

**2013**

**REPORT  
CARD**

★ for ★ **america's  
INFRASTRUCTURE**

**EXECUTIVE SUMMARY**

**ASCE**



## ABOUT ASCE

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American Society of Civil engineers, founded in 1852, is the country's oldest national civil engineering organization. It represents more than 140,000 civil engineers in private practice, government, industry and academia who are dedicated to advancing the science and profession of civil engineering.

# Every family, every community, and every business needs infrastructure to thrive.

Infrastructure encompasses your local water main and the Hoover Dam; the power lines connected to your house and the electrical grid spanning the U.S.; and the street in front of your home and the national highway system.

Once every four years, America's civil engineers provide a comprehensive assessment of the nation's major infrastructure categories in ASCE's *Report Card for America's Infrastructure (Report Card)*. Using a simple A to F school report card format, the *Report Card* provides a comprehensive assessment of current infrastructure conditions and needs, both assigning grades and making recommendations for how to raise the grades. An Advisory Council of ASCE members assigns the grades according to the following eight criteria: capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation. Since 1998, the grades have been near failing, averaging only Ds, due to delayed maintenance and underinvestment across most categories.



Download the full Report Card to your tablet and smartphone at [www.infrastructurereportcard.org](http://www.infrastructurereportcard.org)

## AMERICA'S CUMULATIVE INFRASTRUCTURE G.P.A.



# D+

Now the 2013 *Report Card* grades are in, and America's cumulative GPA for infrastructure rose slightly to a D+. The grades in 2013 ranged from a high of B- for solid waste to a low of D- for inland waterways and levees. Solid waste, drinking water, wastewater, roads, and bridges all saw incremental improvements, and rail jumped from a C- to a C+. No categories saw a decline in grade this year.

The 2013 *Report Card* demonstrates that we can improve the current condition of our nation's infrastructure — when investments are made and projects move forward, the grades rise. For example, greater private investment for efficiency and connectivity brought improvements in the rail category; renewed efforts in cities and states helped address some of the nation's most vulnerable bridges; and several categories benefited from short-term boosts in federal funding.

We know that investing in infrastructure is essential to support healthy, vibrant communities. Infrastructure is also critical for

long-term economic growth, increasing GDP, employment, household income, and exports. The reverse is also true — without prioritizing our nation's infrastructure needs, deteriorating conditions can become a drag on the economy.

While the modest progress is encouraging, it is clear that we have a significant backlog of overdue maintenance across our infrastructure systems, a pressing need for modernization, and an immense opportunity to create reliable, long-term funding sources to avoid wiping out our recent gains. Overall, most grades fell below a C, and our cumulative GPA inched up just slightly to a D+ from a D four years ago.

The total investment needed by 2020 across all infrastructure categories was estimated at \$3.6 trillion, leaving a funding shortfall of \$1.6 trillion (see table 2). We invite you to take a deeper look at the nation's infrastructure conditions in the 2013 *Report Card* — from the state infrastructure facts, to the interactive charts, to our catalog of infrastructure success stories in every state — at [www.infrastructurereportcard.org](http://www.infrastructurereportcard.org).

TABLE 1

# 2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE

|  |                             |    |  |
|--|-----------------------------|----|--|
|  | Aviation                    | D  | <p><b>A</b> = Exceptional<br/><b>B</b> = Good<br/><b>C</b> = Mediocre<br/><b>D</b> = Poor<br/><b>F</b> = Failing</p> <p><i>Each category was evaluated on the basis of capacity, condition, funding, future need, operation and maintenance, public safety, resilience, and innovation</i></p> |
|  | Bridges                     | C+ |  |
|  | Dams                        | D  |  |
|  | Drinking Water              | D  |  |
|  | Energy                      | D+ |  |
|  | Hazardous Waste             | D  |  |
|  | Inland Waterways            | D- |  |
|  | Levees                      | D- |  |
|  | Ports                       | C  |  |
|  | Public Parks and Recreation | C- |  |
|  | Rail                        | C+ |  |
|  | Roads                       | D  |  |
|  | Schools                     | D  |  |
|  | Solid Waste                 | B- |  |
|  | Transit                     | D  |  |
|  | Wastewater                  | D  |  |
|  | America's Cumulative G.P.A. | D+ |  |

ESTIMATED INVESTMENT NEEDED BY 2020:

\$3.6 TRILLION

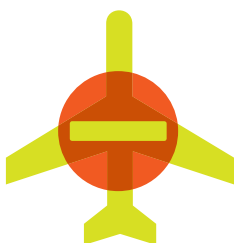




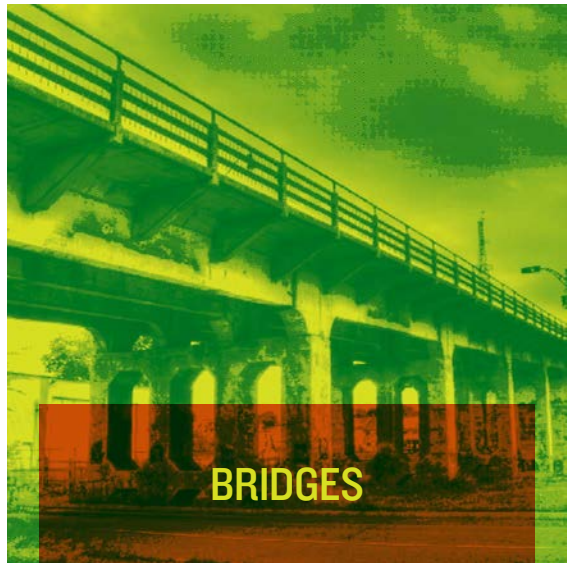
## AVIATION

D

Despite the effects of the recent recession, commercial enplanements were about 33 million higher in number in 2011 than in 2000, stretching the system's ability to meet the needs of the nation's economy. The Federal Aviation Administration (FAA) estimates that the national cost of airport congestion and delays was almost \$22 billion in 2012. If current federal funding levels are maintained, the FAA anticipates that the cost of congestion and delays to the economy will rise from \$34 billion in 2020 to \$63 billion by 2040.



**\$22 BILLION**  
2012 COST OF CONGESTION  
AT AIRPORTS



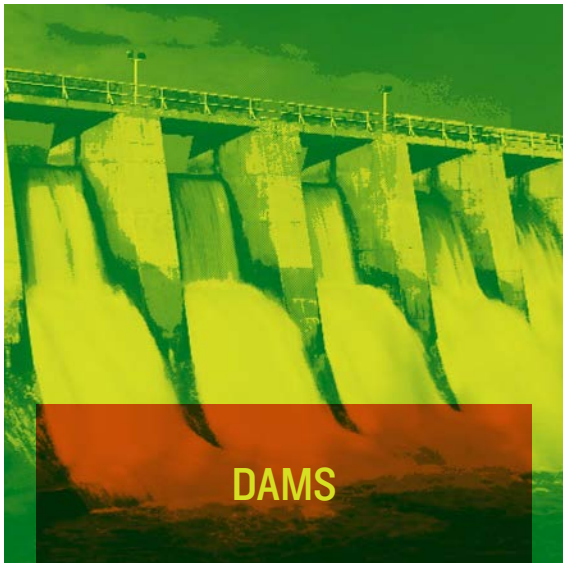
## BRIDGES

C+

Over two hundred million trips are taken daily across deficient bridges in the nation's 102 largest metropolitan regions. In total, one in nine of the nation's bridges are rated as structurally deficient, while the average age of the nation's 607,380 bridges is currently 42 years. The Federal Highway Administration (FHWA) estimates that to eliminate the nation's bridge backlog by 2028, we would need to invest \$20.5 billion annually, while only \$12.8 billion is being spent currently. The challenge for federal, state, and local governments is to increase bridge investments by \$8 billion annually to address the identified \$76 billion in needs for deficient bridges across the United States.



**1 IN 9**  
BRIDGES RATED AS  
STRUCTURALLY DEFICIENT



## DAMS

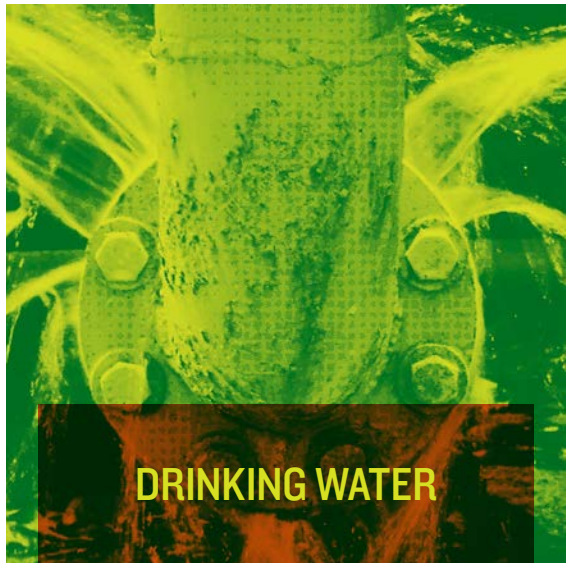
D

The average age of the 84,000 dams in the country is 52 years old. The nation's dams are aging and the number of high-hazard dams is on the rise. Many of these dams were built as low-hazard dams protecting undeveloped agricultural land. However, with an increasing population and greater development below dams, the overall number of high-hazard dams continues to increase, to nearly 14,000 in 2012. The number of deficient dams is currently more than 4,000. The Association of State Dam Safety Officials estimates that it will require an investment of \$21 billion to repair these aging, yet critical, high-hazard dams.



**4,000**

DAMS CURRENTLY  
DEFICIENT IN THE U.S.



## DRINKING WATER

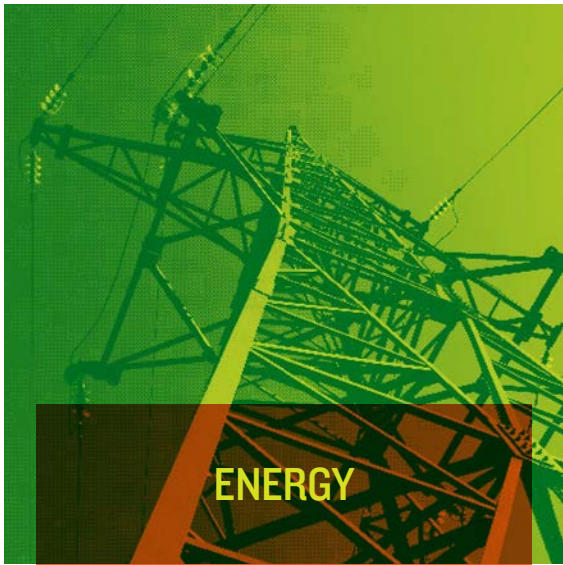
D

At the dawn of the 21st century, much of our drinking water infrastructure is nearing the end of its useful life. There are an estimated 240,000 water main breaks per year in the United States. Assuming every pipe would need to be replaced, the cost over the coming decades could reach more than \$1 trillion, according to the American Water Works Association. The quality of drinking water in the United States remains universally high, however. Even though pipes and mains are frequently more than 100 years old and in need of replacement, outbreaks of disease attributable to drinking water are rare.



**240,000**

WATER MAIN BREAKS  
PER YEAR IN THE U.S.



ENERGY

D+

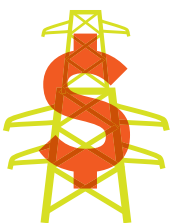
America relies on an aging electrical grid and pipeline distribution systems, some of which originated in the 1880s. Investment in transmission has increased since 2005, but ongoing permitting issues, weather events, and limited maintenance have contributed to an increasing number of failures and power interruptions. While demand for electricity has remained level, the availability of energy will become a greater challenge after 2020. Although about 17,000 miles of additional high-voltage transmission lines and significant oil and gas pipelines are planned over the next five years, permitting and siting issues threaten their completion.



HAZARDOUS WASTE

D

There has been undeniable success in the cleanup of the nation's hazardous waste and brownfields sites. However, annual funding for Superfund site cleanup is estimated to be as much as \$500 million short of what is needed, and 1,280 sites remain on the National Priorities List with an unknown number of potential sites yet to be identified. More than 400,000 brownfields sites await cleanup and redevelopment. The Environmental Protection Agency (EPA) estimates that one in four Americans lives within three miles of a hazardous waste site.



**\$1,000**

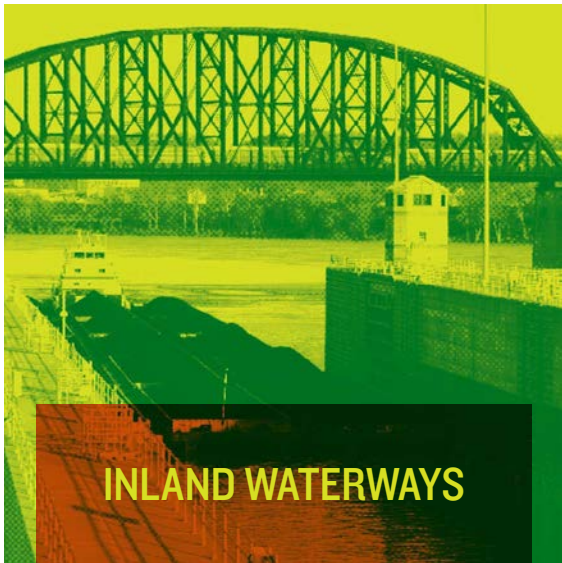
AVERAGE COST OF ONE  
HOUR OF POWER DISRUPTION  
FOR A BUSINESS



**1 IN 4**

AMERICANS LIVING WITHIN  
THREE MILES OF A  
HAZARDOUS WASTE SITE

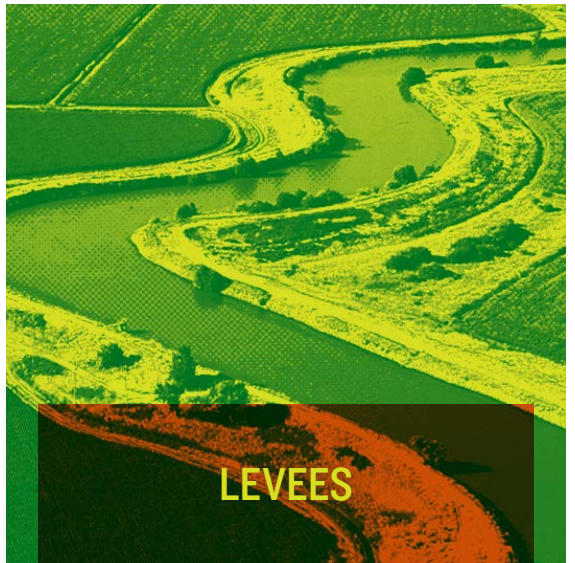




## INLAND WATERWAYS

# D-

Our nation's inland waterways and rivers are the hidden backbone of our freight network — they carry the equivalent of about 51 million truck trips each year. In many cases, the inland waterways system has not been updated since the 1950s, and more than half of the locks are over 50 years old. Barges are stopped for hours each day with unscheduled delays, preventing goods from getting to market and driving up costs. There is an average of 52 service interruptions a day throughout the system. Projects to repair and replace aging locks and dredge channels take decades to approve and complete, exacerbating the problem further.

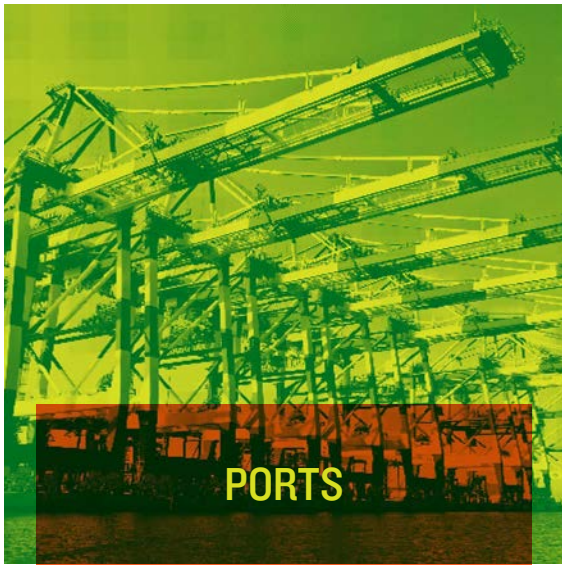


## LEVEES

# D-

The nation's estimated 100,000 miles of levees can be found in all 50 states and the District of Columbia. Many of these levees were originally used to protect farmland, and now are increasingly protecting developed communities. The reliability of these levees is unknown in many cases, and the country has yet to establish a National Levee Safety Program. Public safety remains at risk from these aging structures, and the cost to repair or rehabilitate these levees is roughly estimated to be \$100 billion by the National Committee on Levee Safety. However, the return on investment is clear — as levees helped in the prevention of more than \$141 billion in flood damages in 2011.





## PORTS

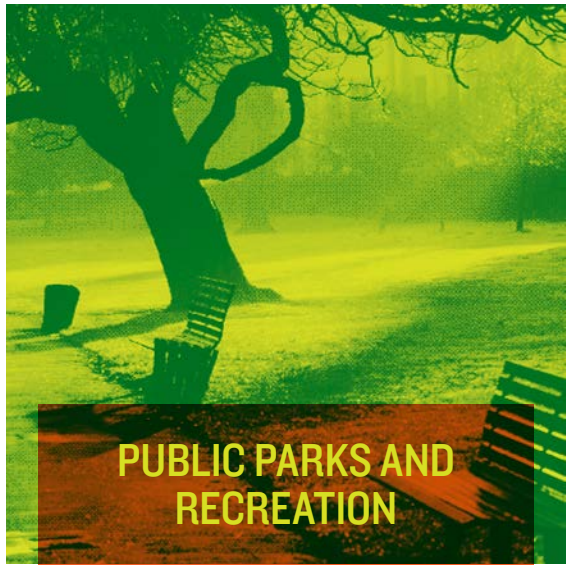
# C

The U.S. Army Corps of Engineers estimates that more than 95% (by volume) of overseas trade produced or consumed by the United States moves through our ports. To sustain and serve a growing economy and compete internationally, our nation's ports need to be maintained, modernized, and expanded. While port authorities and their private sector partners have planned over \$46 billion in capital improvements from now until 2016, federal funding has declined for navigable waterways and landside freight connections needed to move goods to and from the ports.



# 95%

PERCENT OF OVERSEAS  
TRADE THAT MOVES  
THROUGH OUR PORTS



## PUBLIC PARKS AND RECREATION

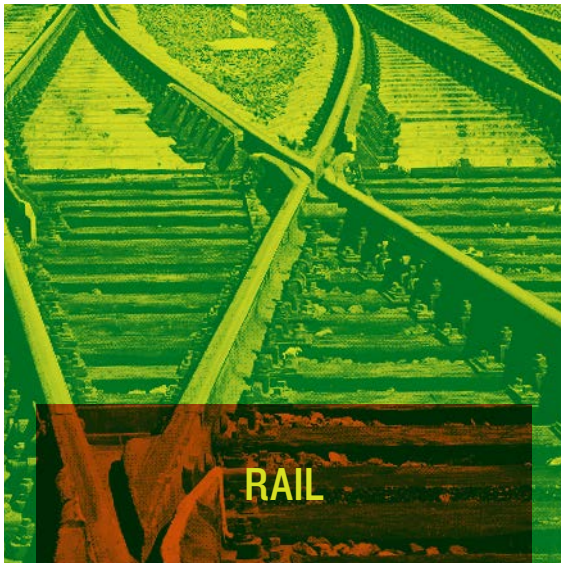
# C-

The popularity of parks and outdoor recreation areas in the United States continues to grow, with over 140 million Americans making use of these facilities a part of their daily lives. These activities contribute \$646 billion to the nation's economy, supporting 6.1 million jobs. Yet states and localities struggle to provide these benefits for parks amid flat and declining budgets, reporting an estimated \$18.5 billion in unmet needs in 2011. The federal government is also facing a serious challenge as well since the National Park Service estimates its maintenance backlog at approximately \$11 billion.



# \$11 BILLION

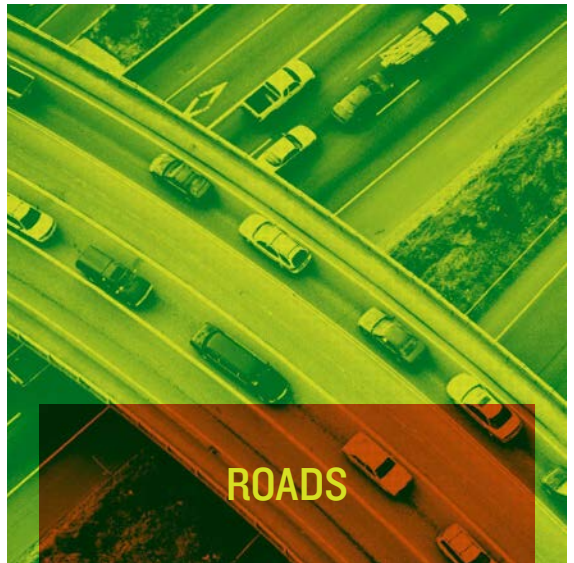
NATIONAL PARK SERVICE  
MAINTENANCE BACKLOG



RAIL

C+

Railroads are experiencing a competitive resurgence as both an energy-efficient freight option and a viable city-to-city passenger service. In 2012, Amtrak recorded its highest year of ridership with 31.2 million passengers, almost doubling ridership since 2000. In 2010 alone, freight railroads renewed the rails on more than 3,100 miles of railroad track, equivalent to going coast to coast. Since 2009, capital investment from both freight and passenger railroads has exceeded \$75 billion, actually increasing investment during the recession.



ROADS

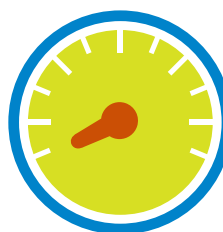
D

Forty-two percent of America's major urban highways remain congested, costing the economy an estimated \$101 billion in wasted time and fuel annually. While the conditions have improved in the near term, and federal, state, and local capital investments increased to \$91 billion annually, that level of investment is insufficient and still projected to result in a decline in conditions and performance in the long term. Currently, the Federal Highway Administration estimates that \$170 billion in capital investment would be needed on an annual basis to significantly improve conditions and performance.



**\$75 BILLION**

CAPITAL INVESTMENT  
MADE IN FREIGHT AND  
PASSENGER RAIL SINCE 2009



**42%**

PERCENT OF AMERICA'S  
HIGHWAYS THAT  
REMAIN CONGESTED





## SCHOOLS

# D

Almost half of America's public school buildings were built to educate the baby boomers — a generation that is now retiring. Public school enrollment is projected to gradually increase through 2019, yet, national spending on school construction has declined to approximately \$10 billion in 2012, about half the level spent prior to the recession. Experts now estimate the investment needed to modernize and maintain our nation's school facilities is at least \$270 billion or more. However, due to the absence of national data on school facilities for more than a decade, a complete picture of the condition of our nation's schools remains mostly unknown.



# 1/2

SCHOOL CONSTRUCTION  
FUNDING COMPARED  
TO PREVIOUS LEVELS



## SOLID WASTE

# B-

In 2010, Americans generated 250 million tons of trash. Of that, 85 million tons were recycled or composted. This represents a 34% recycling rate, more than double the 14.5% in 1980. Per capita generation rates of waste have been steady over the past 20 years and have even begun to show signs of decline in the past several years.



# 34%

PERCENT OF AMERICA'S  
TRASH THAT IS RECYCLED





## TRANSIT

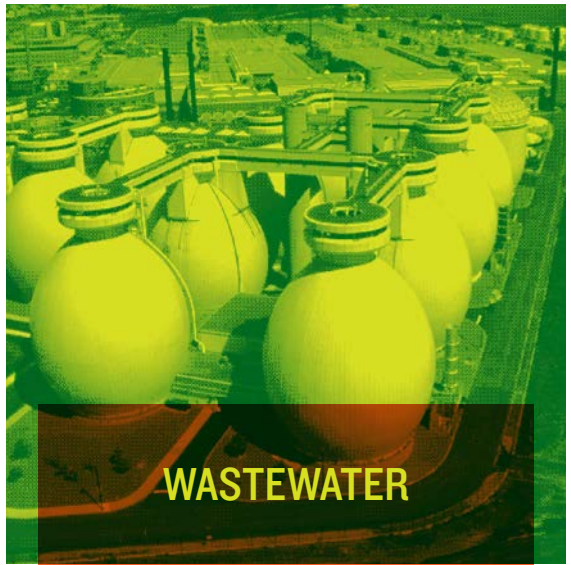
# D

America's public transit infrastructure plays a vital role in our economy, connecting millions of people to their destinations, particularly for the one-third of Americans who do not drive cars. Unlike many U.S. infrastructure systems, the transit system is not comprehensive, as 45% of American households lack any access to transit, and millions more have inadequate service levels. Americans who do have access have increased their ridership 9.1% in the past decade, and that trend is expected to continue. Although transit investment has also increased, deficient and deteriorating transit systems cost the U.S. economy \$90 billion in 2010.



# 45%

PERCENT OF AMERICAN HOUSEHOLDS LACK ANY ACCESS TO TRANSIT



## WASTEWATER

# D

Capital investment needs for the nation's wastewater and stormwater systems are estimated to total \$298 billion over the next 20 years. Pipes represent the largest capital need, comprising three quarters of total needs. In recent years, capital needs for the treatment plants comprise about 15%-20% of total needs, but will likely increase due to new regulatory requirements. Stormwater needs, while growing, are still small compared with sanitary pipes and treatment plants. Since 2007, the federal government has required cities to invest more than \$15 billion in new pipes, plants, and equipment to eliminate combined sewer overflows.



# 75%

PERCENT OF WASTEWATER CAPITAL NEED IS FOR PIPE REPAIR

BY 2020, WITHOUT INCREASED INVESTMENT, TRANSPORTATION DELAYS, BLACKOUTS AND BROWNOUTS, AND WATER MAIN BREAKS WILL LEAD TO INCREASED COSTS OF:

**\$1.2 TRILLION  
TO BUSINESSES AND  
\$611 BILLION  
TO HOUSEHOLDS**

**U.S. Infrastructure Needs**

With each *Report Card*, ASCE estimates the investment needed in each infrastructure category to get to a state of good repair. That is, approximately what amount of investment is needed to get to a grade of B?

Table 2 provides the estimated cumulative investment needs by infrastructure category based on current trends extended to the year 2020 (dollars in \$2010 billions). Categories that are not shaded rely on data from ASCE’s *Failure to Act* series.

**Infrastructure’s Link to our Economy**

The grades in the *Report Card* are a comprehensive assessment of current infrastructure conditions across America. It is important to note that these infrastructure conditions have impacts on our economy as well.

In 2011, ASCE commissioned a series of economic reports called *Failure to Act* to provide an objective analysis of the economic implications for the United States of current investment trends in key infrastructure sectors.

Analyzing current national investment trends for surface transportation, water and wastewater, electricity, airports, inland waterways, and marine ports, the report conveys the overall economic impacts in terms of change in GDP, household income, employment, and exports in the years 2020 and 2040.

In short, investing in infrastructure is an engine for long-term economic growth, increasing GDP, employment, household income, and exports. The reverse is also true – without investing, infrastructure can become a drag on the economy.

Without increased investment, the report concluded that transportation delays, blackouts and brownouts, and water main breaks will lead to increased costs of \$1.2 trillion to businesses and \$611 billion to households by 2020. As conditions deteriorate, it will cost American families an average of \$3,100 a year in disposable personal income.

For more information on these reports, please visit [www.asce.org/failuretoact](http://www.asce.org/failuretoact).

TABLE 2

# CUMULATIVE INFRASTRUCTURE NEEDS BY SYSTEM BASED ON CURRENT TRENDS EXTENDED TO 2020

DOLLARS IN \$2010 BILLIONS

| Infrastructure System |  | Total Needs | Estimated Funding | FUNDING GAP |  |
|-----------------------|--|-------------|-------------------|-------------|--|
|                       | Surface Transportation <sup>1</sup>          | \$1,723     | \$877             | \$846       |  |
|                       | Water/Wastewater Infrastructure <sup>1</sup> | \$126       | \$42              | \$84        |  |
|                       | Electricity <sup>1</sup>                     | \$736       | \$629             | \$107       |  |
|                       | Airports <sup>1,2</sup>                      | \$134       | \$95              | \$39        |  |
|                       | Inland Waterways & Marine Ports <sup>1</sup> | \$30        | \$14              | \$16        |  |
|                       | Dams <sup>3</sup>                            | \$21        | \$6               | \$15        |  |
|                       | Hazardous & Solid Waste <sup>4</sup>         | \$56        | \$10              | \$46        |  |
|                       | Levees <sup>5</sup>                          | \$80        | \$8               | \$72        |  |
|                       | Public Parks & Recreation <sup>6</sup>       | \$238       | \$134             | \$104       |  |
|                       | Rail <sup>7</sup>                            | \$100       | \$89              | \$11        |  |
|                       | Schools <sup>8</sup>                         | \$391       | \$120             | \$271       |  |
|                       | TOTALS                                       | \$3,635     | \$2,024           | \$1,611     |  |
|                       | YEARLY INVESTMENT NEEDED                     | \$454       | \$253             | \$201       |  |

**SOURCES** | 1. Data take from ASCE Failure to Act Series published 2011-13. [www.asce.org/failuretoact](http://www.asce.org/failuretoact) | 2. Airport needs and gaps include anticipated cost of NextGen: \$20 billion by 2020 and \$40 billion by 2040. | 3. Total needs are federal and non-federal high hazard dams. | 4. Funding only includes publicly funded remediation, not funds from private sector. | 5. Total needs numbers is based on discussions with the National Committee on Levee Safety. | 6. Total needs and funded included all costs associated with Parks and Recreation. Funding gap is capital needs only. | 7. These numbers are based on market projection and current investment trends. | 8. These numbers are based on the last available national data collection and brought to current market dollars.

\* numbers may not add up due to rounding

# 21<sup>ST</sup> CENTURY VISION FOR AMERICA'S INFRASTRUCTURE



In the 21st century, we see an America that thrives because of high quality infrastructure. Infrastructure is the foundation that connects the nation's businesses, communities, and people, driving our economy and improving our quality of life. For the U.S. economy to be the most competitive in the world, we need a first class infrastructure system — transport systems that move people and goods efficiently and at reasonable cost by land, water, and air; transmission systems that deliver reliable, low-cost power from a wide range of energy sources; and water systems that drive industrial processes as well as the daily functions in our homes. Yet today, our infrastructure systems are failing to keep pace with the current and expanding needs, and investment in infrastructure is faltering.

In the short term we need a national commitment to bring existing infrastructure into a state-of-good-repair, and in the long term we must modernize and build in a targeted and strategic manner. This means leadership at the federal, state, and local levels of government, by businesses and individuals, to communicate the importance of our nation's infrastructure, to craft innovative solutions that reflect the diverse needs of the nation, and to make the investments the system needs. By employing strategies to use every dollar more efficiently and by deploying creative solutions to infrastructure development such as public-private partnerships, we can implement the right projects on time at the right price.

We must commit today to make our vision of the future a reality — an American infrastructure system that is the source of our prosperity.

See how states are making progress at [www.infrastructurereportcard.org](http://www.infrastructurereportcard.org).



# RAISING THE GRADES: KEY SOLUTIONS

Our nation's infrastructure problems are solvable if we have leadership and commit to making good ideas a reality. Raising the grades on our infrastructure will require that we seek and adopt a wide range of solutions. ASCE has developed three key solutions to begin raising the grades:

**1.**

## **INCREASE LEADERSHIP IN INFRASTRUCTURE RENEWAL**

America's infrastructure needs bold leadership and a compelling vision at the national level.

**2.**

## **PROMOTE SUSTAINABILITY AND RESILIENCE**

Sustainability, resiliency, and ongoing maintenance must be an integral part of improving the nation's infrastructure. Today's transportation systems, water treatment systems, and flood control systems must be able to withstand both current and future challenges.

**3.**

## **DEVELOP AND FUND PLANS TO MAINTAIN AND ENHANCE AMERICA'S INFRASTRUCTURE**

While infrastructure investment must be increased at all levels, it must also be prioritized and executed according to well-conceived plans that both complement the national vision and focus on systemwide outputs.



# 2013 REPORT CARD FOR AMERICA'S INFRASTRUCTURE APP

In a new app format, the American Society of Civil Engineers' 2013 Report Card for America's Infrastructure puts the most comprehensive and clear reference available on America's infrastructure in your pocket. Complete with videos and interactive content, this app will show how your state's infrastructure is doing and what needs attention. Share ideas for action along with any part of the app with friends, coworkers or professional groups, local leaders, or even your elected officials.



Products and images are for illustrative purposes only. ©2012 ASCE

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Download the full Report Card to your tablet and smartphone at [www.infrastructurereportcard.org](http://www.infrastructurereportcard.org)



## ABOUT THE REPORT CARD

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ASCE's Report Card Advisory Council oversees the data analysis and development of the Report Card with the support of the ASCE Infrastructure Initiatives staff. The Advisory Council is made up of over 30 civil engineers with substantial experience in various types of infrastructure who volunteer their time and expertise for over a year to complete the Report Card. The Council members review and assess all relevant data and reports, consult with technical and industry experts, and assign grades according to the following criteria:

**CAPACITY** Evaluate the infrastructure's capacity to meet current and future demands.

**CONDITION** Evaluate the infrastructure's existing or near future physical condition.

**FUNDING** Evaluate the current level of funding (from all levels of government) for the infrastructure category and compare it to the estimated funding need.

**FUTURE NEED** Evaluate the cost to improve the infrastructure and determine if future funding prospects will be able to meet the need.

**OPERATION AND MAINTENANCE** Evaluate the owners' ability to operate and maintain the infrastructure properly and determine that the infrastructure is in compliance with government regulations.

**PUBLIC SAFETY** Evaluate to what extent the public's safety is jeopardized by the condition of the infrastructure and what the consequences of failure may be.

**RESILIENCE** Evaluate the infrastructure system's capability to prevent or protect against significant multihazard threats and incidents and the ability to expeditiously recover and reconstitute critical services with minimum damage to public safety and health, the economy, and national security.

**INNOVATION** Evaluate the implementation and strategic use of innovative techniques and delivery methods.

## GRADING SCALE

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### **A = EXCEPTIONAL: FIT FOR THE FUTURE**

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and resilient to withstand most disasters and severe weather events.

### **B = GOOD: ADEQUATE FOR NOW**

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.

### **C = MEDIOCRE: REQUIRES ATTENTION**

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.

### **D = POOR: AT RISK**

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.

### **F = FAILING/CRITICAL: UNFIT FOR PURPOSE**

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.



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