports from other states, it is very difficult to judge the adequacy of the systems serving Ohio alone. This is compounded by Ohio’s involvement in two different RTOs, and the lack of available data on generation for competitive reasons.

Electric utilities in Ohio are transitioning from the deregulated system into the optional regulated system defined by SB 221. Under the deregulated approach, there has not been a mandate for electric utilities to construct generating facilities. It is the responsibility of the distribution companies to get adequate supply for their customers, from either system-owned plants or from open market purchases. For utilities that elect to return to a regulated approach in Ohio, their need for added generation in Ohio will be subject to PUCO review and approval of rates for cost recovery. The Ohio Power Siting Commission, a part of PUCO, has review and approval authority over proposed power plants in Ohio that exceed 50 MW in terms of the regional impact of the added generation, and in terms of environmental effects and mitigation requirements. At present, it appears that the generating companies in the two RTOs are planning for adequate
generation in the areas of both RTOs, and that Ohio’s current and near term electricity needs can be met by the combination of generating facilities in the state and ability to exchange with other systems in the region.\(^5\)

There are moves to expand interstate transmission capacity, especially to the Northeast states, which could lead Ohio utilities to expand sales out of the state. It is unclear how this might affect availability of low cost power for Ohio customers, but heavy commitments to out-of-state wholesale customers could result in less reserve capacity available for Ohio customers in the future.

In terms of system reliability, transmission and distribution systems (lines, transformers, switchgear) are very important. Since the Midwest/Northeast power outage of 2003, which originated in Northeast Ohio, transmission system regulation has been largely preempted by the federal government. Standards have been imposed that are generally considered adequate for Ohio, and all Ohio utilities have passed the federal reviews. The 2008 report by PUCO on 2007 transmission performance indicated that the number and duration of outages were generally declining over the five-year period ending in 2007.\(^5\) Distribution lines are being moved to road right-of-ways (ROW) for easier access than in wooded areas. Some undergrounding of lines is being considered, but the cost, typically more than triple the cost of aerial lines, is a barrier to this solution in most places. Preventive maintenance is being increased, and asset management programs are being applied in some systems. Rules now require annual inspection of transmission lines, five-year inspection of distribution lines, and monthly inspection of substations. Also, the federal agencies have added authority to help utilities acquire ROW for power lines in certain designated corridors, to help build new lines and strengthen the grid.

Distribution remains largely under the authority of the state through the PUCO. Problem areas are closely monitored by the PUCO, and the utility companies are required to show progress in these areas. Transmission and distribution outages have been cause for concern in Ohio due to weather-based disruptions of the transmission and distribution system. While the trend of outages has been down in recent years, there were extensive and prolonged outages in Ohio due to the strong winds associated with the passage of the remnants of Hurricane Ike in autumn, 2008. These were not considered to be a result of inadequacies on the part of the utilities, as the wind speeds were substantially above the design standards adopted by the utilities with PUCO agreement. The outages were most severe in distribution systems in areas with the best past performance, an indication of the severity of this particular event. The greatest problem is trees near power lines, especially those not in the utility ROW where the utilities have no right to trim. PUCO is pressing the utilities to attempt to get voluntary trimming authority from adjacent landowners. Also, there have been several major outages in recent years due to heavy ice loading, especially in southern Ohio. The design standards for Ohio include lighter ice loading in the south half of the state than in the north, a standard established in 1949. Recent experience indicates that the earlier standards may no longer be applicable in parts of the state.

A major question for electric power systems looking ahead is the “Smart Grid” concept, where automated sensors and control devices would help manage the grid, sense developing problems, and, where appropriate, react automatically. Smart grid studies and initial plans for action within the next year or two are under way at several utilities in Ohio. Other aspects of this initiative, which seems likely to receive much stronger support from the new federal administration, include smart metering (for peak demand reduction), and added transmission
capacity where that would improve system integration of renewable power sources, especially from sources in the Plains and the West. There is concern that Ohio may be pressed to help fund these long distance transmission facilities with no economic benefit to Ohio customers, an approach that PUCO is opposing. If there are going to be federal mandates for importing renewable power, and smart grid and smart metering programs, there may be a need for significant improvements to transmission and distribution for Ohio’s utility systems in the coming years. The need to generate funds from rates to meet these added costs, on top of ongoing normal upkeep and improvements, may lead to large rate increases, consumer opposition, and economic damage to the state’s economy.

The Ohio Legislature included mandates in SB 221 that require an increase in the proportion of alternative or advanced energy sources in the state’s power mix. SB 221 requires that 12.5% of energy be from alternative energy sources (including renewable, conservation, and clean thermal) by 2024. Of this amount, half must be from renewable sources such as wind, hydro, solid waste, and solar. However, the bill includes a cap on excess cost of 3%, which will likely limit the need to add alternative energy unless it is significantly subsidized by other financial sources. The provisions of SB 221, as now in force, do not appear to pose any threat to the future adequacy of Ohio’s electric supply, transmission, and distribution system, provided that they are not superseded by more stringent state or federal requirements.

Because coal currently provides approximately two thirds of Ohio’s electric generating capacity, its elimination, or a major reduction in the use of coal over a short period of time, would likely have a serious adverse effect on the effectiveness and economic viability of the system. There is a strong possibility that coal-fired generation will be required to drastically reduce CO2 emissions in the future. Ongoing research in clean coal technology and carbon sequestration offer the potential for continued use of coal in an environmentally responsible manner, but the resulting costs are as yet unknown. The costs of such coal generation upgrades could impose large financial burdens on the systems. Large expenditures to meet more stringent requirements may strain the utilities’ financial capacity, making it difficult for them to construct adequate facilities to meet any future load growth that may occur, unless appropriate funding methods are put in place.

The future means of providing adequate and reliable electric power to the residents and businesses of Ohio will likely be subject to mandates to meet reduced greenhouse gas emissions, and to utilize a wider range of sources, including locally generated and imported renewable electricity. All of these sources will involve the application of new engineering, design, construction, and operation methods. If these new approaches are to be efficient, reliable, long lasting and economical, they must be selected based on rational decision making processes, including experience, research, pilot applications, and fact-based economic analysis. Throughout this process of decision making and implementation, the input and talents of registered professional engineers will be essential if Ohio is to have a future electric system that meets its needs. These new approaches offer the potential for new industries in Ohio, and for new applications of the expertise of Ohio’s engineers. However, as with all new approaches, they will encounter resistance, well or ill founded, based on local preferences, aesthetics, cost, and other yet to be identifies factors.
Overall, it appears that the electric generation, transmission, and distribution systems in Ohio are satisfactory to meet current needs in the state, reliability problems are relatively few, and those that exist are being addressed by system improvements in equipment and management. There is, however, some cause for concern that the existing system may not meet future requirements in support of economic growth, renewable energy transmission, and smart metering in the state.

Statewide grading for Ohio may be somewhat misleading as the different utility firms have different levels of adequacy, possibly ranging from C to A. Also, while existing utility systems may meet current standards, the standards may change in the future. Possible changes include emission controls for CO$_2$ at coal-fired plants, revised weather-based design standards, smart transmission systems, smart metering equipment, and transmission improvements to allow greater inter-system transfers, and to allow long distance transmission from potential renewable energy sources to load centers. Based on this information, the assigned electric system grade is C+, although changes in system standards at a local, state, or national level might warrant a different grade in the future.

Specific ASCE Ohio Council Recommendations

- To be prepared for the future, Ohio should anticipate changes in standards and have plans in place to meet new standards rather than face sudden changes that may strain technical and financial capabilities of Ohio’s electric utilities.
- Efforts to implement Smart Grid elements should be pursued where economically sound, and utility financing approaches should be in place to assure healthy electric utilities that can afford to meet both higher environmental standards, as well as any additions to meet increased demand.
- Ohio should seek a reasonable level of regulation in terms of using renewable power sources and encourage development of those with the best return on the charges to rate payers. Any additional requirements to meet pollution standards, such as controls on carbon emissions, should be met using the most cost effective technology (i.e. carbon sequestration, nuclear power, and renewable sources should be rated based on effectiveness and sound engineering and economic evaluations).
- Where long term climatologic data and operating experience indicate that current design or operating standards may be outdated (such as the estimated effect of ice on wires, or problems in vegetation control), new standards should be established to improve system reliability.
- For those system improvements that must be funded by customer rates, implementation should be phased to avoid excessive rate shock. Maintaining an economical electric utility climate in Ohio is essential for the citizens in general, for the state’s businesses and, ultimately, for the viability of Ohio’s economy.
Sources

1 Utility company websites and literature provided general statistics on utility customer counts, loads, and capacities

2 Commercial Electric Generating Plants Operating in Ohio as of January 1, 2009

3 Ohio Legislature, 127th session, Senate Bill 221

4 USDOE, Energy Efficiency & Renewable Energy - Ohio

5 Midwest ISO and PJM ISO websites and literature

Ohio residents are privileged to have a vast system of parks at the local, state and national levels. From the Cuyahoga Valley National Park, to the shores of Lake Erie, from the trails and sites at Hocking Hills, to the ever-developing bike trails in Franklin County, Ohioans take advantage of the numerous opportunities to get outdoors and enjoy the natural treasures that the state has to offer. Ohio is one of the few states in the nation that does not impose fees for visitors to its state parks. However, the park systems in Ohio do provide a crucial economic element in the state’s well being in terms of jobs and financial impact. Unfortunately, budgets at all levels of government are being challenged and monies set aside for Parks and Recreation departments are being reduced, causing jobs to be lost, benefits of park usage to be reduced, and deterioration of facilities. A recent study has determined that an extra $26.5 million is needed each year to properly operate the state parks and other divisions under the Ohio Department of Natural Resources, and an additional $29.9 million annually is needed to eliminate the maintenance backlog over the next 10 to 20 years. This does not take into account the funding needed for metro parks and city recreation and parks departments.

Background

On the national level, Ohio is the home to one national park - the Cuyahoga Valley National Park, which preserves 33,000 acres along 22 miles of the Cuyahoga River between Cleveland and Akron in northeastern Ohio. There are also national historic parks in Dayton and Chillicothe, national historic sites in Canton, Mentor and Cincinnati, and National Memorials in Cleveland Heights and Put-in-Bay. Ohio is also part of a national scenic trail.

Ohio has the third most visited state park system in the United States with over 50 million annual visits. The Ohio Department of Natural Resources (ODNR) owns or manages more than 74 state parks, 20 state forests, 132 nature preserves, and 714,235 acres of land. In addition, the department has jurisdiction over 14 designated state scenic rivers, more than 7,000 miles of streams, 120,000 acres of inland waters, and parts of the Ohio River and Lake Erie. ODNR employed more than 2,400 permanent and seasonal staff for fiscal year 2009. This represents only two-thirds of the total number of employees in 1992.

In addition to the natural assets, the infrastructure in the state park system includes more than 10,000 campsites in 57 campgrounds, 80 public beaches, 188 boat ramps, 36 nature/visitor centers, nine lodges, 518 cottages, six golf courses, plus more than 390 trails totaling nearly 1,200 miles. From an administrative perspective, the park systems include buildings, roads, sewer and water systems, vehicles, and equipment.

The ODNR Division of Parks and Recreation (DPR) receives more than half of its budget from the General Revenue Fund (GRF). Approximately 41% is received from camping and rental fees and retail charges and additional money is received from the Water Safety Fund and other miscellaneous revenue funds.

On the local level, residents of Ohio are able to enjoy parks and recreation systems both in urban and rural communities. Metro Park Districts are located in the major cities of Cincinnati, Columbus, Cleveland, Akron, Toledo and Dayton, as well as other locations in Ohio.
Municipalities and townships also have recreation and parks departments that provide trails, community pools, recreation centers, and programs to better serve their constituents. Many of these departments rely on levies, local government funds, and grants to properly maintain and operate their services and facilities.

Almost all metro park districts rely on levies, typically in the form of real estate taxes, as their main source of income to properly maintain and operate their services and facilities. An example of income sources for a metro park system is that of the Franklin County Metro Parks, which has more than 6 million annual visits to its parks. Its revenue comes from real estate taxes (54%), local government funds (20%), grants (12%), earned income (8%), government partnerships (4%), and other sources (2%).

All of these park systems not only provide citizens with a better quality of life, they are also crucial to the economic health of the state and local economies through the amount of related spending in areas such as gas, hotels, bed and breakfasts, cottages, private campgrounds, recreation supplies, food, museums, ski courses, canoe liveries, and other areas. According to a 2004 Ohio State University study, people visiting the Ohio’s state parks alone contribute an estimated $1.1 billion to the state’s economy annually.

Ohio Parks and Recreation Facts and Issues

The infrastructure required to effectively operate the park systems and departments throughout Ohio is deteriorating and in need of replacement or rehabilitation. There is also a constant expectation by the public for the expansion or addition of new facilities as metropolitan areas are expanding into previously rural areas. The DPR is experiencing an annual increase in the number of backlogged and deferred capital maintenance projects. An ODNR committee report estimated that it would cost $556 million to eliminate this backlog. Costs will continue to rise due to an underfunding trend, increases in construction costs for both labor and materials, and changes in environmental and public safety regulations.

Many DPR water and wastewater treatment systems have exceeded their useful lifespan and are in need of replacement. Many of these systems, constructed in the 1970’s, cannot meet the current demands of their users. In 2008, the ODNR Division of Engineering estimated that more than $32 million would be needed to address only those water and wastewater treatment systems that are currently in violation of Ohio EPA water quality standards, are in danger of imminent failure, or have experienced such increases in demand that they are in desperate need of renovation or replacement.

DPR owns 38 registered underground storage tanks and 113 aboveground storage tanks. There are 22 underground storage tank systems, included in the 38 registered tanks, that are in service statewide in Ohio’s state park system. 19 of these systems support retail sales of fuel at state park marinas.

Constant changes in storage tank regulations have made it difficult for the department to remain compliant. Only $500,000 is earmarked annually for underground storage tank repair, removal and replacement. In 2007, DPR removed and did not replace 20 aboveground tanks that were no longer compliant. The parks where these tanks were located have sought alternate means for providing fuel to mowers and rolling stock.
These same needs are also being felt at the local levels as well. Facilities at many urban recreation centers are past their expected service life and are in need of repairs or risk being closed for health and safety reasons. Health and social services are also a big part of local parks and recreation departments. There is a growing need for green initiatives through the use of more bike trails to promote less reliance on motor vehicles to get to work and other activities. The existing trails and services, with more usage, need maintenance at higher levels to remain ahead of and to extend expected service life.

As stated above, the facilities owned and operated by parks and recreation departments are important for the local and state economy in Ohio. The tourism industry in Ohio relies on parks to provide demand for lodging, sporting goods sales, recreational vehicle and watercraft sales, dock rentals, food services, hunting and fishing equipment and licenses, and other areas.

According to a 2002 Ohio Poll conducted by the University of Cincinnati, 83% of all Ohioans have visited a state park at least once in their lifetime. According to a 2004 OSU study, 42% of all households visited a state park at least once in 2004.1

Ohio is one of a few states that does not charge a fee for park visitors. An ODNR proposal to charge modest fees to provide revenues for one of the nation’s finest state park systems was met with public outcry to not implement fees.5

DPR has been subjected to over $17.5 million in GRF reductions since 2000.

The average age of vehicles in the DPR fleet is 10 years with an average of over 100,000 miles per vehicle.

32 state parks have no on-site manager and 22 state parks have no permanent staff, however there has been a significant increase in day and overnight visits. Since 1990, DPR reduced its permanent staff from 800 to 458 positions. DPR park officers are at times the only staff personnel in the park and at times provide functional oversight for seasonal staff working at overnight facilities in the evening. Polls, surveys and written and verbal complaints have indicated that visitors feel less safe because of the reduction in park officer coverage in the parks.

Parks such as Buckeye Lake, Cleveland Lakefront, East Fork, Indian Lake, Van Buren and, Hueston Woods all have maintenance needs.3

An example of reduced services is at Caesar Creek State Park in Warren County. A picnic area, restrooms, and drinking fountains have been removed, a concession stand has been closed due to no staff, and a changing house for the beach was razed due to its deterioration.5

Ohio ranked second among states for the percentage of beach-water samples, 18%, that exceeded health standards for bacteria, based on 1,350 samples taken from Lake Erie in 2007.6

Approximately 2 million people visited nine state-operated beaches on Lake Erie in 2007.6
The City of Cleveland Department of Parks, Recreation and Properties is estimated to employ 511 full time and 842 part time personnel in 2009. The City of Columbus Recreation and Parks Department is expected to employ 269 full time and 1,483 part time personnel in 2009. This shows the importance that recreation and parks departments have on the work force.

A proposal by Toledo City Council would eliminate $450,000 in funding for city-sponsored recreational activities and facilities, like baseball tournaments and the Ottawa Park Ice Rink.

80% of the Toledo Metroparks budget is generated through tax revenue. Shrinking home prices means lower revenue for parks. A recent survey stated that 90% of those who live in Lucas County visit the parks.

The City of Columbus Recreation and Parks Department had planned to close 12 recreation facilities, three specialized facilities, reduce personnel levels in both parks and building maintenance by over $500,000, and discontinue the “Music in the Air” program which would eliminate the Jazz and Rib and Latino festivals in 2009. However, by shifting $618,000 in bed-tax money, the city will help reopen five of the previously closed facilities. In addition, financial assistance from outside groups saved the city’s two downtown main summer events, the Jazz and Rib and Latino festivals.

Franklin County Metroparks placed a 0.75-mill levy initiative on the May 5, 2009 ballot. The plan focuses on maintaining the existing park system. A renewal of the previously expired levy was determined to be insufficient to support future needs and demands. Fortunately, this issue passed with 58% of the vote in favor, which will help support the Metroparks of Franklin County for the next ten years.

The national average for park-related total expenditures, which does not include expenses for stadiums, zoos, museums, and aquariums, per resident, is $91 as of FY2006. In Ohio, Cleveland ($88), Columbus ($78) and Toledo ($40) were below average, while Cincinnati ($140) was above average.

In a national comparison of total parkland per 1,000 residents for cities of similar population densities, Cleveland and Toledo were below average, while Columbus and Cincinnati were slightly above average.

**Policy options**

Ohio’s parks and recreation systems have long been considered some of the finest in the country. Unfortunately, funding for these programs, primarily from state general funds and real estate levies, is being reduced due to the effects of the economic downturn that is lowering home values and causing a reduction in sales tax receipts. Ohio’s state legislators and local government officials must look for ways to maintain our existing facilities and to meet the increased demand for expanding these parks.
Specific ASCE Ohio Council Recommendations

- Ohio Legislators need to consider a proposal for usage fees for its state parks
- Consider a statewide Real Estate Transfer Fee to be dedicated to the state park systems
- Encourage local government agencies to maintain or increase spending for their recreation and parks departments and stress that local festivals and recreation centers create a healthier and happier community
- Urge Ohio’s congressional delegation to support fully funding federal programs that benefit the capital needs of Ohio’s state parks and recreational areas, such as the Land and Water Conservation Fund1
- With the economic benefits provided by the state park system, legislators need to realize that most recreation and parks budgets are just a small fraction of the overall budget, however, they should not always be the first areas examined for cuts and reductions

Sources

1 Ohio Department of Natural Resources, “Ohio State Park and Recreational Area Study Committee Report”, February 27, 2009
2 National Park System Website, home.nps.gov/applications/parksearch/state.cfm?=oh
3 Ohio Department of Natural Resources, Testimony on the 2008-2009 Department Budget, April 5, 2007
4 Franklin County, “Metro Parks Plan For the years 2010 to 2019”
5 Columbus Dispatch editorial, “Pay to play”, April 13, 2009
6 Columbus Dispatch article, “Lake Erie beaches often icky”, July 30, 2008
7 City of Cleveland, 2009 Budget Book, March 23, 2009
8 City of Columbus, 2009 Budget, page 22-2
9 WTOL Website, www.wtol.com , April 7, 2009
11 Columbus Monthly article, “On The Outs”, May, 2009
12 The Trust for Public Land Website, www.tpl.org/ccpe
Railroads

The Ohio freight railroad system originated 69 million tons of freight and terminated 98 million tons of freight in 2005. When through trains are considered, freight railroads in Ohio handled a total of 315 million tons and 6.8 million carloads in 2005. The railroads provide critical services to industries important to Ohio’s economy, hauling raw materials, parts, and finished goods for the energy, construction, automotive, agricultural, and distribution and trade industries. They are also an important industry in the state, employing more than 8,000 workers and paying approximately $500 million in wages. Amtrak offers three passenger train routes through Ohio, serving Cleveland, Cincinnati, and Toledo. Columbus and Dayton do not have passenger train stations. Columbus is the second largest and Dayton the sixth largest city in the U.S. without passenger rail services.

Background

During the early 1800s the prevailing methods of transportation, wagons and canals, were insufficient for the task of hauling large volumes of heavy goods (mainly agricultural) over the Appalachian Mountains. The Baltimore & Ohio Railroad was chartered in 1825. The Pennsylvania Railroad and the New York Central System (or their proxies and/or acquisitions) would become major players in the nineteenth century push from the east coast to the Ohio River, Lake Erie, and beyond. From 1825 to 1875, the state of Ohio would first be a destination and then a thoroughfare as the major eastern railroads eventually reached Chicago and St. Louis. During this time, many regional railroads within the state were chartered as well. These companies hauled the raw materials used in iron production from the mines to the mills, as well as the finished products and agricultural goods from the mills and farm bureaus to market. By 1890, Ohio was a maze of railroads moving north and south, east and west.

Along the way west, immigrant and domestic migration from the east exploded, providing vast amounts of labor. This new overland transportation capability, coupled with the capacity to ship by water, enhanced the ability to carry raw materials to Ohio cities. As a result, many industrial manufacturing facilities soon sprang up all along and south of Lake Erie between Toledo and Pittsburgh. Similar development was taking place along the Ohio River around Cincinnati. By the 1920s, the region was one of the most concentrated industrial zones on earth. The coal needed to make iron and steel, as well as to generate the steam and electricity for production was, and remains, conveniently located along the Ohio River. The iron ore smelted with this coal to make iron was mined in Michigan (now in Minnesota), was, and still is, shipped via the Great Lakes to ports in Ohio, and then transferred to rail for distribution throughout the region. Everything needed to forge a modern economy from materials mined from the earth was no more than 600 miles away by ship or 300 miles away by rail.

Today, Ohio’s freight rail system consists of approximately 5,275 miles of rail, making it the fourth largest in the U.S. There are 36 rail companies operating within the state, and two railroads, CSX and Norfolk Southern, own more than 75% of the rail in Ohio. Approximately 11% of these rail routes are owned by public entities and are operated under contract by private rail companies. Ohio’s economy is the 29th largest in the world, and economic activity translates into transportation demand. In addition, Ohio’s position as a major crossroads state means a great deal of freight traffic passes through the state – as much a one-third of the nation’s total freight volume.
Ohio Railroads Facts and Issues

In the highway freight system, the public sector constructs the roads and the trucking industry and traveling public pays for the highways through fuel taxes as they use the highways. Railroads, conversely, construct their own lines incurring fixed costs whether the lines, bridges, tunnels, and terminals are used or not. As a consequence, railroads tend to be very cautious about over-investing in infrastructure. Most capacity-related investments are very carefully targeted to specific lines and commodities.

The freight rail system is comprised of three classes of railroad companies based on annual operating revenues: Class I freight railroads; Class II regional or short-line railroads; and Class III or local line-haul carriers. Table 1 presents the miles of track in each class operated by the freight railroad companies in Ohio. The table breaks out the number of miles in two categories: the mileage of track excluding additional rights and the mileage including additional rights. Trackage rights are an arrangement where the company that owns the line retains all rights, but allows another company to operate over certain sections of its track. Table 1 indicates the preponderance of long-haul freight rail lines and the relative lack of local or regional track.

<table>
<thead>
<tr>
<th>Ohio</th>
<th>Number of Freight Railroads</th>
<th>Miles Operated in 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excluding Trackage Rights</td>
<td>Percent of Total Mileage</td>
</tr>
<tr>
<td>Class I</td>
<td>4</td>
<td>3,295</td>
</tr>
<tr>
<td>Class II (Regional)</td>
<td>2</td>
<td>866</td>
</tr>
<tr>
<td>Class III (Local)</td>
<td>14</td>
<td>761</td>
</tr>
<tr>
<td>Switching &amp; Terminal</td>
<td>16</td>
<td>353</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>5,275</td>
</tr>
</tbody>
</table>

Table 1. Ohio Railroad Class and Track Mileage

Amtrak services Ohio with three long-distance trains: the Capitol Limited (Chicago-Cleveland-Pittsburgh-Washington, D.C.); the Cardinal (Chicago-Cincinnati-Washington D.C.-New York); and the Lake Shore Limited (Chicago-Cleveland-Buffalo-New York). Amtrak reported that during FY2008, more than 121,000 people either boarded or departed a train at one of the seven stations within the state of Ohio, which represented a 9.6% increase over FY2007. Also during FY2008, Amtrak expended more than $12.5 million for goods and services in Ohio, more than a third of which was spent in Cleveland. During that same year Amtrak employed 56 Ohio residents and paid wages totaling more than $3.9 million. While motor vehicles dominate public transit service in Ohio, Cleveland operates 19 miles of heavy rail and 15 miles of light rail track used for public transit.

The Association of American Railroads estimates that Ohio railroads handled 315 million tons of freight in 2005 (the most recent data available). If this freight were to be transported by truck on Ohio’s roadways, it would equate to an additional 7.9 million trucks. The demand for freight rail service is forecast to increase 71% by tonnage and 85% by ton-miles between 2005 and 2035. This indicates that not only will the amount of freight increase significantly, but the distance it travels will as well. Table 2 presents data from the Federal Highway Administration’s Office of...
Freight Management and Operations for the tonnage and value of freight shipments in Ohio broken out by mode of transportation. Actual data for 1998 along with projections for 2010 and 2020 are presented. The majority of the increase is forecast in highway operations and for domestic markets.

<table>
<thead>
<tr>
<th>Ohio</th>
<th>Tons (millions)</th>
<th>Values ($ billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highway</td>
<td>661</td>
<td>934</td>
</tr>
<tr>
<td>Rail</td>
<td>159</td>
<td>187</td>
</tr>
<tr>
<td>Water</td>
<td>115</td>
<td>132</td>
</tr>
<tr>
<td>Air</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>State Total</td>
<td>936</td>
<td>1,254</td>
</tr>
<tr>
<td>By Destination/Market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>893</td>
<td>1,202</td>
</tr>
<tr>
<td>International</td>
<td>42</td>
<td>51</td>
</tr>
</tbody>
</table>

Table 2. Freight Shipments To, From, and Within Ohio: 1998, 2010, and 2020

The Ohio Department of Transportation (ODOT) has identified 30 critical rail choke points, a location where trains routinely are required to wait on a siding for other trains to pass on the main tracks. Choke points can also be a low tunnel or bridge, or a rail yard that is too small to accommodate all the cars being picked up or put out, causing the train to “park” on the main line and block through traffic. ODOT estimates that the total cost to improve these 30 choke points is $1.19 billion. Of this total, more than $440 million is needed to correct projects involving Ohio’s two largest freight carriers, CSX and Norfolk Southern. The single most expensive project is the Conrail “Short Line,” which is now the CSX main line around Cleveland. It has been estimated that the cost to correct just this problem would be $243 million.

ODOT and the Ohio Rail Development Commission (ORDC) have aggressively improved safety warning devices at highway-rail grade crossings. Historically, ODOT has allocated $15 million per year in Hazard Elimination and Surface Transportation Program funds for highway-railroad grade crossing safety improvements or corrective activity designed to alleviate highway-railroad safety problems. These funds are administered by the ORDC for projects on state or local roads. From fiscal years 1995 through 2003, the ORDC funded the construction of 950 light and gate installations, 62 crossing circuitry upgrades, 239 crossing surface reconstructions, 133 crossing closures, and a physical inventory of every public grade crossing in the state. An at-grade crossing is an intersection of a roadway and a railroad. Since 2003, ORDC has targeted at-grade crossing upgrades on passive crossings with higher train speeds. A passive crossing has no electronic warning device for the roadway. ORDC estimates that approximately 1,500 crossings in the state have maximum train speeds above 20 mph and passive warning devices. This indicates a potential for severe motor vehicle-train accidents.

There are nearly 16,000 railroad crossings within the state of Ohio. Of those, more than 15% are currently closed to the traveling public. Table 3 shows the number of rail crossings in the various categories, as compiled by the Public Utilities Commission of Ohio. A private crossing is one where the roadway is not under the jurisdiction of the local government agency. Pedestrian crossings are any that does not include motor vehicles, including bicycle paths.
### Table 3. Highway/Railroad Crossings in the State of Ohio

Since 1990, motor vehicle/train crashes at grade crossings in Ohio have declined 66% and the number of fatalities has dropped by 77%. This improvement was achieved during a period of steady increase in the amount of train traffic and in the number of registered motor vehicles and licensed drivers in Ohio. Table 4 shows the number of highway-rail incidents that occurred at public and private crossings from 2005 through 2008.

### Table 4. Highway/Railroad Crossings Accidents in Ohio from 2005 to 2008

#### Policy Options

Ohio’s economic future depends on maintaining and improving its aging railway transportation infrastructure. Ohio’s elected officials at all levels must constantly look for ways to fund, develop, and improve Ohio’s network of passenger trains as an alternative to air and automobile travel. This should include the continued study of the “Ohio Hub” network of high-speed, frequent trains connecting the principal business and population centers in the state with those in adjoining states and Canada.
Specific ASCE Ohio Council Recommendations

- Increase funding levels for federal aid programs for rail development
- Integrate rail into the state multimodal transportation policy and recognize and take advantage of efficiencies
- Increase public/private partnerships to enhance opportunities for multimodal facility development
- Support environmental streamlining of transportation projects
- Increase funding for rail safety programs at the national and state levels
- Encourage the use of life-cycle cost analysis principles to evaluate the total cost of projects

Sources

1 Ohio Department of Transportation, Ohio Freight Rail Choke Point Study, August 2007
2 U.S. Census Bureau, Metropolitan Statistical Areas Served By Amtrak, 2008
4 Ohio Department of Transportation, Ohio’s Intermodal Transportation System, October 2007
5 Ohio Department of Transportation, Ohio’s Intermodal Freight Strategy, October 2006
6 Associations of American Railroads, Railroad Service in Ohio, June 2008
7 Amtrak Fact Sheet, State of Ohio, FY2008
11 Ohio Department of Transportation, Rail Safety Programs, September 2008, www.dot.state.oh.us/Divisions/Rail/Programs/Safety
Roads

Grade: D

With more than 125,000 miles of roads, Ohio has one of the largest and most utilized roadway networks in the United States. Unfortunately, congestion and the deterioration rate of road conditions and safety are accelerating. Proper maintenance and available capacity of the roadway network is crucial to Ohio’s economy. Billions of dollars are being lost annually due to lost time, wasted fuel consumption, traffic accidents, and inefficient manufacturing caused by inconsistent delivery schedules. As roads continue to require more attention, the shortfall of funds needed to maintain this critical infrastructure continues to increase. It is estimated that by the year 2014, Ohio will have a highway budget shortfall of more than $10 billion at the state government level alone. Ohio’s state and local agencies face a difficult challenge to address this budget deficit in the midst of a downturn in the economy, a task that is required if they wish to not just maintain, but correct the poor roadway conditions and over-congestion problem facing the state’s roadway infrastructure.

Background

Ohio’s location within the United States has contributed to the state’s extensive roadway network, which includes numerous miles of public roads within the state’s boundaries. Bordering the state to the north are the Great Lakes, while the Ohio River borders the state to the south. These two bodies of water have enabled transportation of goods and materials over water to and from Ohio’s borders and resulted in a need for an efficient and well-maintained internal network of roads to support the industrial and economic development of the state. As a midwestern state, Ohio also boasts a large amount of agricultural interests distributed across the state. The combination of widespread agricultural development and a well-developed industrial base contributed to a need for miles of public roads to move goods and people throughout the state and beyond.

The network of public roads connects the three principal cities in Ohio (Columbus, Cleveland, and Cincinnati) as well as 930 additional cities, towns and villages. These public roads span the 88 counties and 1,362 current and historic townships that divide the state into smaller governmental jurisdictions. The Ohio Department of Transportation (ODOT) owns 19,266 miles of roadway, 29,009 miles are owned by counties, 73,006 miles are owned by townships, and 3,826 miles are owned by others, including State Parks and other state and local agencies.

The length of the public roads in Ohio amounts to 3.1% of the total length of public roads in the United States. Included in Ohio’s public roads are 1,574 miles of Interstate highways, which represents 3.4% of the total length of the Interstate system in the United States. This ranks Ohio 5th nationally in Interstate road length, behind Texas, California, Illinois and Pennsylvania. Ohio is also ranked 7th nationally in total public road length.

The 21 Interstate routes in the state have supported the migration of a significant portion of the population outside of the principal cities. This migration has led to an increase in vehicle miles traveled (VMT). VMT is the measure that is commonly used to describe automobile use on a daily or annual basis by incorporating the number of vehicle trips and the length of those trips. Since 2000, Ohio’s VMT has increased 5%, and the total VMT measured in 2006 ranked Ohio 6th nationally.
Ohio Roads Facts and Issues

Deterioration of the road infrastructure in Ohio is accelerating. The lack of financial programming and the number and length of roadways in Ohio are contributing to an increased number of roads being evaluated as having a fair, poor, or critical condition. The following is a breakdown of the physical condition of Ohio’s roadway infrastructure: 5,6

- Excellent – 22.5%
- Good – 34.5%
- Fair – 29.0%
- Poor – 11.3%
- Critical – 2.7%

Ohio ranks “critical” roads as those that are dangerous, unsafe, or unusable and that are in need of immediate improvement. “Poor” roads are deemed inadequate or substandard and will need improvement soon to preserve usability. “Fair” roads will likely need improvement in the near future. “Excellent” roads are in good condition and will not require improvement in the near future. 43% of Ohio’s roads are in critical, poor, or fair condition. This is an increase from 2000, when 38% of Ohio’s roads were in these substandard categories. One leading contributor to this is the increase in truck traffic on the roads. Truck registration in Ohio increased 9.3% from 2000 to 2006, and truck VMT increased just over 10% in the same period.3 This increased truck traffic is accelerating the deterioration of the state’s highway pavement.

Substandard road conditions are dangerous. Poor and obsolete road design, deteriorating pavement conditions, and lack of safety features are major contributors to many fatal highway accidents. While the total number of fatalities in Ohio has dropped from 2000 to 2006, the number of traffic fatalities equates to 16 fatalities per year for every 100,000 licensed drivers. This ranks Ohio 40th nationally in total traffic fatalities per 100,000 licensed drivers.9 Pedestrian fatalities as a result of traffic accidents accounted for 7.8% of total traffic fatalities in 2006, up 0.7% from 2000.3,4 Crash data in 2005 for the six largest urbanized areas in Ohio (Columbus, Cleveland, Cincinnati, Toledo, Akron, and Dayton) indicates there were 811 fatalities and 91,144 injuries as a result of traffic accidents, costing the economy $8.85 billion in 2005, or $4,055 for each resident living in just these six cities.7

Congestion in the large urbanized areas in Ohio is getting worse. Each year, the Texas Transportation Institute publishes a ranking of highway congestion in the 50 largest urban areas, as ranked by hours of delay per person.8 In 2002, Columbus was ranked 41st nationally and was the only Ohio city included.4 By 2005, Columbus’ ranking rose to 34th, and Cincinnati and Cleveland joined Columbus as Ohio cities included on the list (ranked 40th and 49th, respectively).9 Congestion caused the annual average delay (defined as extra travel time during peak period travel) per traveler in the city of Columbus to rise from 27 hours in 1995 to 33 hours in 2005 – an increase of over 22%.8

There is general consensus that maintaining the integrity of the state’s roadway infrastructure system requires continual updates and a steady and predictable flow of capital. According to the U.S. Department of Commerce, in 2005, Ohio state and local governments collected $2.5 billion in revenue for use on transportation projects.9 Sources of this revenue included motor fuel taxes, truck registration, interest income, and miscellaneous income including vanity license
fees. However, in the same year, Ohio spent $4.4 billion on highway projects. This shortfall is compounded each year due to consistent lack of ability to receive enough revenue to cover project expenses. According to the Ohio Department of Transportation’s 2008-2009 Business Plan, the state agency will see a shortfall of nearly $3.3 billion by 2014. When the deficit from the Transportation Review Advisory Council (TRAC) list of Tier 2 projects (projects that have been identified as a need, but do not currently have funding in place to complete) is added in, the shortfall increases to $10.05 billion by 2014 at the state level alone.

TRAC is a committee that chooses the major transportation projects in the state of Ohio to be funded and constructed based on several criteria, such as congestion, ability to provide mobility and connectivity, and economic development. The budget deficit makes it difficult for TRAC to successfully create a legitimate, fundable list of projects that are necessary to maintain the existing conditions of the roads, let alone improve the facilities that are substandard.

Policy Options

As transportation infrastructure continues to deteriorate and the demand continues to increase, Ohio must look to solutions that can improve the roadway conditions, decrease congestion, and improve safety. These solutions should be wide-ranging and include decreasing dependency on traditional vehicular travel, utilization of modern transportation technologies, and increasing investments in transportation projects across the state.

To decelerate the increasing demand on Ohio’s roadway network, it is critical to provide options that promote the use of alternative means of transportation. Incorporation of complete streets designs to increase pedestrian and bicycle travel, encouragement of ride-sharing, and willingness for companies to incorporate telecommuting and flexible scheduling are a few examples of ways to accomplish this goal.

Solutions that could materialize through the use of modern technologies would be the incorporation of innovative designs in roadway projects that improve capacity, reduce delay, and increase safety for Ohio’s transportation network. Such designs may include the use of roundabouts in lieu of traditional intersection designs and diverging diamond interchange configurations instead of a standard diamond interchange. Ohio will need to remain on the cutting edge of design and construction to determine feasible solutions in locations of constrained right-of-way or environmentally sensitive areas.

Proper funding is an integral part of making all of the necessary solutions viable, however, Ohio is experiencing a major budget deficit that is impeding its ability to maintain and improve its current roadway network. Some potential sources of revenue that would help overcome the deficit include the American Recovery and Reinvestment Act of 2009, a potential increase in the state gas tax, or other options including tolling or mileage-based licensing fees. Should Ohio receive financial support from any or all of these sources, it would still likely leave the state short of the necessary funding required to keep the infrastructure at a desirable level. Therefore, the continual pursuit of additional sources of revenue is crucial.
Specific ASCE Ohio Council Recommendations

- Remove the Highway Trust Fund from the unified federal budget
- Increase funding for long-term fundamental highway research efforts at the national level
- Encourage the use of life-cycle cost analysis principles to evaluate the total costs of projects
- Support the environmental streamlining of highway projects
- Address the long-term viability of fuel taxes for transportation funding, and explore the viability of the most-promising options to strengthen this funding. In particular, the effects of fuel cell technology should be studied to lessen the nation’s dependence on gasoline as a fuel source for automobiles, as should investigating the creation of a mileage-based system for funding our nation’s surface transportation systems.

Sources


6. Ohio Department of Transportation, Pavement Conditions Report, November 2008


8. Texas Transportation Institute, The 2007 Urban Mobility Report, September 2007


The following sources provided additional information considered in the preparation of this section of the report:


14 Bureau of Transportation Statistics, *Ohio Transportation Profile*, March 2001


17 Texas Transportation Institute, *The 2003 Urban Mobility Report*, November 2003
Schools

The quality of schools in Ohio, as in the rest of the country, is crucial to our state’s long-term viability and ability to compete in the national and global marketplace. The physical structures and related infrastructure are critical components that have a direct impact on the quality of our schools. Overcrowded, inefficient, outdated, and deteriorating buildings and infrastructure have a negative impact on the quality of education our students receive. The state of Ohio has recognized this and taken positive steps to address the school infrastructure requirements, in particular the securitization of Ohio’s share of the Tobacco Settlement that earmarked $4.12 billion for school construction during the period 2009-2011. However, the education funding formula of the state, which has been declared unconstitutional by the Ohio State Supreme Court, continues to impede addressing all school infrastructure needs in an efficient and proactive manner.

Background

The method of providing general educational funding and capital funding for school facilities in Ohio has been a source of controversy for many years. Since 1979, when the case of Board of Education of Cincinnati vs. Walter was litigated, various courts in Ohio have ruled that the method the state uses to fund education was unconstitutional. In 1979, school districts were successful in presenting evidence that described school facilities that were obsolete, poorly lighted, and suffered from inadequate maintenance because of inequitable and inadequate funding. School superintendents testified that school tax levy inadequacies and failures of school bond issues forced them to borrow funds from commercial lenders to keep schools operating.1

In 1997, the Ohio State Supreme Court ruled that the state constitution required the Legislature to fund a thorough and efficient system of public schools with a strict requirement to implement the system fairly across all school districts. The court held that state funding of schools be judged as inadequate if districts have insufficient funds to provide a safe and healthy learning environment. The court ordered the Legislature to systematically revise the school funding scheme.1

In response to this, the Ohio School Facilities Commission (OSFC) was created in 1997 as a separate state agency to oversee the rebuilding of Ohio’s public schools.2 The OSFC administers the state’s comprehensive kindergarten through 12th grade public school construction program. The agency helps school districts fund, plan, design, and build new or renovated schools. OSFC is responsible for the administration of several programs including the Classroom Facilities Assistance Program (CFAP), Vocational Facilities Assistance Program (VFAP) and the Exceptional Needs Program (ENP), which together address needs for new and renovated school facilities.3

Over the past nine years, the OSFC has worked with more than 75% of the local school districts by conducting facility assessments and developing preliminary plans for addressing facility needs. The OSFC estimates that there is a need for approximately 2,500 quality learning environments in Ohio.
During the 1998-2007 fiscal years, the OSFC managed yearly appropriations across all its programs totaling $5.92 billion, an average of approximately $592 million per year. This provided funds for projects in an average of 25 school districts per year. In part, these funds have been dedicated to a combination of 481 newly renovated facilities, 141 buildings under construction, and full completion of 114 school district projects. In 2007, the OSFC reported that all facility needs in 123 school districts have been fully addressed.2

In 2007, the state approved a plan to securitize Ohio’s share of the Tobacco Settlement through an immediate cash payout (the Tobacco Master Settlement Agreement is an agreement entered into in 1998 between the four largest U.S. tobacco companies and the attorneys general of 46 states). As a result, $4.12 billion was earmarked for school construction during the 2009-2011 fiscal years. The OSFC estimates that this will provide funds for completion of about 250 additional buildings in approximately 140 school districts across the state. The projects will be financed by a combination of state and local funding. Local funding is required before the projects can start.

The OSFC recognizes that school facilities built in accordance with the Ohio School Design Manual standards have had a positive impact on academic achievement because of improvements in the learning environment and more cost-effective, efficient operations. In 2007, the OSFC embarked on a Green Schools Initiative that will enhance the benefits of Ohio’s school facilities by building schools that are healthier for students and teachers and will cost less to operate. The OSFC adopted a rating system created by the non-profit U.S. Green Building Council, Leadership in Energy and Environmental Design (LEED) called the LEED® for Schools Green Building Rating System™ as part of its school design standards. The LEED® system is a widely used benchmark for the design and construction of energy efficient and environmentally conscious buildings. Schools built to LEED® specifications have been shown to have a positive effect on the health, attendance and performance of students, teachers and staff. Certification provides the community with a rating for their school buildings that verifies that the buildings meet standards for a high level of energy and environmental performance. Schools in districts approved for funding after September 2007 are required to meet LEED® for Schools Silver Certification, with a goal to meet the Gold Certification level in the future.

In the 2009 Report Card for America’s Infrastructure, ASCE indicated that comprehensive, authoritative data on the condition of America’s school buildings has not been collected in a decade.4 This is true for Ohio, where the most recent state-wide survey of the conditions of school buildings appears to have been conducted under order of the Legislature in 1989. This survey concluded that $10.2 billion was needed to address out-of-compliance building health and safety issues, including asbestos removal.1 At the time of the survey, the data showed that more than 50% of Ohio’s schools were at least 50 years old and 15% were at least 70 years old. In addition, only 17% of heating systems and 31% of roofs were in satisfactory condition, and only 25% of plumbing systems were in good working order. Only 30% of schools had adequate fire alarm systems.

These data were supported by later studies from the U.S. General Accounting Office (GAO, now known as the General Accountability Office), which reported in 1996 that 95% of Ohio’s schools were in bad need of upgrades or repairs.5
The federal Department of Education (ED), Institute of Education Sciences, National Center for Education Statistics has developed criteria to estimate the “functional age of schools.” Functional age is based on the year of construction of the main instructional building(s) for schools that have not experienced any major renovations since their original construction. However, for schools that have been renovated, the functional age is based on the year of the most recent major renovation. Therefore, the ED considers the age of the main instructional buildings as measured in years since original construction and in years since the most recent renovation.

The ED indicates that determining and describing the age of public schools can be difficult. Many schools have instructional buildings that have been heavily renovated in the years since they were originally built. For such schools, the year of their last renovation is often a better index of the school’s age than the year of original construction. Therefore, in describing school age, consideration must be given to both the year of construction and year of most recent renovation for schools that have been renovated.

In 1999, the ED estimated that, on a national basis, the average age of the main instructional building(s) of public schools was 40 years, based on years since original construction. Across all schools reporting a major renovation since initial construction, the renovation had occurred an average of 11 years ago. The average functional age of schools, as defined above, was 16 years. The average functional age of the school varied by school enrollment, with small schools typically older than medium or large schools (20 years compared with 15 and 14 years, respectively). 

Ohio Schools Facts and Issues

The Website SchoolDataDirect.org provides a resource for educators, researchers, and policymakers to access data on public schools. School Data Direct is an online service of the State Education Data Center (SEDC). SEDC is a new service of the Council of Chief State School Officers, funded by the Bill & Melinda Gates Foundation as part of the Council's National Education Data Partnership. For Ohio, SEDC reports the following:

<table>
<thead>
<tr>
<th>Ohio Public Schools and Districts: Education Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 Number of students</td>
</tr>
<tr>
<td>2007 Number of schools</td>
</tr>
<tr>
<td>2007 Number of school districts</td>
</tr>
<tr>
<td>2006 Spending per student</td>
</tr>
</tbody>
</table>

Table 1.

The SEDC also reports the following:

<table>
<thead>
<tr>
<th>United States Public Schools and Districts: Education Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007 Number of students</td>
</tr>
<tr>
<td>2007 Number of schools</td>
</tr>
<tr>
<td>2007 Number of school districts</td>
</tr>
<tr>
<td>2006 Spending per student</td>
</tr>
</tbody>
</table>

Table 2.
Ohio spent 6.8% less than the national average on each of its students in 2006. In 2007, Ohio had 3.7% of the total number of students and 4.0% of the total number of schools in 4.2% of the total school districts in the country.

Ohio has made significant strides in reducing its school infrastructure requirements since the OSFC was created in 1997. The American Federation of Teachers report *Building Minds, Minding Buildings, School Infrastructure Funding Need* indicates that school infrastructure funding need in Ohio has decreased from an estimated $20.9 billion in 2001 to $9.32 billion in 2008. However, the estimated $9.32 billion of needed infrastructure investment in 2008 ranks Ohio sixth in the country for total funds needed.1

**Policy Options**

The Rebuild America’s Schools Coalition contends that federal partnerships are necessary as local communities struggle to finance, build, and modernize school facilities to address the economic and educational challenges of the 21st century.8 The American Recovery and Reinvestment Act approved by Congress includes financing and funding for school construction, modernization, renovation and repair. A tax provision of the legislation includes $24.8 billion for Qualified School Construction Bonds and for the expansion of the Qualified Zone Academy Bond (QZAB) program. The new Qualified School Construction Bonds will be for school construction, renovation, repair, and site acquisition. The $24.8 billion is almost the entire bond authorization called for in the America’s Better Classrooms Act. Although this is significant, because the local school district may have to cover the debt service cost of the bonds, there may still be a limitation in the use of these programs because local funds may not be available.

The American Recovery and Reinvestment Act also added funding for school modernization as one of the purposes in a $53.6 billion State Stabilization Fund. These funds will be available for school modernization if state and local officials decide to use the funds to modernize schools. Governors will control 18.2% of these funds that can be used for public safety and education purposes including public school modernization, renovation, and repair, and for higher education renovation and repair. Local school districts that will receive the remaining 81.8% of the State Stabilization funds can use the funds for school modernization, as well as for education programs, such as the Individuals with Disabilities Education Act (IDEA), Title I No Child Left Behind, and Perkins programs.8

The American Recovery and Reinvestment Act is a big step forward in the financing of school construction bonds to help build, renovate, and repair our nation’s schools and in the funding of school modernization. However, the total of $78.4 billion in funds in the two appropriations discussed above are less than a third of the estimated $254.6 billion needed for school infrastructure nationally.1 In addition, ASCE indicates that the National Education Association’s best estimate to bring the nation’s schools into good repair is $322 billion,4 meaning the gap is even larger.

The Taxpayers Relief Act of 1997 included a tax provision that established the QZAB program to assist local school districts with school renovations and other purposes. In 2006 and 2007, QZABs provided up to $400 million per year in bond authority for schools in targeted zones or
where 35% or more of the students are eligible for free or reduced cost lunch. Since 1998, $4 billion in QZAB bond allocations have been provided to the 50 states and the U.S. territories. QZABs have been used successfully in nearly every state.\(^8\)

As much as the efforts of the OSFC have helped to address school infrastructure needs in the state, there are still issues that need to be addressed. OSFC indicated that they have worked with 75% of the local school districts in Ohio to conduct facility assessments and develop preliminary plans for addressing facility needs, which means that 25% of the districts have not received assistance as of 2007. The OSFC indicates that they have fully completed projects in 123 school districts, but that means there are still identified needs in 491 school districts. The $4.12 billion earmarked for school construction during the 2009-2011 fiscal years from the Tobacco Settlement will continue the progress made to date. However, the OSFC estimates that this will provide funds for completion of about 250 additional buildings in approximately 140 school districts across the state, still leaving about 351 districts with defined needs.

One of the issues that impedes progress is the fact that the OSFC projects will be financed by a combination of state and local funding. Local funding is required before the projects can start. Under the state’s formula for financing education, most school districts must receive voter approval for a levy to raise the local funds. The need for provision of local funds can delay or stop the project from proceeding.

**Specific ASCE Ohio Council Recommendations**

- Urge the governor and state Legislature to reform the education funding formula to a more equitable, progressive formula that supports funding for needed capital infrastructure investments. Consider providing dedicated funding for school infrastructure requirements with provisions that will prevent these funds from being redirected towards paying for operating expenses
- Work with the Ohio congressional members to establish a federal/state/local partnership with the federal government assuming a leadership role to address school infrastructure funding needs on a continuing basis
- Expand federal tax credits supporting increased use of school construction bonds
- Encourage school districts to adopt regular, comprehensive construction and maintenance programs.
Sources


3. Ohio School Facilities Commission Website, [www.osfc.ohio.gov](http://www.osfc.ohio.gov)


7. School Data Direct Website, [www.schooldatadirect.org](http://www.schooldatadirect.org)

8. Rebuild Americas Schools Website, [www.rebuildamericasschools.org](http://www.rebuildamericasschools.org)
Wastewater

Grade: D+

Much of the burden on funding for municipal wastewater treatment is borne by local government, estimated to be 95% local versus state funded during the period 1991-2005. Aging systems discharge billions of gallons of untreated wastewater into U.S. surface waters each year. Several federal agencies estimate that the nation must invest billions over the next 20 years to update or replace existing wastewater systems and build new ones to meet increasing demand. Preservation and restoration of clean water supplies for the many uses our society expects will require the cooperation and participation of all levels of government to provide necessary funding. ASCE estimates that Ohio has $11.16 billion in wastewater infrastructure needs.

Background

Clean water, both surface waters and drinking water, has been an intrinsic part of our nation’s development. The public has come to depend on our government to provide the policies and infrastructure to ensure that clean water is available to support its many uses in our society. The preservation of our clean water supply is a multifaceted effort involving many federal, state, and local government organizations, as well as private firms and individuals. This section of the report card will address the status of a portion of Ohio’s infrastructure that contributes to the provision of clean water for the state’s residents and visitors.

The Ohio Environmental Protection Agency (OEPA), Division of Surface Waters (DSW) Website lists more than 20 programs associated with clean water that are administered by the DSW. These programs cover a wide range of topics, some of which are beyond the scope of this section. This Wastewater section of the report card focuses on two broad areas: public and private wastewater treatment facilities for municipalities and surface water preservation and restoration. The section will not specifically address privately-owned septic systems serving individual homes, treatment and disposal of industrial wastes stemming from commercial facilities, or solid waste (sludge) disposal. Surface waters are addressed through consideration of wastewater and storm water impacts on water quality and through discussion of non-point source pollution. Drinking water is discussed in a separate section of the report card.

ASCE, in the 2009 Report Card for America’s Infrastructure, indicated that several organizations have released estimates of funding shortfalls associated with the operation, maintenance, repair, upgrade, and/or construction of new wastewater facilities to meet current and projected demand. The U.S. Environmental Protection Agency (EPA) in their 2008 report to Congress estimated that, as of 2004, nationwide capital investment needs for wastewater pollution control were $202.5 billion. This amount includes $134.4 billion for wastewater treatment and collection systems, $54.8 billion for combined sewer overflow corrections, and $9.0 billion for storm water management. Small communities have documented needs of approximately $17.0 billion. The EPA indicates that the increase in overall national needs is due to a combination of population growth, more protective water quality standards, and aging infrastructure.

In 2002, in response to a joint request from the 106th Congress, the Congressional Budget Office (CBO) estimated that an annual investment between $13.0 billion and $20.9 billion would be needed for wastewater systems during the period 2000-2019. The CBO also estimated that annual operations and maintenance costs for wastewater treatment during the same period,
which are not eligible for federal aid under current programs, would average between $21.4 billion and $25.2 billion. The CBO presented estimates for low-cost and high-cost scenarios for both capital investments and operations and maintenance costs for what they consider to be the most likely possibilities. They indicate that this is necessary because of the large uncertainty in the estimates of these future costs.  

In 2002, the EPA also released *The Clean Water and Drinking Water Gap Analysis* they conducted to identify whether there was a quantifiable gap between current levels of spending and projected clean water investment needs. The EPA indicated that uncertainty in the methods and assumptions used to generate the estimates warranted the presentation of a lowermost and uppermost extreme. The EPA also included a point estimate that is an average of each possible combination of assumptions. Estimates of capital needs for clean water investments during the period 2000-2019 ranged from $331 billion to $450 billion with a point estimate of $388 billion. Estimates for the capital needs gap for clean water ranged from $0 billion to $177 billion with point estimates ranging from $21 billion to $122 billion depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap. The EPA also compared projected operations and maintenance needs during the period 2000-2019 with current levels of spending and estimated the gap to be between $0 billion and $229 billion with point estimates ranging from $10 billion to $148 billion, depending upon whether the EPA used a revenue-growth or no-growth scenario to estimate the gap.  

Regardless of which of these estimates is considered, it is clear that operations, maintenance, and capital investments in wastewater treatment facilities are not keeping up with the decaying infrastructure and the increasing demand placed on these facilities. This is despite significant investments being made by local, state, and federal governments. ASCE indicates that Congress has invested more than $77 billion in the construction of publicly-owned treatment facilities since 1972. ASCE indicates that total nonfederal spending on sewer and water between 1991 and 2005 was $841 billion. ASCE states that the physical condition of many of the nation’s 16,000 wastewater treatment systems is poor due to a lack of investment in plants, equipment, and other capital improvements over the years.  

A consequence of the investment gap in wastewater infrastructure is that many systems have reached the end of their useful design lives. Older systems that mingle storm and wastewater collection systems are plagued by chronic overflows during major rainstorms and heavy snowmelt, which results in the discharge of raw sewage into surface waters. The EPA estimated that the volume of combined sewer overflows discharged nationwide is 850 billion gallons per year. According to the EPA, sanitary sewer overflows, caused by blocked or broken pipes, result in the release of as much as 10 billion gallons of raw sewage annually.  

Much of the burden on funding for municipal wastewater treatment is borne by local government. In their 2007 report *Who Pays for the Water Pipes, Pumps and Treatment Works? - Local Government Expenditures on Sewer and Water – 1991 to 2005*, the U.S. Conference of Mayors cites statistics obtained from the U.S. Census Bureau that indicate that the local government share of funding spent on sewer services (their term for the pipes, pumps and water treatment works that comprise a public-purpose wastewater treatment system) is just over 95%. Table 1 compares local government expenditures to state expenditures for the fiscal years 1991-1992 through 2004-2005. Also included in the table are disaggregated capital outlays for sewer systems which averaged nearly $10 billion per year for the 12 years of data available.  

Page 58
Table 1. Local and State Sewer Expenditures

The Census Bureau data indicate that local government spending has increased approximately 75% during the 14 years presented in Table 1, with a relatively consistent trend of increased spending per year. State spending over this period was relatively flat. Local government capital spending also increased, although the trend was less consistent. Despite the increased spending by local governments, the national statistics cited above indicate that additional operations, maintenance, and capital investment is required.

Ohio Wastewater Facts and Issues

There is a general lack of statewide data for Ohio on which to draw conclusions. A lack of reported statewide data seems to be true nationally, and was alluded to in several of the sources for national data referenced in this section. Other state infrastructure report cards have also cited this as a limitation in preparing a statewide assessment of wastewater infrastructure. For instance, Colorado’s 2008 Infrastructure Report Card indicated that one of the most critical findings of the research effort for the wastewater section of the report was a lack of findings. The Colorado report indicated that the available information about the existing water infrastructure is scarce, and where it did exist, is limited in description. The report cited the dearth of existing data documenting the current or future state of Colorado’s wastewater infrastructure as a limitation that results in an estimate indirectly founded on defensible data.7

The OEPA Website provides information about programs administered in the state and which includes current status and future plans related to Ohio’s wastewater programs. Of the over 20 programs included under the DSW, several are cited in the following paragraphs.1
The OEPA Storm Water program implements the federal storm water program for both industry and municipalities within the state. Storm water discharges are generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during rainfall and snow events that often contain pollutants in quantities that could adversely affect water quality. Most storm water discharges are considered point sources and require coverage by a National Pollutant Discharge Elimination System (NPDES) permit.

The OEPA Combined Sewer Overflow program addresses the control of municipal and industrial sewer overflows that occur during periods of heavy rainfall. The locations where discharges of untreated combined wastewater occur, as well as the discharge events themselves, are known as combined sewer overflows (CSOs). Combined sewers were built to collect sanitary and industrial wastewater, and storm water runoff, and transport this combined wastewater to treatment facilities. Flows conveyed to the treatment plant are then treated and discharged to a nearby river or stream. Combined sewers are designed to transport all flows to a treatment plant during dry weather and small wet weather events (i.e., rainfall and snowmelt). During larger wet weather events, the volume of storm water entering the combined sewer system may exceed the capacity of the combined sewers or the treatment plant. When this happens, combined sewers are designed to allow a portion of the untreated combined wastewater to overflow into the nearest ditch, stream, river or lake. This prevents pipes rupturing, sewage backing up into basements, and/or streets flooding. Ohio has approximately 1,308 known CSOs in 86 communities as of June 2008, ranging from small, rural villages to large metropolitan areas. OEPA continues to implement CSO controls through provisions included in NPDES permits and using orders and consent agreements when appropriate. The NPDES permits for CSO communities require them to implement the nine minimum control measures. Requirements to develop and implement Long Term Control Plans (LTCPs) are also included where appropriate. In 2007, the U.S. EPA adopted a new definition for the Water Safe for Swimming Measure, which sets goals to address the water quality and human health impacts of CSOs. The new definition sets a goal of incorporating an implementation schedule of approved projects into an appropriate enforceable mechanism, including a permit or enforcement order, with specific dates and milestones for 75% of the nation's CSO communities. As of May 2008, 54 of Ohio's original 89 CSO communities meet this definition. An additional 13 communities are required to meet the definition by October, 2008 to bring Ohio into compliance with U.S. EPA's goal.

A lakes monitoring and assessment program was identified as a key area for development in OEPA's Surface and Ground Water Strategy 2005-2009. OEPA initiated a new Inland Lakes Program on March 1, 2006. This program is an initiative to evaluate the water quality of Ohio's inland lakes and reservoirs and to provide a mechanism to determine attainment of Clean Water Act goals for various uses, including aquatic life, recreation, public water supply, and human health.

OEPA's Lake Erie programs include participation by the DSW in many state and regional Lake Erie and Great Lakes related issues and efforts. The two main programs are: the development and implementation of Remedial Action Plans (RAPS) for the Maumee, Black, Cuyahoga and Ashtabula river areas of concern and the development of a lake-wide management plan (LaMP) for Lake Erie. Both of these efforts are focused on reducing the loadings of pollutants and restoring all beneficial uses to these water bodies. Both programs are described in the Great Lakes Water Quality Agreement between Canada and the United States, and are mandated under the Great Lakes Critical Programs Act amendment to the Clean Water Act.
The OEPA Total Maximum Daily Load (TMDL) program focuses on identifying and restoring impaired or threatened water bodies. The program was established under Section 303(d) of the Clean Water Act to address polluted rivers, streams, lakes and other surface water bodies. A TMDL is a written, quantitative assessment of water quality problems in a water body and its contributing sources of pollution. It specifies the amount a pollutant needs to be reduced to meet water quality standards, allocates pollutant load reductions, and provides the basis for taking actions needed to restore a water body. The DSW developed a 12-step project-management-based TMDL process to accomplish these assessments. The process builds on existing monitoring, modeling, permitting, and grant programs and works within a “five-year monitoring strategy.” The process calls for increased public involvement in problem-solving and decision-making.1

The OEPA indicates that the Clean Water Act helped solve many of Ohio’s traditional, point source pollution problems. Many of the remaining problems are more challenging because they result from two other sources of pollutants: polluted runoff and physical alterations to a stream or river channel. These are referred to as non-point sources of pollution since they are the result of land use and/or man-made changes to a river rather than flows from a single point of discharge.1

Polluted runoff is rain or snowmelt that flows across the land picking up contaminants such as sediment, nutrients, or bacteria. The runoff carries these pollutants to small streams that eventually flow into a larger river. Physical alterations are changes made to a stream channel or stream banks and include activities, such as the conversion of headwater streams into drainage ditches, constructing levees and dams, and straightening a stream to encourage improved drainage. Physical alterations also include activities, such as removing trees along a river bank or installing rock rip-rap on a river bank to prevent erosion.1

Provisions of the Clean Water Act call upon states to develop comprehensive plans to manage non-point source pollution in their rivers and streams. Ohio’s Non-point Source Management Plan (NSMP) was first completed in 1998 and consisted of more than 600 pages of detailed strategies for addressing water quality impairments. Subsequent revisions to the plan were completed in 1992, 1999 and, most recently, in 2005. The purpose of Ohio’s NSMP is to identify strategies implemented by Ohio’s NSMP partners to restore and maintain the chemical, physical and biological integrity of surface water bodies in the state. The short-term goal of the plan is for 80% of the Ohio's streams to attain their designated aquatic life-uses by 2010.1

The OEPA often relies on local government organizations to implement the plans they develop under the various programs discussed above. One example of a local government program is Project Clean Rivers of the City of Columbus, Department of Public Utilities, Division of Sewerage and Drainage (DOSD). Project Clean Rivers is an umbrella title of the various programs and services that DOSD provides to achieve clean water goals. The following paragraphs describe several efforts within Project Clean Rivers that illustrate how local governments comply with federal and state policies.8

The Wet Weather Management Plan (WWMP) was delivered to the OEPA on July 1, 2005 and OEPA has now issued final approval for the plan. This plan included the System Evaluation and Capacity Assurance Plan (SECAP) and the Combined Sewer Overflow Long Term Control Plan (LTCP), both required by consent orders that Columbus signed in 2002 and 2004 with the state of Ohio. Large-scale capital improvements will be designed under this plan, which are expected
to cost $2.5 billion over the next 40 years. When the plan’s improvements are implemented, there will be a dramatic decrease in sewer overflows and basement backups that occur in the Columbus service area after rain events and snowmelt. The improvements are in addition to other projects already underway and planned, such as rehabilitation of older sewers and upgrades at the wastewater treatment plants.\textsuperscript{1,8}

Construction on the Big Walnut Augmentation/Rickenbacker Interceptor is currently underway. This sewer tunneling capital improvement project that will greatly reduce wet weather sewer overflows on the Scioto River at the Southerly Wastewater Treatment Plant by providing in-pipe storage. Construction of this deep tunnel will also provide additional downstream capacity needed for future improvements on the east side of Columbus. Construction costs are estimated to be $220 million.\textsuperscript{8}

The DOSD conducts inflow and infiltration studies to locate sources of storm water and groundwater that enter the sewer system in various ways. Older sewers are being rehabilitated through trenchless technology, such as cured-in-place piping methods. The process helps seal out excess water that contributes to sewer backups and overflows and reinforces the structural integrity of the sewer, preventing collapse. The DOSD also conducts the Capacity Management, Operation and Maintenance Program, the Industrial Waste Pretreatment Program, the Storm Water Management Program, and the Water Quality Management Program under the Clear Rivers Project umbrella.\textsuperscript{8}

In the \textit{2009 Report Card for America’s Infrastructure}, ASCE indicated that Ohio has $11.16 billion in wastewater infrastructure needs.\textsuperscript{2}

\textbf{Policy Options}

The CBO indicates that federal support for water system investment comes from several programs. These include clean water and drinking water State Revolving Funds (SRFs) under the Clean Water Act, which provide capitalization grants through appropriations to EPA, loan and grant programs from the Department of Agriculture’s Rural Utilities Service, and Community Development Block Grants administered by the Department of Housing and Urban Development. The federal government also supports water infrastructure through tax preference on municipal debt and qualified private activity bonds.\textsuperscript{4}

ASCE indicates that federal funding under SRFs has remained flat for more than a decade. ASCE contends that federal assistance has not kept pace with the needs, and that virtually every authority agrees that funding needs remain very high.\textsuperscript{2} However, the CBO contends that increasing federal funding for wastewater system investment can have unintended consequences. The CBO indicates that analysis of the federal wastewater construction grants program concluded that it reduced other contributions to wastewater capital spending by 67 cents on the dollar. They indicate that federal support does not necessarily increase investment in water infrastructure because the federal support may prompt cuts in state and local spending or the state and local spending to be diverted to other uses. The CBO points out that federal subsidies can redistribute the burden of water costs from some households to others, and that subsidies run the risk of undermining incentives for managers and consumers to take cost-effective actions, thereby retarding change in the water industry and raising total costs to the nation as a whole.\textsuperscript{4}
Despite the reservations cited by the CBO and others, ASCE indicates that the case for increased federal investment is compelling. Current and projected funding needs are large and unprecedented. ASCE indicates that in many locations, local sources cannot be expected to meet this challenge alone and, because waters are shared across local and state boundaries, the benefits of federal help will be disseminated throughout the nation. Many other highly important infrastructure programs enjoy sustainable, long-term sources of federal backing, often through the use of dedicated trust funds. Under current policy, water and wastewater infrastructure do not.\(^2\)

**Specific ASCE Ohio Council Recommendations**

- Increase funding for wastewater infrastructure system improvements and associated operations through a comprehensive program that addresses all aspects of point and non-point source pollution
- Create a national Water Infrastructure Trust Fund to increase funding for the upgrade of state and local infrastructure systems under the Clean Water Act, including storm water management and other projects designed to improve the nation’s water quality
- Retain traditional financing mechanisms, such as appropriations from general treasury funds, issuance of revenue bonds and tax exempt financing at state and local levels, public-private partnerships, state infrastructure banks, and user fees on certain consumer products
- Expand innovative financing mechanisms, including broad-based environmental restoration taxes

**Sources**

1. Ohio Environmental Protection Agency, Division of Surface Water Website, [http://www.epa.state.oh.us/dsw](http://www.epa.state.oh.us/dsw)


8 City of Columbus, Department of Public Utilities, Division of Sewerage and Drainage Website, [http://utilities.columbus.gov/](http://utilities.columbus.gov/)
Acknowledgements

Infrastructure Report Card Committee

Kevin P. Carpenter, P.E., P.S., Chairman
Jennifer M. Alford, P.E.
Aaron H. Call
Matthew P. Choma, P.E.
David C. Lenzer
Stephen J. Loskota, P.E.
Daniel M. Hill, P.E.
James A. Pajk, P.E.
Charles M. Poskas, P.E.
David F. Pritchard, P.E.
Robert K. Redfield
Michael J. Smejkal, P.E.
Brian D. Toombs, P.E.
Emily E. Wieringa, P.E.

Peer Review Committee

Gina K. Beim, P.E.
Carolyn J. Merry, PhD
James F. Neuenschwander, P.E.
Randall S. Over, P.E.
Dean C. Ringle, P.E., P.S.
Jennifer M. Webster, P.E.

Ohio Council

Joseph A. Recktenwald, P.E., President
Scott J. Heisey, P.E., Vice President
Donald H. Gallimore, P.E., Secretary
James A. Pajk, P.E., Treasurer
Delegates from the Ohio Sections