2011 REPORT CARD
for Maryland's Infrastructure

MARYLAND SECTION
AMERICAN SOCIETY OF CIVIL ENGINEERS
1852
1914

2011 REPORT CARD
for Maryland's Infrastructure

Maryland's Infrastructure

TRANSIT C-

ROADS C-

DAMS C

BRIDGES B-

STORMWATER D

MARYLAND'S G.P.A. C-

Baltimore Metropolitan Infrastructure Supplement

DRINKING WATER C-

WASTEWATER C

The 2011 Report Card for Maryland's Infrastructure grades five categories compiled for the state of Maryland and two for Metropolitan Baltimore. Categories were evaluated on the basis of condition, operation and maintenance, capacity, future need, public safety, resilience, and funding.

A = Exceptional
B = Good
C = Mediocre
D = Poor
F = Failing

The American Society of Civil Engineers – Maryland Section

2011 REPORT CARD
for Maryland's Infrastructure

EXECUTIVE SUMMARY

The Maryland Section of the American Society of Civil Engineers (ASCE) has developed the 2011 *Report Card for Maryland's Infrastructure*. Maryland's infrastructure is vital to its economy, the mobility of its workforce, the environment, safety, and quality of life.

The Maryland Section of ASCE represents more than 2,000 civil engineering professionals who live and work in Maryland and whose obligation it is as professional engineers to be dedicated to the advancement and betterment of human welfare. Civil engineers are stewards of the nation's infrastructure, charged with the design, construction, operation, and maintenance of our vital public works. Inherent in that responsibility is the obligation to periodically assess the state of the infrastructure, report on its condition and performance, and advise on the steps necessary for its improvement. On behalf of engineers dedicated to problem solving and creating a healthy environment and better quality of life for their community, the Maryland Section of ASCE presents this document to the residents and policy makers of Maryland. At the end of the day, we must ask ourselves if the grade is acceptable. We believe that Maryland's infrastructure should be second to none. We cannot be content with a C- average as shown in this 2011 *Report Card for Maryland's Infrastructure*.

The 2011 *Report Card for Maryland's Infrastructure* is not intended to be a commentary on, nor an evaluation of, the performance of any particular government agency, department, or individuals. Our research found that most agencies progress well in fulfilling their ever-expanding responsibilities despite being underfunded. Funding for Maryland's infrastructure is woefully inadequate while the state's population, infrastructure needs, and traffic congestion continue to grow at record pace.

A challenge in producing the *Report Card for Maryland's Infrastructure* was to avoid being overly influenced by local needs, especially in the Baltimore and Washington, D.C. metropolitan areas where data tended to concentrate. Although in many categories more data were available for the metropolitan areas, efforts were made to make a statewide analysis; however, for drinking water and wastewater, the data used were so concentrated in the Baltimore metropolitan area that the grades for these categories reflect only the Baltimore metropolitan area.

The 2011 *Report Card for Maryland's Infrastructure* focuses its attention on Maryland's transit, road, dam, bridge, and stormwater infrastructure and the Baltimore metropolitan area's drinking water and wastewater infrastructure. The 2011 *Report Card for Maryland's Infrastructure* is an informational compilation of assessments for the select categories of infrastructure in the regions described.

METHODOLOGY

The 2011 *Report Card for Maryland's Infrastructure* was modeled after the national ASCE *Report Card for America's Infrastructure*. Most recently released in 2009, the *Report Card for America's Infrastructure* grades the infrastructure of the entire nation.

The ASCE Maryland Section report card committee is comprised of 15 engineers with experience in the disciplines presented in the report. The committee members analyzed current data and conditions within the categories, consulted with additional technical and industry experts, and assessed and assigned grades. In most cases, existing data from federal, state, and local agencies and organizations were compiled by the committee members. In some cases, new data were collected from interviews with experts in the field.

Various government agencies were contacted and provided data for use in the development of the *Report Card for Maryland's Infrastructure*. Some government agencies chose not to provide data. The *Report Card for Maryland's Infrastructure* was written independently by the ASCE Maryland Section report card committee. The various government agencies who provided data were not writers, nor did they have any undue influence on the grade or on any portion of the *Report Card*. The Maryland Section of ASCE truly appreciates the assistance from these government agencies in assembling the data. The text for each category of the *Report Card* lists the many agencies who aided by providing data for this effort.

To assign grades, the committee considered several fundamental criteria. These include condition, operation and maintenance, capacity, future need, public safety, resilience, and current and future funding. The grade determination was based on both publicly available data and the discretion of the engineers serving on the committee. The *Report Card for Maryland's Infrastructure* was reviewed by the report card committee, the board for the Maryland Section of ASCE, and members of the staff for National ASCE.

The fundamental components assessed for each area of the *Report Card for Maryland's Infrastructure* were:

CONDITION: An evaluation of the infrastructure's existing or near future physical condition

OPERATION AND MAINTENANCE: An evaluation of the owners' ability to operate and maintain the infrastructure properly and determine that the infrastructure is in compliance with government regulations

CAPACITY: An evaluation of the infrastructure's capacity to meet current and future demands

FUTURE NEED: An evaluation of the cost to improve the infrastructure and determine if future funding prospects will be able to meet the need

PUBLIC SAFETY: An evaluation of how the public's safety is jeopardized by the condition of the infrastructure and what the consequences of failure may be

RESILIENCE: An evaluation of the infrastructure's capability to prevent or protect against significant multi-hazard 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

FUNDING: An evaluation of the current level of funding for the infrastructure category compared to the estimated funding need

GRADING CRITERIA

The 2011 *Report Card for Maryland's Infrastructure* followed a letter grade scale similar to that used in other infrastructure report cards:

A = EXCEPTIONAL
B = GOOD
C = MEDIOCRE
D = POOR
F = FAILING

Our evaluation is based on a grade of A being the goal for all of our infrastructure. Grades below A indicate there is room to improve our infrastructure and thereby to aid the citizens of Maryland.

GRADES

Maryland's infrastructure rates a cumulative grade of C-. While not all categories of infrastructure fare the same or face the same issues, they generally suffer from delayed maintenance and chronic funding deficiencies. Grades range between B- for bridges to D for stormwater.

TRANSIT: **C-** (National: D) **PAGE 1**

Transit use is the fastest growing of all modes of transportation in Maryland, averaging a 3 percent increase per year. Ridership is anticipated to increase on all modes of mass transit in Maryland in the coming years. Operating expenses will rise while budgeted funding fails to keep pace. Continued emphasis should be placed on planning and level of service efforts, coupled with an implemented strategy to increase funds in support of those efforts.

ROADS: **C-** (National: D-) **PAGE 13**

While the majority of the pavement system in Maryland is in acceptable ride quality condition, it is reaching the end of its design life. Deterioration will escalate costs to motorists and increase traffic congestion. The Washington, D.C. and Baltimore metropolitan areas are the first and fifth most congested in the nation at a cost of $1,555 and $1,218 per year, respectively, to commuters. Trends show vehicle travel is increasing twice as fast as the addition of lane miles. The existing roads need to be improved, but funding must be increased to do so.

DAMS: **C** (National: D) **PAGE 19**

Dam failures can cause significant consequences such as loss of life, property and infrastructure damage, as well as environmental degradation. Maryland has 72 high hazard dams and 98 significant hazard dams and is adding more annually. Additional resources, including a dedicated funding source, are required to perform the necessary inspections, maintenance, and emergency planning for Maryland's dams in order to assure public safety.

BRIDGES: **B-** (National: C) **PAGE 27**

Maryland has well-planned asset management and maintenance programs. Bridge owners are decreasing the number of structurally deficient bridges, but they are doing so at a diminished rate because of funding shortfalls. Presently, 7 percent of Maryland's bridges are structurally deficient and most of these are owned and maintained by local municipalities. Funding shortfalls must be countered because bridge conditions are a real safety issue with ramifications affecting people, traffic, and the economy.

STORMWATER: **D** (National: D-*) **PAGE 33**

Managing the quantity and quality of stormwater runoff and maintaining drainage conveyance systems is critical for protecting the public against flooding and helping to improve the health of the Chesapeake Bay. Maryland's goal is to comply with 100 percent of pollution limits by 2020. Funding shortfalls within Maryland jeopardize the implementation of necessitated, critical preventive measures and maintenance with negative consequences to residents, aquatic life, and the Chesapeake Bay.

DRINKING WATER: **C-** (National: D-) **PAGE 39**

While the Baltimore metropolitan area has adequate surface water supply, its water reservoirs are inadequately designed. Furthermore, the aged distribution system is exceeding its service life and is susceptible to catastrophic failure. In 2009, there were more than 1,100 water main breaks in the Baltimore metropolitan area. Additional resources are required to move from reactive repair to proactive, preventive maintenance.

WASTEWATER: **C** (National: D-) **PAGE 45**

The Baltimore metropolitan area's wastewater system is aging and overflowing. To respond to these issues, pointed consent decrees and federal regulations are being imposed. Additional resources are required to comply with these and to move from reactive repair to proactive, preventive maintenance for the sake of public health and protection of the Chesapeake Bay.

*Stormwater was evaluated concurrent with wastewater in the 2009 Report Card for America's Infrastructure

RAISING THE GRADES: RECOMMENDATIONS

Maryland's infrastructure faces some very real problems that threaten the way of life of our citizens and visitors if they are not addressed. Under each category of infrastructure, the report card committee makes recommendations to improve the infrastructure and its grade. These include policy and procedure changes on the federal, state, and local levels.

Recommendations for each category in the 2011 *Report Card for Maryland's Infrastructure* align with National ASCE's five key solutions to raising the grade as presented in the 2009 *Report Card for America's Infrastructure*. In general, our recommendations follow these five points:

INCREASE state and local government leadership in infrastructure to address the crisis;

PROMOTE sustainability and resilience in infrastructure to protect the natural environment and withstand natural and man-made hazards;

DEVELOP state and regional infrastructure plans that complement a statewide vision and focus on system-wide results;

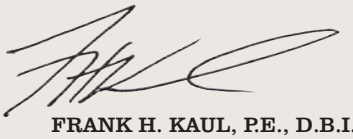
ADDRESS life-cycle costs and ongoing maintenance to meet the needs of current and future users;

INCREASE and improve infrastructure investment from all stakeholders.

Maryland has to address the funding issues for our infrastructure. The capital needs of our vast infrastructure are significant. Failure to fund them now will lead to exponentially greater costs in the future. The 2011 *Report Card for Maryland's Infrastructure* highlights the need for improvements to our infrastructure. Current events from failures on transit lines, increasing congestion of roads, existing liability of dams, deterioration that comes with aging of bridges, and massive water main failures, all lead to a need to focus on Maryland's infrastructure as a critical task now and in the future.

Through broadened awareness and discussion of the issues raised in this report, we hope to increase understanding of the current and future infrastructure needs of Maryland, prompting decision makers in our communities and the state legislature to formulate policies and provide the necessary funding to address the needs of Maryland's infrastructure.

Maryland's citizens and policy makers must unite to address the problems and issues posed by the current and future state of our infrastructure and respond with dedication and measurable results. If we choose to ignore our infrastructure, then we face significant degradation of basic public services, Maryland's ability to remain competitive in attracting new businesses, and our quality of life.



FRANK H. KAUL, P.E., D.B.I.A
ASCE Maryland Section President

GRADE

C-

TRANSIT

REPORT CARD FOR MARYLAND'S INFRASTRUCTURE:

TRANSIT

Mass transit has received significant national attention in recent years for its ability to provide an affordable and environmentally friendly alternative to automobiles. With the recent rise in fuel costs combined with the economic challenges facing our state, Maryland has seen transit use increase more than for any other mode of transportation, including automobile travel. Transit use has increased 34 percent since 1996. The primary challenge in transit has become meeting the demand to expand the transit systems and provide new services while maintaining and improving the existing systems within a limited budget.

INTRODUCTION

Maryland provides a wide range of transit options and the number of passenger trips per capita is consistent with comparable cities on the east coast. The Baltimore and Washington, D.C. areas are both in the top 15 urban areas (eleventh and third, respectively) according to passenger trips relative to population, meaning that the transit options in these areas are relatively popular. Transit service in Maryland is provided primarily by two agencies—the Maryland Transit Administration (MTA) and the Washington Metropolitan Area Transit Authority (WMATA)—in addition to 24 locally operated transit systems (LOTS) which operate across the state. These agencies provide multiple modes of transit to Maryland residents and visitors, including fixed route services, such as bus and light rail, as well as paratransit and other non-fixed route services. Paratransit options, like taxi access and MetroAccess, provide flexible routes and schedules that make transit available to those unable to use the existing fixed route systems.

MTA, which primarily operates within Baltimore and the surrounding metropolitan areas, is currently the 12th largest transit system in the nation based on the number of trips provided, according to the American Public Transportation Association (APTA). The transit system includes local bus, light rail, Metro subway, paratransit systems and the taxi access system. MTA contracts with Amtrak and CSX to operate the MARC train service, as well as with four bus companies to provide commuter bus service statewide. MTA provides funding and statewide support for the LOTS and serves as a liaison to WMATA.

WMATA provides transit access to the District of Columbia for the National Capital Region, which includes Montgomery and Prince George's counties in Maryland, as well as Arlington, Fairfax, and Loudoun counties and the cities of Alexandria, Fairfax, and Falls Church in Northern Virginia. WMATA provides Metrorail, Metrobus, and MetroAccess (paratransit) services and is currently the fourth largest transit agency in the nation, according to APTA.

There are 24 LOTS in Maryland, which cover the state's 23 counties, as well as the cities of Baltimore, Annapolis, and Ocean City. These systems offer a variety of services, including fixed route, deviated fixed route, and demand-response transportation services. Figure 1 shows the location of the various LOTS in Maryland.

LOCATIONS OF LOCALLY OPERATED TRANSIT SYSTEMS

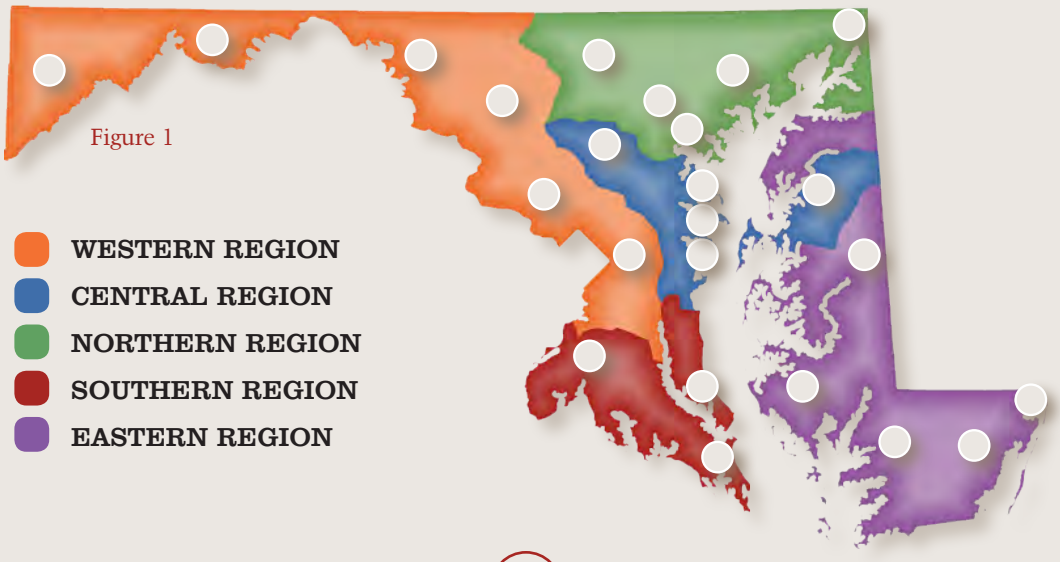


Figure 1

CURRENT OPERATIONS

The breakdowns of ridership by the various modes of transit offered by MTA and WMATA are shown in Figures 2 and 3.

ANNUAL RIDERSHIP BY MODE ON MTA

TRANSIT MODE	RIDERSHIP
LOCAL BUS	69,845,849
COMMUTER BUS	3,971,510
METRO SUBWAY	13,566,823
LIGHT RAIL	8,712,170
MARC TRAIN	8,081,155
MOBILITY/PARATRANSIT	1,094,437
TAXI ACCESS	355,542

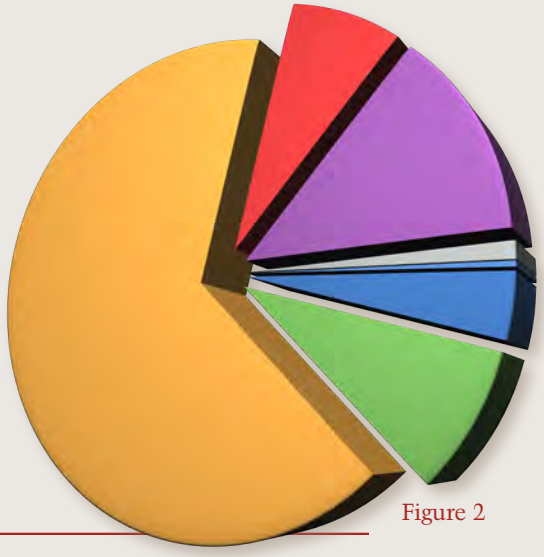


Figure 2: Breakdown of annual ridership by mode 2009 – *MTA*

Figure 2

ANNUAL RIDERSHIP BY MODE ON WMATA

TRANSIT MODE	RIDERSHIP
METROBUS	123,670,000
METROACCESS	2,400,000
METRORAIL	217,220,000

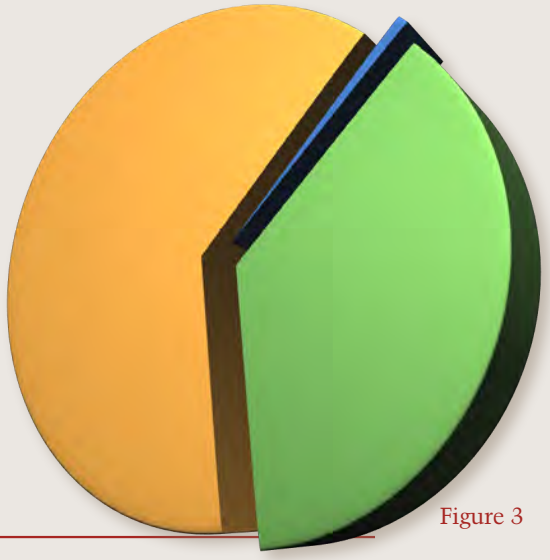


Figure 3: Breakdown of annual ridership by mode 2009 – *WMATA*

Figure 3

Ridership on MTA and WMATA systems has seen significant growth in the past five years. From 2005 to 2009, transit ridership has increased by a combined 37 million trips, or 7.5 percent. Comparisons of ridership totals between 2005 and 2009 are shown in Tables 1 and 2.

In 2008, 8.5 percent of Maryland's workers and 35.7 percent of Washington, D.C. workers commuted via public transit.

RIDERSHIP INCREASE ON MTA SINCE 2005

Transit Mode	2005 Annual Ridership (thousands)	2009 Annual Ridership (thousands)	Percent Change
Local Bus	63,241	69,846	10%
Commuter Bus	2,929	3,972	36%
Metro Subway	12,863	13,567	5%
Light Rail	4,925[1]	8,712	77%
MARC Train	6,884	8,081	17%
Mobility/Paratransit	550	1,094	99%
Taxi Access	241	356	48%
Locally Operated Transit Systems	37,752	45,635	21%
Totals	**124,460**	**151,262**	**22%**

Table 1: Summary of MTA ridership data

[1] *Light Rail Ridership decreased in 2004 and 2005 due to construction of Double Track project*

RIDERSHIP INCREASE ON WMATA SINCE 2005

Transit Mode	2005 Annual Ridership (thousands)	2009 Annual Ridership (thousands)	Percent Change
MetroRail	259,430	296,857	14%
MetroBus	153,392	133,773	-13%
MetroAccess	1,253	2,107	68%
Totals	**414,076**	**432,738**	**5%**

Table 2: Summary of WMATA ridership data

Several performance measures are used in the transit industry to measure efficiency and effectiveness of the system, including passenger trips per revenue vehicle mile, operating cost per revenue vehicle mile, and operating cost per passenger trip. Table 3 compares these measures with corresponding national averages (numbers in green reflect measures where Maryland is better than the national average). These are measures of the system's service effectiveness, service efficiency, and cost effectiveness, respectively. These performance indicators provide a basis for assessing how the current systems operate, from a service and cost perspective.

- A high level of service effectiveness would be indicated by a larger number of passenger trips per revenue vehicle mile. This targets how many riders are on-board for any given mile that the service is in operation.
- Service efficiency is measured based on the operating cost per revenue vehicle mile. Transit agencies work to minimize this amount and thereby reduce the cost for each mode to travel from destination to destination.
- Cost effectiveness is measured based on the operating cost per passenger trip. This allows the agency to evaluate how much it costs to transport passengers between destinations. A lower net cost indicates a more cost effective system overall.

TRANSIT PERFORMANCE VS. NATIONAL AVERAGE

Transit Mode	Passenger Trips/ Revenue Per Vehicle Mile			Operating Cost/ Revenue Per Vehicle Mile			Operating Cost/ Passenger Trip		
	MTA	WMATA	Nt'l Avg[1]	MTA	WMATA	Nt'l Avg[1]	MTA	WMATA	Nt'l Avg[1]
Local Bus & Metrobus	4.1	3.28	2.72	$12.76	$19.99	$9.08	$3.11	$3.96	$3.34
Commuter Bus [2]	0.9	-	-	$8.84	-	-	$9.86	-	-
Metro Subway & Metrorail	2.7	3.26	5.41	$10.13	$11.84	$9.35	$3.92	$3.64	$1.73
Light Rail	3.1	-	5.2	$13.58	-	$14.53	$4.34	-	$2.79
MARC Train	1.6	-	1.52	$19.75	-	$13.91	$12.72	-	$9.14
Mobility/Paratransit & Metroaccess[2]	-	-	-	$5.01	-	$3.75	$40.32	$41.39	$25.36

Table 3: Comparison of transit performance measures for MTA, WMATA and national averages by transit type

[1] *National averages based on data obtained from 2010 Public Transportation Fact Book - Appendix 'A': Historical Tables*

[2] *Some data not available for inclusion*

TRANSIT MODES

MTA LOCAL BUS: *The MTA local bus system includes 705 buses serving 7,500 stops with 439 shelters along 47 routes in the Baltimore Metropolitan area.*

System Age: The average age of buses in MTA's fleet is 7.3 years, compared to the national average of 7.5 years.

Future Ridership: Annual ridership is anticipated to increase to 74 million trips in 2011, representing a six percent increase as compared to last year.

Performance: Service is on time for 87 percent of trips. Service effectiveness is well above the national average. However, the cost per revenue mile is above the national average, thus indicating lower overall service efficiency. The cost per trip for bus service is below the national average, indicating the system is slightly more cost effective than other bus systems in the country.

WMATA METROBUS: *The MetroBus system includes 1,479 buses serving 12,216 stops with 2,398 shelters along 350 routes in the Washington D.C. metropolitan area. Approximately 34 percent of buses in service operate in Maryland.*

System Age: The average age of buses in WMATA's fleet is 8.2 years compared to the national average of 7.5 years.

Future Ridership: Annual ridership is anticipated to increase to 135 million trips in 2011, an increase of approximately one percent. This increase is anticipated to continue through the year 2020. In 2008 and 2009, ridership increases were approximately one percent and 0.7 percent, respectively.

Performance: Service is on time for 73 percent of trips. Service effectiveness is moderately above the national average. Operating cost per revenue mile and per trip are both above national averages, indicating lower levels of service efficiency and cost effectiveness as compared to other systems in the country.

MTA COMMUTER BUS: *There are five commuter bus routes to and from Baltimore and 13 routes to and from D.C. that connect suburban residential areas to downtown business centers. Routes to and from D.C. serve nearly 10 times more riders than the Baltimore routes do.*

System Age: Because these systems are independently owned, there is no available data.

Future Ridership: Annual ridership is anticipated to increase to 4.4 million trips in 2011, a 10 percent increase from 2009.

Performance: A 2008 audit of the commuter bus service indicated that overall service efficiency was below the national average, according to the Maryland Department of Transportation's (MDOT) Department of Legislative Services.

MTA METRO SUBWAY: *Subway service extends from Owings Mills through Baltimore County to downtown Baltimore and covers a distance of 15.5 miles with 34 miles of track and 14 stations. The system includes 100 cars.*

System Age: The average age of the subway cars is 25 years compared to the national average of 21 years.

Future Ridership: Annual ridership is anticipated to increase to 14.2 million trips in 2011, an increase of approximately three percent from the previous year.

Performance: Service is on time for 95 percent of trips. The measures of effective service and cost compare unfavorably to national averages; however, service efficiency is consistent with peers.

WMATA METRORAIL: *Metrorail is a rapid transit system with 106 miles of track, 86 stations, and 850 cars. The system incorporates 51 miles of subway, 46 miles of surface track, and 9 miles of aerial structures. Service is provided over five lines: blue, green, orange, red, and yellow.*

System Age: The average car age is 21 years and is comparable with the national average.

Future Ridership: Annual ridership is anticipated to increase 1.7 percent to 302 million trips in 2011. This trend is expected to continue through 2020.

Performance: Service is on time for 89 percent of trips. All performance measures are below national averages.

MTA LIGHT RAIL: *The light rail system in the Baltimore area serves the north-south corridor of the Baltimore metropolitan area from Hunt Valley, through downtown Baltimore, and south to BWI/Thurgood Marshall Airport and Cromwell Station in Glen Burnie. The light rail system includes 57 miles of track that serve 33 stations using 53 cars.*

System Age: The average rail car age is 13 years compared to the national average of 15.7 years.

Future Ridership: Annual ridership is anticipated to increase ten percent to 9.6 million trips in 2011.

Performance: Service is on time for 97 percent of trips. Comparison of light rail service to national averages indicates that the system is below average with respect to service effectiveness and cost effectiveness and comparable in service efficiency.

MTA MARC TRAIN: *MARC train service operates weekdays connecting Perryville to Washington, D.C. (Penn Line), Camden Station Baltimore to Washington, D.C. (Camden Line), and Frederick to Washington, D.C. (Brunswick Line). The system includes 202 miles of track with 42 stations and 135 passenger cars. Trains are powered by 30 diesel and 10 electric locomotives; therefore, 25 percent of trains are operated with an alternative fuel system, compared to the national average of ten percent.*

System Age: The average age of rail cars is 12 years while the national average age of railcars is 16.3 years.

Future Ridership: Annual ridership is anticipated to increase four percent to 14.2 million trips in 2011.

Performance: Service is on time for 89 percent of trips. Service effectiveness is on pace with national averages whereas service efficiency and cost effectiveness are not on pace with national averages.

MTA MOBILITY/PARATRANSIT AND TAXI ACCESS: *Mobility/paratransit and taxi access are shared-ride services provided to individuals with disabilities who are unable to access existing fixed-route services in the Baltimore metropolitan area. Service is provided within three-quarters of a mile of fixed route services in Baltimore City and Anne Arundel and Baltimore counties. Taxi access is a premium service using local taxi and sedan services.*

System Age: Not applicable

Future Ridership: Annual ridership is anticipated to increase 12 percent in fiscal year 2011; however, no increase to taxi service is expected.

Performance: A 2008 audit of the mobility/paratransit service indicated that service efficiency and cost effectiveness were below national averages.

WMATA METROACCESS: *MetroAccess is a shared-ride, paratransit service provided to individuals in the Washington D.C. Metro area whose disability prevents them from using existing fixed route services. The system includes 599 vehicles, including 504 vans and 95 sedans.*

System Age: Not applicable

Future Ridership: By 2020, annual ridership is anticipated to increase 112 percent to 4.5 million trips. It continues to be the fastest growing transit mode in the WMATA system.

Performance: Service is on time for 92 percent of trips. The cost effectiveness of this transit mode is well below the national average.

SAFETY

According to data from the Federal Transportation Administration, transit ranked among the safest modes of transportation in 2008. There was nearly a nine-fold increase in accident events per million miles driven versus accident events per million miles ridden on transit nationally in 2008 (1.95 per million miles driven versus 0.22 per million miles ridden on transit). Maryland transit systems accounted for 4.2 percent of the nation's transit incidents due to collision and about 0.8 percent of the nation's transit incidents without collision; these represent 1.6 percent of all transit incidents, which is on par with Maryland's share of total passenger trips nationally, 1.2 percent.

National passenger fatality rates for transit modes are orders of magnitude less than for motor vehicle travel. Rail transit modes (heavy rail and light rail) had a low occurrence (0.02) of passenger fatalities per 100 million passenger miles. Other common transportation modes had national fatality rates per 100 million passenger miles as follow: 0.05 for transit bus; 0.20 for aviation; 0.41 for ferry; and 1.42 for motor vehicle (1.07 for motor vehicle transportation in Maryland). Maryland transit had six fatalities; combined with Washington, D.C., there were 10 fatalities in 2008.

FUTURE EXPANSION

Transit in Maryland must focus on meeting future demands along established routes, improving the efficiency and effectiveness of these services, and expanding the availability and connectivity of transit across our state. For capital projects, the state maintains a Consolidated Transportation Program (CTP), a six-year capital budget for transportation projects. It includes anticipated MTA projects and contributions to WMATA.

The CTP includes upgrades to the MARC system meant to increase capacity, as well as on-going system upgrades including bus and rail car replacement. System preservation and maintenance are also major components of MTA's future planning.

The CTP shows that Maryland has entered into the design stages of three major transit projects in the Baltimore-Washington, D.C. area. If constructed, these would provide increased opportunities for transit use by connecting suburban and urban markets and other transit systems with the potential to reduce congestion on Maryland's crowded highways and roads. Specifically, Maryland is working on the Red Line, the Purple Line, and Corridor Cities Transitway (CCT). The Red Line is planned for the Baltimore metropolitan area and its design complements the MTA Metro Subway. The Purple Line and CCT will serve Montgomery and Prince George's counties, such that the former will be integrated into the Silver Spring Transit Center. The Red and Purple lines are proposed light rail systems and the CCT is still being studied for either light rail or rapid transit bus service. The Red and Purple lines are on similar schedules for which preliminary engineering is underway and construction could begin in 2014. The CCT project is approximately one year behind the two light rail projects in terms of projected start of construction. These projects have not yet been funded for construction.

The CTP reflects significant contributions to WMATA in the next six years, whose 2011-2020 *Capital Needs Inventory* identifies $11 billion in needed improvements. These system needs are required to update and upgrade the existing system, as well as provide expansion for future ridership growth. Planning studies indicate that by 2020 ridership on the Metrorail's Orange Line will exceed capacity and that the Yellow and Green lines will be operating with highly congested conditions.

GRADE

The report card transit committee for the Maryland Section of ASCE obtained data related to the transit systems in Maryland from various sources, including MTA, WMATA, MDOT, APTA, the Federal Transit Administration (FTA), the National Transit Database (NTD), and other sources. Data obtained are similar to the information used on a national level in the development of ASCE's 2009 *Report Card for America's Infrastructure*, which assigned transit a grade of D.

AFTER CONSIDERING THE AVAILABLE INFORMATION, TRANSIT IN MARYLAND IS ASSIGNED A GRADE OF "C-".

FUNDING

CURRENT FUNDING:

Transit funding in Maryland is provided through the Transportation Trust Fund (TTF), an account dedicated to transportation funding that includes both operating and capital expenditures. The TTF includes a contribution to WMATA, whose expenses are divided between Maryland, Virginia, and Washington D.C. under a contractual agreement to share system costs.

In fiscal year 2009 (FY 2009), the total MDOT budget was approximately $3.51 billion, which was reduced in FY 2010 to $3.48 billion.

MTA expenses in FY 2009 totaled $860 million, with $591.7 million in operating costs and $269 million in capital expenditures. Funding sources included 59 percent state funding, 28 percent federal funding, and 13 percent from fare revenues. For FY 2010, the operating budget was increased by just 2.5 percent to $606.25 million due in part to a $2.3 million reduction made by the Board of Public Works. The reduction included the elimination of 22 positions and the addition of statewide employee furloughs. The capital budget showed an increase from 2009 to 2010 of $183 million to $451 million.

The overall WMATA budget in FY 2009 was approximately $1.8 billion, which was increased in FY 2010 to $2.2 billion. The budget is primarily supported through 44 percent combined state and local funding, 36 percent fare and parking revenue, and 18 percent federal subsidies. The WMATA allocation from Maryland in FY 2009, was a combined $285 million, including $210 million for operating costs and $75 million for capital expenses. This represents about 31% of the total funding received from state and local agencies for WMATA. The FY 2010 operating budget from Maryland was increased by a similar margin as MTA, only 2.5 percent, to $215.25 million. The capital program was reduced in 2010 to $52 million, including a $20 million reduction made by delaying project funding until FY 2012.

FUTURE FUNDING:

For FY 2011, MDOT's total budget is approximately $3.6 billion, an increase of 4.3% over FY 2010. Of this total, 29% ($1.05 billion) is allocated to MTA and 9% ($326.5 million) is allocated to WMATA for capital and operating expenses.

For FY 2011, MTA's operating budget shows an increase of only $9.7 million, or 1.6 percent, to $616 million; and, potential statewide MDOT budget cuts could reduce the budget increase. Maryland's Department of Legistlative Services (DLS) anticipates a $40 million increase in operating expenses in 2011 for MTA. This includes an increased cost to the state for MARC train service to account for expiration of the current operating contract between CSX and MTA and an anticipated new contract in 2011 that could generate higher operating costs for access fees and the possible addition of a third party to operate and maintain the MARC system. Maryland's DLS also anticipates operating expense increases for FY 2012 to 2015, approximately $30 million per year. These statistics indicate that MTA will be underfunded in meeting the operating expenses in 2011 and future years. Efforts to meet operating cost increases could mean fare increases, service reductions, and other cost cutting measures. In FY 2011, MTA's capital budget is reduced by $18 million to $433 million, representing a 4.1 percent decrease from FY 2010.

WMATA's 2011 budget is $2.18 billion, approximately the same as FY 2010, with $1.4 billion in operating expenses and $712 million in capital programs. WMATA operating expenses for FY 2011 have increased by $94 million and are covered largely by an across the board fare increase expected to generate about $108 million in revenue in FY 2011. Maryland's contribution to WMATA for FY 2011 is approximately $225 million for operating expenses and $102 million for capital expenses, reflecting increases of 4 percent and 96 percent, respectively.

The proposed CTP for 2010 to 2015 totals approximately $9.5 billion, including $2 billion allocated to MTA (22 percent) and $1.4 billion to WMATA (15 percent). It does not include construction funding for any of the three proposed MTA expansion projects, the Red Line, Purple Line, or CCT. Funding for these capital projects is anticipated to include a federal subsidy of 50 percent of the construction cost. The estimated costs of the Red and Purple line projects are $1.6 and $1.5 billion, respectively. Construction of these lines would also increase future operating expenses to support the new transit lines.

RECOMMENDATIONS

The Transit Committee has the following recommendations to improve Transit in Maryland:

- Implement a plan to increase revenue and provide needed construction dollars for expanded transit systems and to cover future operating cost increases.
- Identify service overlaps, evaluate alternate routes, and eliminate inefficient services to improve the overall effectiveness of transit services and reduce operating expenses.
- Continue planning and design for three identified transit systems (Red Line, Purple Line, and CCT) to provide additional service in highly congested areas.
- Identify future needs and potential expansion of transit systems in Maryland to expand access and reduce congestion on local roads. A focus on linking suburban communities to urban business districts is critical to reducing congestion.

CONCLUSION

Ridership has increased significantly in recent years due to many factors including economic hardships, rising fuel costs, and environmental awareness. The demand for access to transit in Maryland is on the rise and residents are willing to use systems that provide efficient and cost effective alternatives to automobiles. It has been demonstrated that the development of transit systems positively impacts commuter and traveler habits.

As ridership increases, the effectiveness of these systems will be quickly impacted. Operating expenses continue to rise and potential budget shortfalls are looming. These budget challenges have the potential to significantly impact the level of service provided by the state's transit system.

Improving transit service and connectivity with Maryland's current transportation network will require a commitment to expand the services offered and continued efforts to improve the quality and effectiveness of the existing transit systems.

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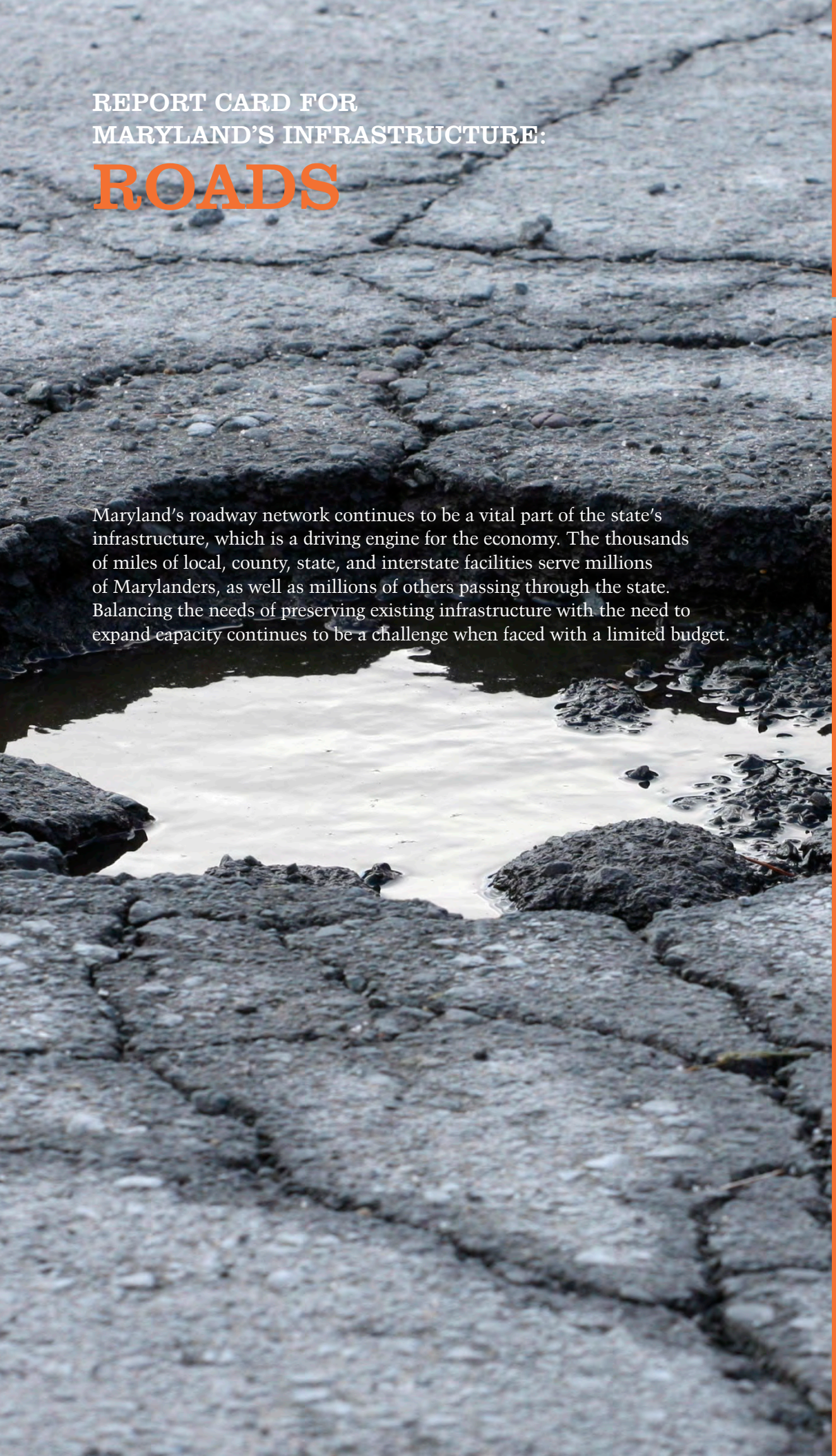


REPORT CARD FOR
MARYLAND'S INFRASTRUCTURE:

ROADS

Maryland's roadway network continues to be a vital part of the state's infrastructure, which is a driving engine for the economy. The thousands of miles of local, county, state, and interstate facilities serve millions of Marylanders, as well as millions of others passing through the state. Balancing the needs of preserving existing infrastructure with the need to expand capacity continues to be a challenge when faced with a limited budget.

GRADE

C-

ROADS

INTRODUCTION

The Maryland State Highway Administration (MDSHA) owns and maintains the roads for all state routes and a number of interstates throughout Maryland, accounting for 5,407 miles of roadway. The analysis of the roadway network in Maryland is based on current data provided by MDSHA and on data from a number of the counties throughout Maryland. Some of the counties in Maryland decided not to participate in this analysis and did not provide data. Combining data from MDSHA and available county data, the data is encompassing of the entire state's roads and thorough enough to provide a competent analysis.

There are several toll roads throughout Maryland that are owned and maintained by the Maryland Transportation Authority (MDTA). MDTA is self funded through the collection of tolls and is not funded through federal and state dollars. Therefore, the condition of these roads did not factor into this analysis. The capacity of the toll facilities, however, did play a factor in the rating of roads since the toll facilities provide capacity for the overall Maryland roadway system.

CURRENT CONDITION

HEALTH OF THE NETWORK

The majority of the conditions for the approximately 11,000 miles of road assested falls in the average range for ride quality (see Figure 1). This average range encompasses roads in good, mediocre, and poor condition. The percentage of roads in above average condition has trended upward while the percentage of roads in below average condition has gone down over the past five years. This is mostly due to the budget cuts over the past few years which have required agencies to focus on system preservation instead of increasing capacity. Consequently, the state is maintaining existing roads, but not building new roads. However, travel demand is increasing throughout the area and, without concurrently increasing the capacity to meet demand, congestion is increasing.

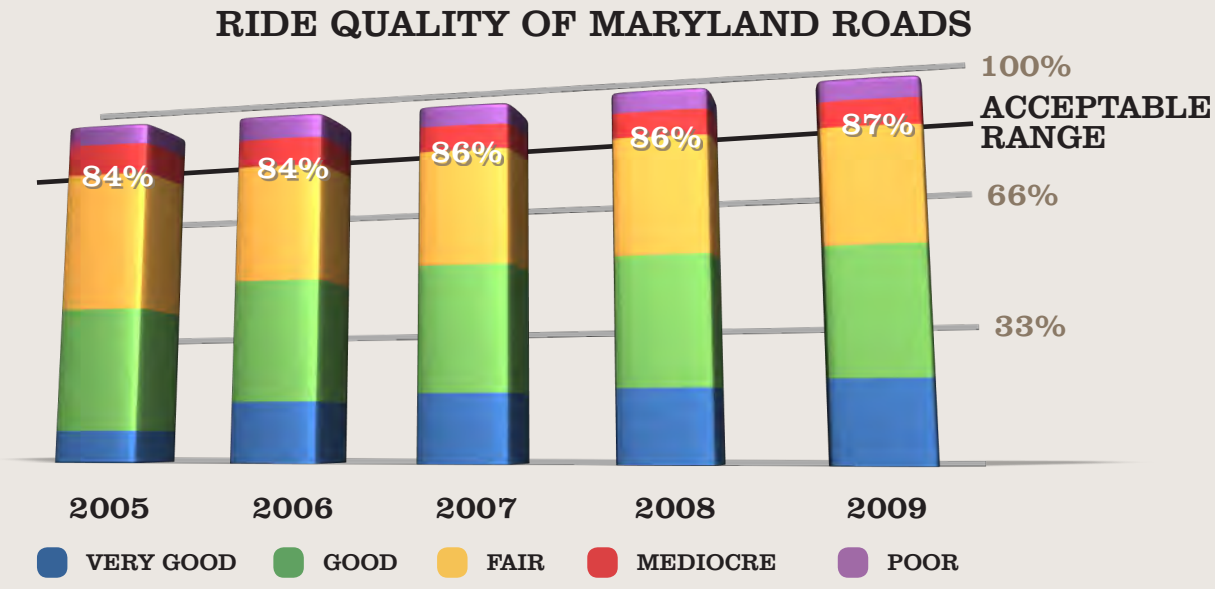


Figure 1: Statewide acceptable percentage of ride quality

PAVEMENT AGE

The majority of the roadways in the state network are reaching an age that requires major rehabilitation or reconstruction. As the network continues to age, demands on the state to preserve the current system will continue to increase. Approximately 84 percent of the roadways in MDSHA's network are at least 30 years old. In fact, 25 percent of Maryland's existing non-interstate network was constructed prior to 1930. Thirty-eight percent was constructed between 1950 and 1975. Seventy-two percent was constructed between 1950 and 1975.

STATE OF THE INTERSTATE

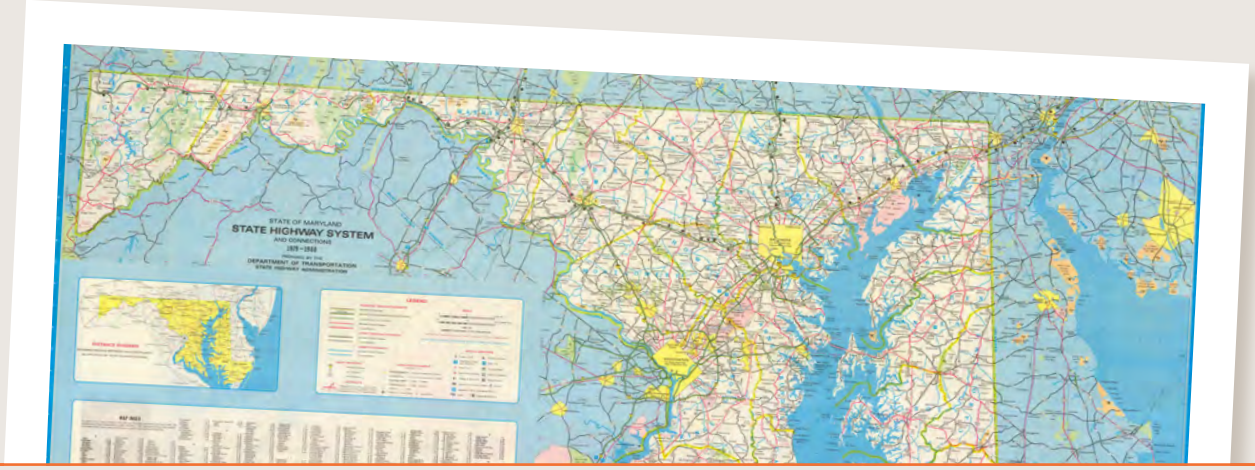
There are a total of 2,276 lane-miles of interstate roadway in the MDSHA highway network, accounting for approximately 15 percent of total lane miles and nearly 30 percent of vehicle miles traveled (VMT) In Maryland. VMT is a measure of the extent of motor vehicle operation and equals the total number of vehicle miles travelled within a specific geographic area over a given period of time.

MDSHA data indicated that 95 percent of the MDSHA interstate pavement network had acceptable ride quality conditions in 2009. Compared to the rest of the MDSHA pavement network, the interstate system had 21 percent more roadways in very good condition, 16 percent less in fair condition, and 8 percent less in mediocre or poor condition. Interstates have maintained an acceptable ride quality condition of 94 percent or higher since 2005.

In recent years, MDSHA has shown consistent improvement in constructed ride quality, averaging a 17.5 percent improvement per year in the percent of roads in acceptable ride conditions. This is partly due to the focus on system preservation as well as the infusion of funding from the American Recovery and Reinvestment Act of 2009 (ARRA).

CAPACITY

The Washington, D.C. metropolitan area is the most congested metropolitan area in the country and the Baltimore metropolitan area is the fifth most congested, according to the Texas Transportation Institute annual study on nationwide traffic congestion released in January 2011. Sixty-five percent of Maryland's interstate highways are congested. Vehicle travel on Maryland's interstates increased 52 percent from 1990 to 2004, while lane miles only increased 21 percent.



The negative effects of congestion include increases in travel time, higher cost of goods, loss of economic competitiveness, and impacts on the environment, such as on air quality. Over the past five years, the Maryland Transportation Authority has funded, designed, and begun construction on two large capital improvement projects aimed at increasing capacity of and decreasing congestion on Maryland's roads. These projects include the I-95 Electronic Toll Lanes project in Baltimore City and the Intercounty Connector (MD 200) in Montgomery and Prince George's counties.

GRADE

The report card roads committee for the Maryland Section of ASCE obtained data related to the roads in Maryland from various sources, including county departments of public works, the Maryland State Highway Administration (MDSHA), and the United States Department of Transportation. The data obtained are similar to the information used on a national level in the development of ASCE's 2009 *Report Card for America's Infrastructure,* which asigned roads a grade of D-.

AFTER CONSIDERING THE AVAILABLE INFORMATION, ROADS IN MARYLAND ARE ASSIGNED A GRADE OF "C-".

FUNDING

Increased funding for roadway projects is critical. According to the Federal Highway Administration (FHWA), for every $100 million spent on highway safety improvements, 145 lives will be saved over a 10-year period. In addition, for each $1 billion spent for highway construction, 28,000 jobs are generated annually.

Funding for roadway projects in Maryland has continued to decrease over the past three years. For example, pavement rehabilitation in Prince George's County in the early 2000s was generally funded at $10 to $12 million per year. Over the past three years, funding has been significantly reduced to approximately $3 to $5 million per year. Funding for resurfacing in FY12 is currently only $1 to $3 million.

Funding for Maryland's transportation system is based on the gas tax and other funding sources, which are designated for transportation infrastructure and operated through the Transportation Trust Fund (TTF). The gas tax in Maryland has not increased since 1992. In that time, inflation alone has reduced the buying capacity tax from 21 percent to just 8 percent. Additionally, funds have been taken from the TTF in order to balance the budget over the last several years; this means that funds designated for transportation haven't been available and therefore capital projects have been deferred.

Maryland was successful in allocating all money available from ARRA. Since the ARRA money was designated for "shovel ready" projects, the state was mostly able to use the funds for pavement rehabilitation and resurfacing projects in 2009 and 2010. This money didn't increase funding to transportation projects, but rather just replaced funds that were previously cut from the budget. There was not a net increase in funding levels for transportation.

There are significant issues with both the state and federal transportation programs. The federal surface transportation program (SAFETEA-LU) has expired and new legislation is needed to provide for long-term infrastructure investment. At the state level, the level of funding and integrity of the Transportation Trust Fund are critical issues.

RECOMMENDATIONS

All Maryland residents will benefit from improved roadway infrastructure—from cleaner air and shorter commute times, to fewer accidents and lower vehicle repair costs. The condition of the state's roads is critical, and a lack of funding in the near term due to economic conditions has diminished the opportunities to maintain and improve the system. In the long term, significant efforts are needed to maintain the system and increase capacity to meet increased demand. The roads committee has the following recommendations for improving the state's roads:

- Improve conditions.
- Reduce congestion by increasing capacity with good, multi-modal transportation options.
- Increase focus on safety.
- Increase user fees such as gas taxes and transition to mileage based fees
- Renew trust in the Transportation Trust Fund.

CONCLUSION

Maryland's roads help drive the economy and support our quality of life. While progress has been made in Maryland to address the pavement condition of the existing roadway network, it is critical that funding for capital improvement projects be increased. Failure to do so will continue to result in costly roadway repairs and reconstruction and increase time delays for Maryland's residents.

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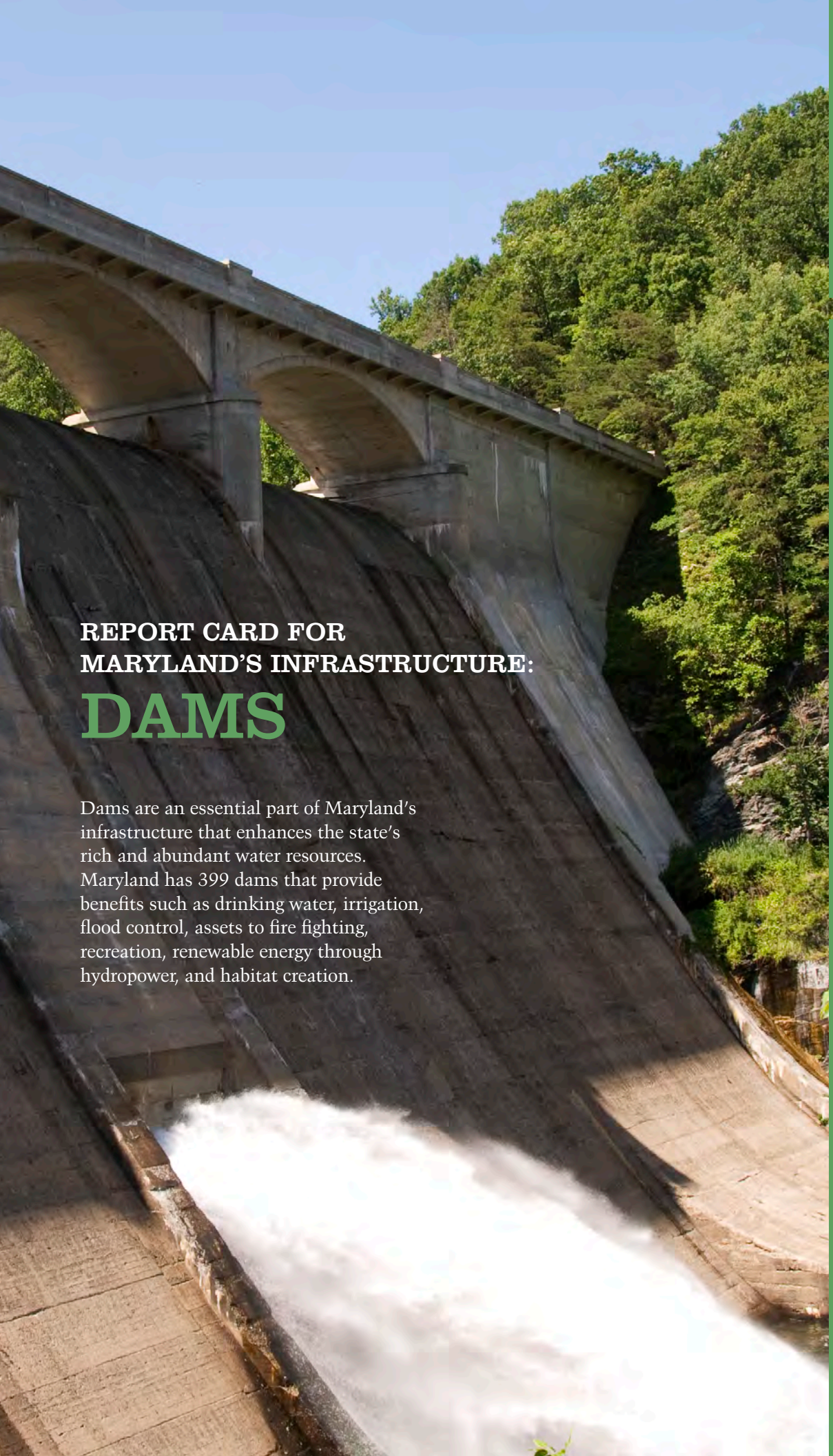


GRADE

C

DAMS

REPORT CARD FOR MARYLAND'S INFRASTRUCTURE:

DAMS

Dams are an essential part of Maryland's infrastructure that enhances the state's rich and abundant water resources. Maryland has 399 dams that provide benefits such as drinking water, irrigation, flood control, assets to fire fighting, recreation, renewable energy through hydropower, and habitat creation.

INTRODUCTION

Maryland defines a dam as any obstruction, wall, or embankment constructed for the purpose of storing water. Small impoundments that are less than 20 feet in height, have less than a square mile drainage area, and whose failure will not cause loss of life or property damage, are typically classified as ponds. Figure 1 shows the distribution of dams across Maryland.

Maryland has 72 high hazard dams, 98 significant hazard dams, and 229 low hazard dams. The number of high hazard and significant hazard dams continues to increase, as two high hazard and 10 significant hazard dams were added in Maryland in the last five years.

DAM LOCATIONS

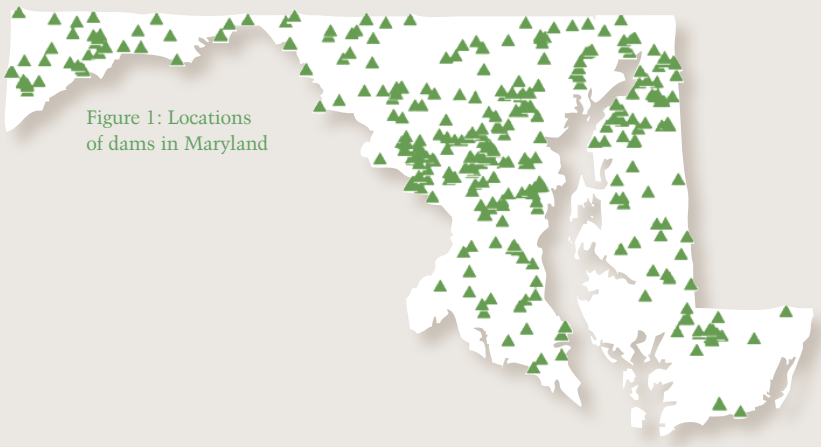


Figure 1: Locations of dams in Maryland

CURRENT CONDITIONS

DAM HAZARD POTENTIAL

While dams provide important benefits, their failure can cause significant consequences such as loss of life, property damage, and environmental damage. A dam's hazard potential is classified on the basis of the anticipated consequences of failure, not the condition of the dam. Maryland classifies its dams as high hazard, significant hazard, and low hazard as follows:

HIGH HAZARD POTENTIAL (HH):
Failure of dam could result in loss of life.

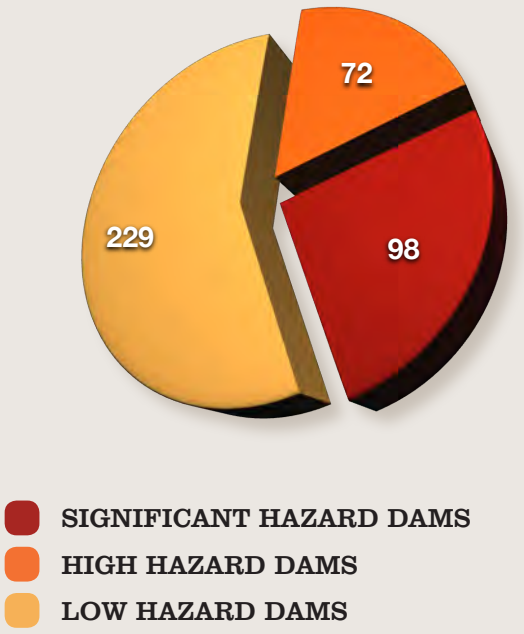
SIGNIFICANT HAZARD POTENTIAL (SH):
Failure of dam could result in damage to buildings and important infrastructure.

LOW HAZARD POTENTIAL (LH):
Failure of dam could result in loss of the dam or damage to the floodplain, but no expected loss of life or significant property damage.

See Figure 2 for the breakdown of dam hazard classifications in Maryland.

DAM HAZARD POTENTIAL

Figure 2: Number of dams in Maryland by hazard type



Fifty-six percent of Maryland's high and significant hazard dams are publicly owned by federal, state, and local governments while 44 percent are privately owned by individuals, corporations, farmers, and homeowners associations.

Maryland has been monitoring the safety of dams since 1934 with a permit and inspection program run by the Maryland Department of the Environment Dam Safety Division (MDE-DSD). However, the responsibility and liability rests on the shoulders of the dam owners. MDE's Dam Safety Program has many components including safety inspections, enforcement, permitting and design review, construction quality assurance oversight, emergency planning, and dam owner education.

The responsibility for ensuring the safety of the state's dams falls to the MDE-DSD, which does not currently have sufficient resources, funding, or staff to conduct all of the required dam safety inspections or to take appropriate enforcement actions. MDE-DSD has five full-time employees and a budget of approximately $400,000 to regulate 399 dams. This equates to 80 dams per staff member, which is lower than the national average of 200 dams per staff member. MDE-DSD estimates that three additional engineers are needed to perform the work required for the existing dams, as well as those added annually.

Thirteen dams are currently determined to be unsafe or deficient in Maryland - six high hazard, four significant hazard, and three low hazard dams. Many dams are determined to be deficient as a result of aging, deterioration, and/or lack of maintenance. Also, dams are often deemed unsafe or deficient as a result of increased scientific and engineering knowledge about large flood events and earthquakes. Additionally, as downstream development increases, existing dams are frequently reclassified to a higher hazard level, which typically requires costly rehabilitation to bring the dams up to the higher hazard standards.

The ages of Maryland's dams vary greatly, including some built more than 300 years ago. The average age of MDE's 399 dams is 87 years

See Figure 3 for a breakdown of when Maryland's dams were constructed.

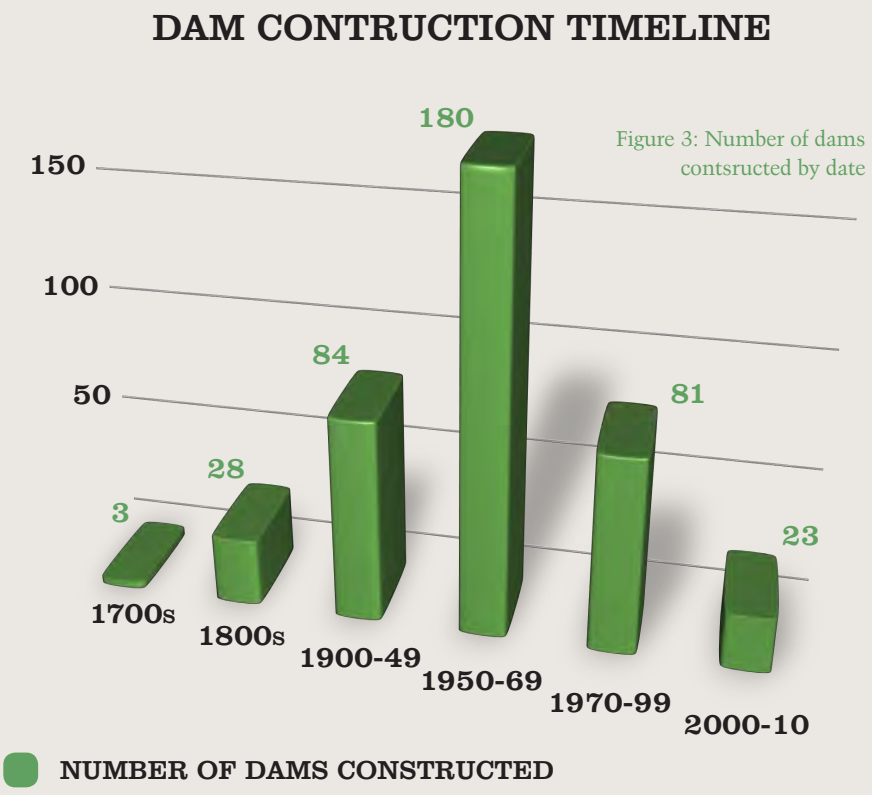


Figure 3: Number of dams contsructed by date

OPERATION AND MAINTENANCE

During the past five years, owners of high hazard and significant hazard dams spent nearly $30 million to repair 19 dams, including four repairs costing more than $3.5 million each. Publicly owned dams made up 16 of the 19 repaired dams. At the end of that five year period, 10 deficient high and significant hazard dams remain to be repaired. MDE-DSD estimates that an additional $80 million is needed to repair the remaining deficient high hazard and significant hazard dams; four of those dams currently have design plans, but lack funding for construction. Many of the remaining deficient dams are privately owned and those dam owners have significantly less funding for repairs than public owners. While not included in the estimate for repairing all high hazard and significant hazard dams, low hazard dam repairs are generally less expensive, but the cumulative cost of these repairs may be significant.

Lack of funding is a major road block for repairing all deficient high hazard and significant hazard dams. There are no dedicated state or federal funding sources available to fund dam repairs. Some local municipalities have dedicated funds toward dam repairs; however, most dam owners must find emergency funds to make repairs or they must compete for funds with all other types of infrastructure projects.

During the period from 2001 to 2007, there was a national average per year of 221 high hazard dams added to the deficient list, while 139 were repaired and removed from the deficient list. This represents an alarming trend of deficient dam repairs not keeping up with the addition of new deficient dams. Because it is repairing deficient dams more quickly than new efficient dams can be added, Maryland is ahead of the national average. Still, any deficient hazard dam in need of repair poses a potential danger for downstream residents, businesses, and infrastructure.

Emergency action plans (EAPs) are documents that are essential in the event of a dam failure, or the potential for failure, in order to notify people residing below the dam and coordinate their evacuation. MDE-DSD has a high percentage of EAPs relative to the national averages—99 percent versus 53 percent for high hazard dams and 77 percent versus 27 percent for significant hazard dams. But, many EAPs still require annual updating. Current state law does not give MDE-DSD the authority to require older dam owners to have EAPs.

Dam inspections are an important way to assess the condition of the dams, identify new conditions below the dam, and determine the need for repairs. MDE-DSD is supposed to inspect high hazard dams annually and significant hazard dams every three years. In 2009, the agency was able to conduct 95 percent and 147 percent (reflecting that some of the significant hazard dams were inspected more frequently than the required three years) of required inspections, as compared to the national average of 89 percent and 69 percent for high hazard and significant hazard dams, respectively.

REGULATIONS

The safety of dams in Maryland is regulated through the statutory and regulatory authority granted to MDE. Permits are required for anyone building or modifying a dam. In addition, MDE has the authority to perform dam safety inspections, require attaching permit conditions to deed documents, and seek enforcement actions including criminal penalties. Current regulations do not allow MDE to seek civil penalties.

GRADE

The report card dams committee for the Maryland Section of ASCE obtained data and important information related to the dams and dam safety in Maryland from various sources, including MDE, the National Inventory of Dams (NID) maintained by the United States Army Corps of Engineers, and the Association of State Dam Safety Officials. The data obtained are similar to the information used on a national level in the development of ASCE's 2009 *National Report Card on America's Infrastructure,* which assigned dams earned a grade of D.

The dams committee compared critical statistics in Maryland to the national data of other state dam safety programs, including number of staff, annual budget, the percentage of high hazard and significant hazard dams with EAPs, and the total number of dams. It also analyzed additional data, such as the number of deficient dams and the state's recent history of repairing deficient dams.

AFTER CONSIDERING THE AVAILABLE INFORMATION, DAMS IN MARYLAND ARE ASSIGNED A GRADE OF "C".

POSITIVE FACTORS INFLUENCING MARYLAND'S DAM GRADE:

- MDE-DSD is performing ahead of the national average in number of hazard dams with EAPs (46% more than national for high hazard and 50% more than national for significant hazard).
- Maryland has a better ratio of dams per staff than the national average (80 dams per staff member in Maryland versus 200 dams per staff member nationwide).
- Maryland is significantly reducing the number of deficient dams through repair work while the national trend shows an average annual increase in deficient dams.
- No new high hazard dams have been declared deficient in Maryland in the last five years, whereas an average of 221 high hazard dams are declared deficient nationally each year.
- Maryland dam inspections are performed at a higher rate than the national average (95 percent versus 89 percent of required high hazard dam inspections).

AREAS FOR IMPROVEMENT TO MARYLAND'S DAM GRADE:

- Maryland has no dedicated funding source for repairing dams.
- Public dam owners must compete for funds with owners of other infrastructure.
- MDE-DSD lacks the statutory authority to require older hazard dams to have EAPs and to impose civil penalties.
- MDE-DSD does not have enough resources to fully perform its dam safety duties.

FUNDING

As Maryland's dams age and downstream development continues, many dams will require repairs and significant investment to maintain their safety and benefits. Unfortunately, most dam owners do not have funds for maintenance and/or replacement. It is imperative that owners have access to funding and/or low-interest loans in order to fund major dam repairs for high hazard and significant hazard dams, in particular, in order to provide for the health, welfare, and safety of the public. Currently, no dedicated state or federal funding programs are available for these repairs and future funding will continue to be an issue.

Little Seneca Dam: an earthen embankment dam

RECOMMENDATIONS

The dams committee has the following recommendations, which will address the current needs of MDE's Dam Safety Program and the safety and security of dams throughout the state:

- Create a dedicated funding source (grants and/or low-interest loans) for the rehabilitation and repair of high hazard and significant hazard dams to maintain public safety.
- Provide greater resources in the form of additional personnel and funding for MDE-DSD to maintain dam safety.
- Provide statutory authority for MDE-DSD to be able to impose civil penalties upon dam owners who do not address dam safety requirements, as well as to be able to require all high hazard and significant hazard dam owners to have and exercise EAPs.
- Support the creation of a dam rehabilitation funding bill at the federal and state levels.

Loch Raven Dam: a concrete gravity dam

Brighton Dam: a slab and buttress dam

CONCLUSION

Dams are an essential part of Maryland's infrastructure. If these dams fail there is potential for loss of life, property, and other critical infrastructure. Repairing and rehabilitating deficient dams is critical. The MDE-DSD is charged with regulating the safety of Maryland's dams. While they are doing better than many other state dam safety agencies relative to inspections, repair of deficient dams, and requiring EAPs, there is more that can be done. Greater resources, as well as additional statutory authority and public education, are needed to ensure the safety of Maryland's dams and the public.

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REPORT CARD FOR
MARYLAND'S INFRASTRUCTURE:

BRIDGES

GRADE
B-

BRIDGES

There are more than five thousand bridges in Maryland that form a vital part of the transportation infrastructure. A bridge closure will do more than just create local traffic delays. This breakdown in the transportation network will have repercussions on both local and regional traffic, emergency response, and commerce. Communities can become isolated. In an emergency, every second wasted because of a detour could be a life in jeopardy. Businesses can be forced to redirect shipments or bypass stops all together. While these consequences are true of any road closure, what makes the upkeep and maintenance of a bridge important is a very real safety concern. A bridge failure can result in loss of life, and it can have serious ramifications for the local economy.

INTRODUCTION

Maryland has 5,140 bridges on which its roadway network relies. Their function affects traffic, emergency response, and commerce. Of the 5,140 bridges in Maryland, 359 are rated as structurally deficient and 959 are rated as functionally obsolete.

CURRENT CONDITIONS

A bridge is considered structurally deficient when its main load carrying elements are found to be in poor condition due to deterioration or damage. The structurally deficient rating is an early warning sign for engineers to use when prioritizing funding and initiating repairs, or beginning the process of replacing the bridge. A functionally obsolete bridge is one that was built to standards that are not consistent with today's standards. Maryland places greater emphasis on addressing structurally deficient bridges than on addressing functionally obsolete bridges because the structurally deficient status is based on condition, which can worsen over time if not addressed, whereas the functionally obsolete status is not necessarily a measure of condition deficiency. In addition, functionally obsolete bridges typically do not have any significant impact on commuting time, commerce, and emergency services.

Seven percent of bridges in Maryland are structurally deficient, which is significantly lower than the national average of 12.1 percent. This figure has decreased for more than 10 years because of a concentrated effort by the State Highway Administration and local jurisdictions.

The percent of functionally obsolete bridges in Maryland, 18.7 percent, is higher than the national average of 14.8 percent. This percentage, like the national average, has remained relatively constant over the last 10 years.

While the big signature bridges around the state and world are beautiful and inspring, most bridges are small.

Small, local bridges are found on almost every raod connecting people to their home, workplaces, schools, and communities

Without these local bridges our access to the things we need most would be difficult or impossible.

In total, 25.7 percent of bridges in Maryland are structurally deficient or functionally obsolete, which is slightly below the national average of 26.0 percent. Functionally obsolete bridges have not been weighted as heavily during this grading process. Since the number of structurally deficient bridges in Maryland is lower than the national average, and the number of structurally deficient bridges in Maryland has been declining steadily, Maryland bridges earn a higher grade than the national grade assigned in the 2009 *Report Card for America's Infrastructure*.

In urban areas, 8 percent of Maryland's bridges are structurally deficient, as opposed to rural areas where only 6.1 percent of bridges are structurally deficient. Urban areas have a lower percentage of functionally obsolete bridges—16.6 percent for urban areas versus 20.5 percent for rural areas. Combining structurally deficient and functionally obsolete, Maryland has 24.6 percent of its deficient bridges on urban roads, compared to the national average of 30.5 percent. In Maryland, the percentage of deficient bridges in urban areas has been declining over the past decade, whereas the national trend shows an increasing number of deficient bridges in urban bridges.

In Maryland, approximately 55 percent of bridges are on the state highway system, while the remaining 45 percent are owned by local and other jurisdictions. However, state-owned bridges represent more than 80 percent of the total bridge deck area in Maryland. Furthermore, the state highway system carries the vast majority of traffic in Maryland, especially heavy truck traffic.

Only approximately 4.2 percent of the bridges on the state system are structurally deficient, a figure well below the national average of structurally deficient bridges (12.1 percent). Of the 359 structurally deficient bridges in the state, nearly 69 percent of them are owned and maintained by local municipalities.

A bridge's sufficiency rating represents a percentage out of 100 and it is determined from multiple factors that indicate a particular bridge's adequacy for service, for example, highway classification, traffic volume, roadway width and alignment, structure type, detour length, and condition. The bridge sufficiency rating methodology has been standardized for national use. Approximately 53 percent of Maryland's bridges have a sufficiency rating ranging between 80 and 100 percent and approximately 89 percent have a sufficiency rating of 60 percent or higher.

In summary, Maryland maintains a low, declining number of structurally deficient bridges and a high percentage of bridges with a sufficiency rating of more than 60 percent.

REGIONAL, STATE, AND FEDERAL REGULATIONS

The federal government requires all bridges to conform to the American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Specification. This is supplemented by the Maryland Bridge Design Specifications. These regulations ensure all bridges meet a minimum for safety in design.

PUBLIC SAFETY

Each bridge structure in Maryland is inspected at least once every two years in accordance with the National Bridge Inspection Standards. These routine inspections help identify deterioration and necessary maintenance.

Today, new bridges are built with redundant structural members in order to maintain integrity if part of the bridge structure is compromised and to prevent a catastrophic failure of a bridge. Many bridges in operation were originally designed with an anticipated 50-year lifespan. Recent developments in design, materials, and technology allow new bridges to be designed with an anticipated lifespan of 80 to 100 years, thus increasing the return on investment.

CAPACITY

Bridges are designed to carry legally loaded, heavy truck traffic without any significant restriction. If an engineer determines a bridge is not suitable to carry a particular legal weight or truck, then that bridge will become weight-posted, including appropirate signage. The number of weight-posted bridges owned by the state is relatively low—31 bridges—and has declined steadily over the last decade. The number of locally owned weight-posted bridges has also been steadily decreasing. There are now 706 locally owned weight-posted bridges, as compared to 935 in 2000. None of the weight-posted bridges are on national highways, which means none of the most heavily utilized bridges limit traffic due to a lack of structural capacity.

GRADE

The report card bridge committee for the Maryland Section of ASCE obtained data related to bridges in Maryland that included the state's current bridge inventory. The information collected included state and locally owned bridges. It was reviewed by the committee to determine the overall condition of the bridges in the state. The data obtained are similar to the information used on a national level in the development of the ASCE's 2009 *Report Card for America's Infrastructure,* which assigned bridges a grade of C.

AFTER CONSIDERING THE AVAILABLE INFORMATION, BRIDGES IN MARYLAND ARE ASSIGNED A GRADE OF "B-".

FUNDING NEEDS

FUNDING NEEDS

Estimated funding projections through 2015 provide for a continued investment in reducing the number of state-owned, structurally deficient bridges. This is accomplished through a two-step asset management program that accounts for rehabilitating or replacing bridges that are already

deficient and upholding a mandatory maintenance program for the rest of the bridge inventory that prevents currently non-deficient bridges from becoming deficient. Based on estimated funding projections for Maryland through 2015, a budgeting shortfall of about $208 million is expected for state-owned bridges.

As with the funding shortfall on the state level, funding has been similarly affected for the local municipalities. This creates a shortfall in funding available to repair or replace locally owned and maintained bridges around the state. With almost 69 percent of the structurally deficient bridges in the state being owned and maintained by local municipalities, this lack of funding could create disruptions in travel on local roads if the bridges are not maintained properly and continue to deteriorate.

FUNDING SOURCES

Maryland was successful in allocating all money available from the American Recovery and Reinvestment Act of 2009. However, the federal surface transportation program (SAFETEA-LU) has expired and new legislation to provide for long term infrastructure investment is needed. Transportation funding is also provided on the state level from vehicle title fees and a 23.5 cent per gallon gas tax, which has remained constant since 1992.

IMPENDING CHALLENGES

Many of the remaining structurally deficient bridges on the state highway system are large, complex, and expensive to rehabilitate or replace, and the costs to maintain and construct bridges is constantly increasing. With the recent economic crisis and the expiration of the SAFETEA-LU program, it is difficult to develop a reliable program based on needs versus available funding.

RECOMMENDATIONS

Maryland has made good progress toward reducing its number of structurally deficient bridges. While the ideal goal is to have zero structurally deficient bridges, new structurally deficient bridges are identified each year. The projected needs and anticipated funding levels through 2015 are a good estimate of the level of investment required to continue to decrease the number of deficient bridges in the state. With this information in mind, the bridges committee has the following recommendations:

- Continue to actively manage the bridge inventory through a sound, and fully funded, asset management philosophy, as well as wise stewardship of resources. Funding past 2015 should be increased to reduce the number of structurally deficient bridges to zero with an asset management and replacement program.
- Counter projected funding shortfalls to achieve reduction in the number of structurally deficient bridges. Consider enhancing current revenue sources such as user fees, gas taxes and tolls.
- Renew the federal SAFETEA-LU legislation with long-term funding as soon as possible in order to meet the needs of both state and local funding for bridge rehabilitation and replacement.

CONCLUSION

Progress has been made in Maryland to address the needs of the state's bridge infrastructure, it is important that this investment be continued to maintain or replace ailing bridges. Failing to do so will result in costly repairs and more travel delays for Maryland residents.

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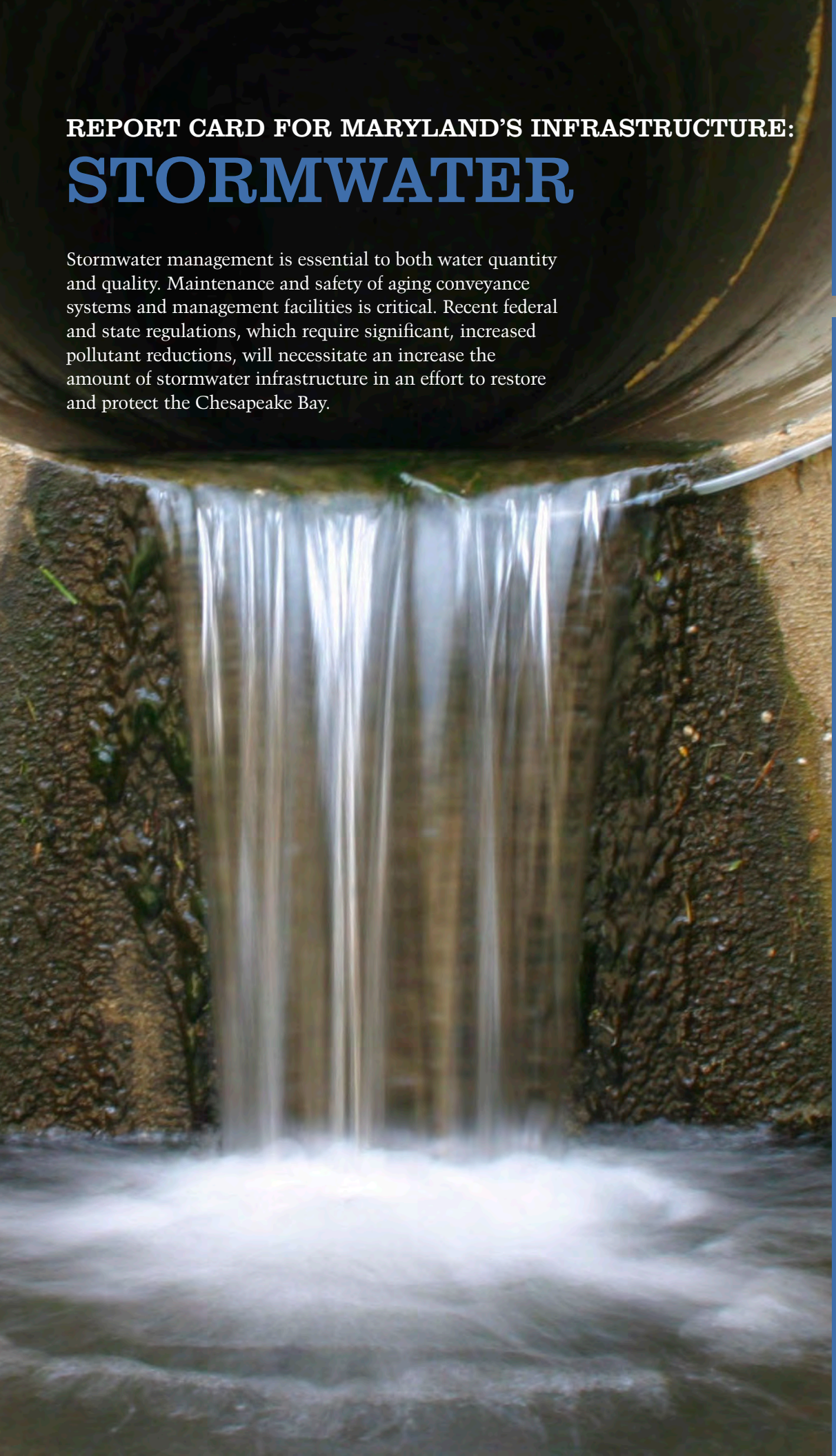

REPORT CARD FOR MARYLAND'S INFRASTRUCTURE:

STORMWATER

Stormwater management is essential to both water quantity and quality. Maintenance and safety of aging conveyance systems and management facilities is critical. Recent federal and state regulations, which require significant, increased pollutant reductions, will necessitate an increase the amount of stormwater infrastructure in an effort to restore and protect the Chesapeake Bay.

GRADE

D

STORMWATER

INTRODUCTION

Maryland's stormwater drainage infrastructure includes best management practices (BMPs), such as ponds that treat the quantity and quality of stormwater runoff, as well as stormwater pipes and channels, that convey stormwater through the state and ultimately to the Chesapeake Bay. If stormwater infrastructure is not adequate, maintained and/or functioning properly, Maryland residents and visitors could experience damaging and potentially life-threatening flooding, increased pollution in local streams, reduced aquatic wildlife, and a continuing decline in the health of the Chesapeake Bay.

Figure 1. Typical stormwater outfall to natural stream.

CURRENT CONDITIONS

CONVEYANCE SYSTEMS

The Baltimore City storm drain system is an example an example of aging infrastructure in need of maintenance. Many of the storm drains in the inner-city are brick or stone and are nearly 100 years old. In recent years, several collapses of large capacity storm drains have caused damage to roadways and other utilities, thus compounding the problem. Though Baltimore City embarked on a thorough inspection and mapping of its stormwater system in the 1990s and identified many structural and capacity deficiencies, a needed, significant capital program of rehabilitation and repair was not undertaken, due primarily to lack of funding. Baltimore City is just one of many jurisdictions across the state facing issues related to aging storm drain infrastructure.

A significant component of the overall stormwater infrastructure statewide is the large number of ponds, including the appurtenant embankments and drainage structures. The Maryland Department of the Environment's (MDEs) Dam Safety Division estimates that there are approximately 15,000 ponds in Maryland. Many of these ponds have extensive maintenance issues and require ongoing inspection and maintenance to ensure their stability and safety. The continued need for maintenance and repair of these ponds will increase demands for funding on state, local, and private owners. Without proper maintenance, the structural integrity of these ponds could be compromised, leading to failures that would pose a threat to public safety and create downstream property and environmental damage.

The development boom in the 1970s, plus the state stormwater management regulations in 1982, led to construction of a large number of ponds during that time period. Most of these ponds were built with corrugated metal pipe (CMP) spillways, which had an expected service life of 25 to 40 years. The number of ponds with CMP spillways that are now reaching or exceeding their expected service life is a major cause of concern. The cost of redesign and rehabilitation of these metal pipes could amount to significantly more than the pond repair capital budgets of local and municipal government pond owners. The impact on smaller, private pond owners would be even larger, since many do not have capital budgets for repair costs.

There are instances where a public roadway serves as the embankment for a stormwater pond. In these cases, the failure of the aging metal pipe spillway under the roadway could lead to a roadway collapse and have dire consequences and potential for loss of life, property, and infrastructure. It is expected that as ponds continue to age and deteriorate, the cost of repairs will continue to climb steadily.

POLLUTION

Stormwater conveyance systems, such as pipes and streams, were well conceived and designed such that there are separate systems for sewerage and stormwater drainage. However, these conveyance systems were designed to improve hydraulic efficiency in order to drain stormwater away from urbanized areas and prevent flooding, not to treat the storm runoff for water quality.

In recent years, the conveyance systems, including channels and streams in addition to the aging pipes, have been recognized as an essential part of the ecosystem and a contributor to overall water quality health. Stream bank erosion and the conveyance of non-point source pollution, i.e. surface water running over land and picking up pollutants and then depositing them in receiving streams, are critical issues relative to improving the health of Maryland's streams and the Chesapeake Bay. Non-point source pollution includes oil, grease, and trash from roadways, agricultural runoff, and excess nutrients from lawns. High levels of pollutants in streams often reduce available oxygen that is needed by aquatic life to survive and create unsightly conditions in streams and the Chesapeake Bay. Spawning of fish and other native wildlife occurs in these streams and rivers, which further highlights the need for improved water quality throughout the state.

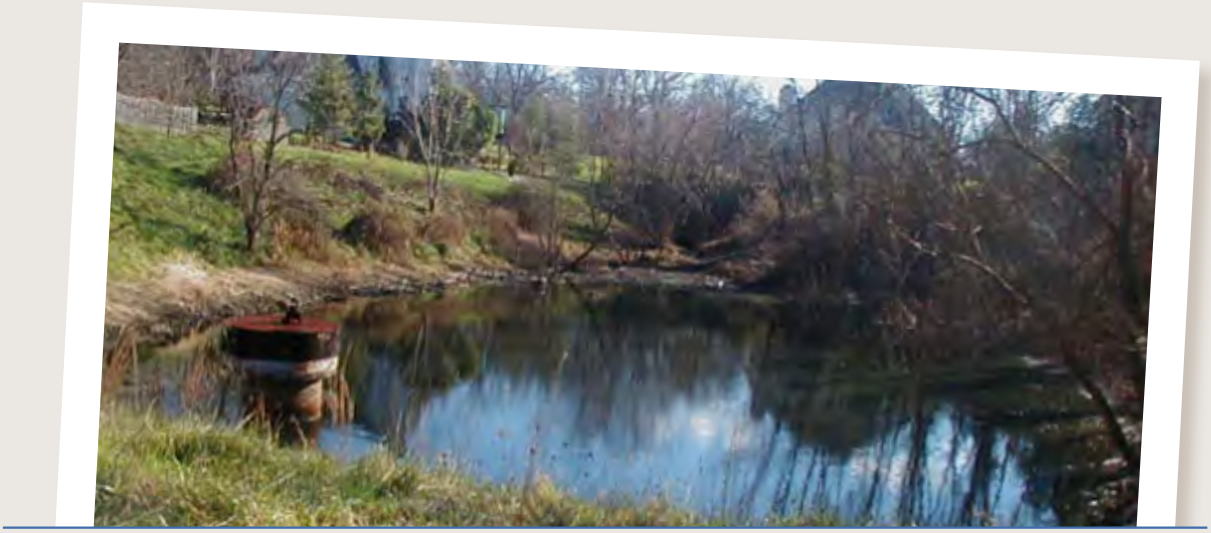

Figure 2. Typical stormwater management pond showing overflow riser.

REGULATIONS

The need for controlling storm runoff to protect against loss of life and property damage in Maryland became apparent as a result of the devastation left behind by tropical storm Agnes in June 1972. On a local level, stormwater management for flood control began in response to Agnes, but stormwater management did not become required statewide until the Maryland General Assembly passed the Stormwater Management Act in 1982. MDE is responsible for developing and enforcing the state's stormwater regulations.

Initially, stormwater management was only required to address the quantity of storm runoff to provide flood control. In 1986, Maryland's stormwater management regulations were updated to include water quality treatment, such as the removal of pollutants from stormwater before it is released into local waterways. Since then, Maryland has adopted a series of increasingly more stringent water quality regulations. The latest regulation, the Stormwater Act of 2007, mandates the use of environmental site design (ESD) for addressing stormwater in new and re-development projects. ESD is a comprehensive design strategy for maintaining pre-development runoff characteristics through the use of small-scale treatment devices and land-use techniques. Prior to ESD the typical method for accomplishing the same result was the use of larger, more centralized treatment facilities.

At the federal level, the United States Environmental Protection Agency (EPA) recently promulgated a draft total maximum daily load (TMDL), which defines numerical limits for specific pollutants being discharged into the Chesapeake Bay. A TMDL describes a maximum amount of a pollutant that a body of water can receive, while still meeting water quality standards. Despite restoration efforts during the last 25 years, poor water quality continues to be an issue in the Chesapeake Bay. The EPA deems the recent issuance of the Chesapeake Bay TMDL as the guide to achieving the restoration goals for the Chesapeake Bay. Significantly more stormwater BMPs will be required to both reduce the quantity and improve the quality of such discharges. The EPA and the state acknowledge the high price tag associated with meeting the TMDLs; however, the source for this significant funding for implementation has yet to be identified.

The federally mandated National Pollutant Discharge Elimination System (NPDES) program and NPDES permits put an additional requirement on the 10 largest jurisdictions in Maryland, including the State Highway Administration, to improve water quality. MDE, which administers the NPDES program, determined that it was appropriate to issue an NPDES permit to the State Highway Administration since it is the owner of a significant amount of impervious roadways. One method required by the NPDES permits for improving water quality is to retrofit older developments that were constructed prior to the requirement of stormwater management or that have BMPs designed prior to the current, stricter water quality requirements. The costs associated with these anticipated retrofit projects will significantly exceed current capital budgets for most, if not all, affected jurisdictions.

Maryland's schedule is to reach 70 percent of the TMDL goal by 2017 and 100 percent of the goal by 2020. Restoration of the Chesapeake Bay will continue to fall short of its goals if these deadlines are not met.

GRADE

The report card stormwater committee for the Maryland Section of ASCE obtained data related to stormwater drainage infrastructure in Maryland from various sources, including Baltimore City and County, MDE, the Maryland Department of Planning's Infrastructure Assessment Workgroup, and the EPA.

ASCE's 2009 *Report Card for America's Infrastructure* did not report on stormwater as its own category, so there is no national stormwater grade for comparison. The 2009 *Report Card* considered stormwater in its assessment of wastewater, which was assigned a grade of D-.

AFTER CONSIDERING THE AVAILABLE INFORMATION, STORMWATER IN MARYLAND IS ASSIGNED A GRADE OF "D".

FUNDING

There is a lack of dedicated funding to provide for inspection and maintenance for existing BMPs and conveyance systems. Funds are also needed to construct new BMPs and/or retrofit existing BMPs to meet current standards in light of the newly released federal and state requirements, which set aggressive pollutant removal requirements and a short timeframe in which to accomplish the pollutant reductions. Meeting the new standards will necessitate a significant increase in the number of BMPs and in the associated stormwater conveyance system infrastructure in Maryland. An influx of funds is needed in the short term to facilitate the state's goal of meeting the TMDL pollutant limits for the Chesapeake Bay by 2020. Furthermore, a long-term funding mechanism is needed to support the ongoing maintenance needs of existing stormwater infrastructure, as well as the anticipated large amount of new infrastructure.

The lack of a committed funding source has impeded the comprehensive maintenance and updating of critical stormwater systems and will continue to be an issue with the substantial effort that will be required to meet the Chesapeake Bay TMDL goal of 2020. Facilities for stormwater management have become increasingly sophisticated over the years, increasing not only capital costs, but also imposing an increased cost for ongoing inspection and maintenance, particularly for local governments that bear the burden of regulating such structures.

RECOMMENDATIONS

Adequate funding is needed for the repair of existing infrastructure and to build new and upgrade existing BMPs to meet the new Chesapeake Bay TMDL and 2020 nutrient reduction goals. Statewide, stormwater funding must compete for funding with other infrastructure areas, such as the needs of critical water supply and wastewater systems, which are required to maintain public health. The following should be kept in mind:

- Establish an enterprise funding approach in which a fund provides goods to the public for a fee with the intent of making the entity self-supporting.
- Implement a separate stormwater utility, which includes a method of collecting revenue that could be dedicated to implementation of a comprehensive program for maintenance and rehabilitation of existing stormwater systems.
- Make funding available to owners of private storm drain systems and BMPs still needing funding assistance.

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2. Chesapeake Bay Foundation. *Maryland Stormwater Regulations* (2010)
3. City of Baltimore's Department of Planning. Six Year Capital Program (2010)
4. Maryland Infrastructure Assessment Workgroup Report (September 18, 2008)
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REPORT CARD FOR MARYLAND'S INFRASTRUCTURE

BALTIMORE METROPOLITAN INFRASTRUCTURE SUPPLEMENT:

DRINKING WATER

Safe and reliable drinking water is often taken for granted. In the Baltimore metropolitan area, the city of Baltimore provides drinking water to a population of nearly 2 million people. The multiple surface sources of supply are adequate for the population served; however, aging pipelines pose a major challenge to sustaining the level of service.

GRADE

C-

DRINKING WATER

BALTIMORE METROPOLITAN INFRASTRUCTURE SUPPLEMENT

INTRODUCTION

A drinking water system provides potable water for drinking and fire protection. It is made up of supply, treatment, and distribution systems. The aging urban infrastructure issues facing the Baltimore metropolitan area are also being faces by many of Maryland's cities and town.

CURRENT CONDITIONS

The Baltimore metropolitan area drinking water system is comprised of four distinct components:

1) The water supply system, including the watersheds, streams, and reservoirs owned and managed by Baltimore City;
2) Two treatment systems, Ashburton and Montebello, owned and operated by Baltimore City;
3) Water distribution system within the City of Baltimore; and
4) Water distribution system located in the surrounding Baltimore County and interconnected with the surrounding counties.

The water supply system has adequate surface water supply. The system has a backup source from the Susquehanna River that has been used rarely during extreme droughts. Although the supply is entirely surface water, and thus subject to contamination from spills, an extensive watershed management program exists to provide a measure of protection.

One concern with the supply is that there are a number of finished water reservoirs in the system that are neither covered nor provided with additional treatment as required by state and federal law. Baltimore City is currently under a regulatory compliance order and is continuing to move toward implementation of cover and treatment options for each of the five reservoirs in accordance with the following completion schedule:

1) Towson Finished Water Reservoir - 2013.
2) Montebello WFP Finished Water Reservoir - 2014.
3) Guilford Finished Water Reservoir - 2016.
4) Druid Lake - 2018.
5) Ashburton Lake - 2018

Figure 1. Crews repairing leaking water mains in Baltimore City (Source: KCI, 2010)

Baltimore City routinely monitors the water quality of the entire system and has implemented enhanced disinfection processes at each facility to provide additional treatment until the permanent improvements are completed.

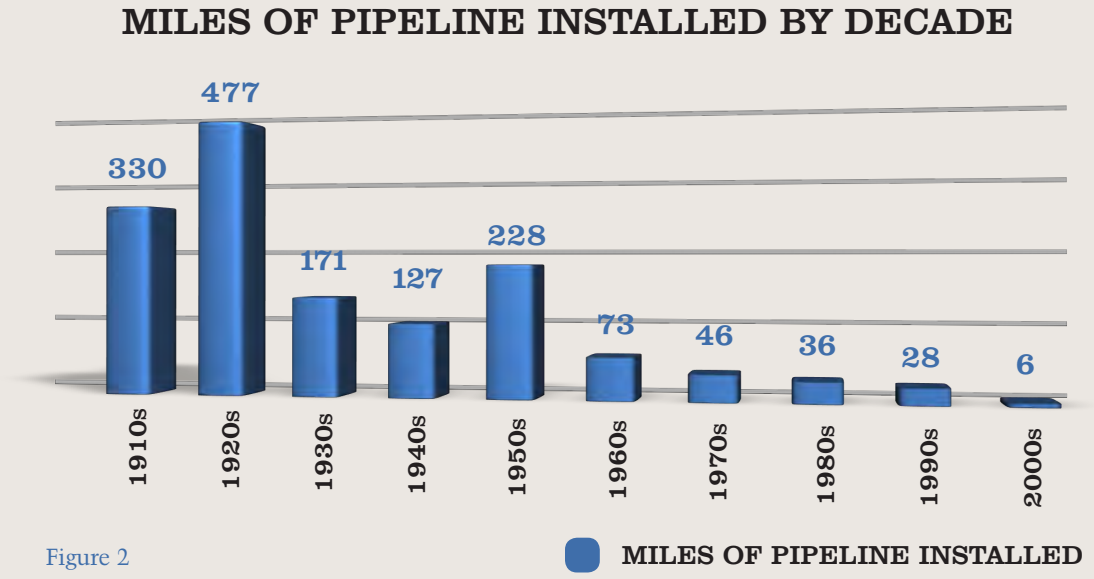

Figure 2

Perhaps the most pressing concern is the aging water distribution system (Figure 2). In 2009 there were more than 1,100 water main breaks, a majority of which were in small diameter lines. Dramatic water main breaks in recent years, including a 36-inch diameter main break in Baltimore City in March 2010, have underscored the need for a comprehensive assessment of the condition of aging pipes. In Baltimore City, a vast majority of the distribution system is cast iron pipe that is reaching the end of its useful service life. The distribution system in the surrounding counties, though maintained by the city, is constructed primarily of relatively new ductile iron pipe and is less prone to catastrophic breaks than the old cast iron pipes.

Recently, Baltimore City began a comprehensive water audit to find and repair leaks and breaks, and to determine the condition of the distribution system. The city is currently developing an infrastructure leakage index to benchmark the city's performance with that of other cities across the country.

GRADE

The report card drinking water committee for the Maryland Section of ASCE obtained data related to drinking water in the Baltimore metropolitan area from various sources including, Baltimore City and County, the Maryland Department of the Environment, the Maryland Department of Planning's Infrastructure Assessment Workgroup, and the United States Environmental Protection Agency (EPA). The data obtained are similar to the information used on a national level in the development of the ASCE's 2009 *Report Card for America's Infrastructure,* which assigned drinking water a grade of D-.

AFTER CONSIDERING THE AVAILABLE INFORMATION, DRINKING WATER IN THE BALTIMORE METROPOLITAN IS ASSIGNED A GRADE OF "C-".

FUNDING

It is imperative that funds and resources be available for the extensive rehabilitation and replacement program for drinking water infrastructure in the Baltimore metropolitan area. Fortunately, the Baltimore metropolitan area's water system is operated as an enterprise fund - a fund that provides goods to the public for a fee with the intent of making the entity self-supporting and protecting revenue from being diverted to other uses. The onging comprehensive investigations and condition assessments and robust capital program are good starting points, but additional resources are needed to complete the work.

Baltimore City's 2011-2016 capital budget calls for spending more than $1.051 billion on water supply improvements, including $488 million for construction of a new water treatment plant at Fullerton, and maintenance, repair, and replacement of water mains. Approximately 43 percent of the $488 million will have to be financed by the city, primarily through the sale of revenue bonds while the remaining balance will be funded by the surrounding counties. These large expenditures will necessitate an increase in water rates. However, rate increases are currently capped at less than 10 percent per year, leaving a potential shortfall in funding.

Funding at the state and federal levels is woefully inadequate to ensure minimum compliance with ever-tightening state and federal regulations. More funding is needed to ensure the continued safe and reliable supply of potable water to the region for drinking and fire protection. Baltimore metropolitan area ratepayers have seen a steady annual increase of approximately 10 percent per year for water and wastewater services. With the recent national economic climate, future increases of that magnitude are uncertain. Although the need for funding is great, the fact that a reasonable financial mechanism is in place for the Baltimore Department of Public Works (DPW) to fund improvements has helped to increase the grade for the drinking water infrastructure.

Baltimore DPW officials note that in order to manage the capital improvements and ultimately move from a mode of reactive maintenance to proactive maintenance, a significant increase of in-house engineering and management staff capabilities are needed. Currently, many Baltimore DPW engineering and management functions are performed by outside consultants, largely the result of years of retiring staff with little or no backfill. Long-term sustainability of the infrastructure will require recruiting, training, and developing in-house engineering and maintenance staff.

RECOMMENDATIONS

Responsible jurisdictions have made progress and shown a commitment to responding to regulatory compliance orders regarding supply, and to upgrading and maintaining aging pipelines despite lagging funds. The drinking water committee has the following recommendations for further improvement of the Baltimore metropolitan drinking water:

- Continue progress toward full compliance with state and federal regulations.
- Increase state and federal investment.
- Remove caps on rate increases and consider increasing water rates.
- Increase training and education opportunities for sanitary engineering and maintenance workers.
- Improve compensation for public works employees.

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1. American Society of Civil Engineers. *Report Card for America's Infrastructure* (2009)
2. City of Baltimore's Department of Planning. *Six Year Capital Program* (2010)
3. Maryland Infrastructure Assessment Workgroup Report (September 18, 2008)
4. Personal interview with Mr. Alfred H. Foxx, Director, City of Baltimore Department of Public Works (November 15, 2010)

GRADE

C

WASTEWATER

BALTIMORE METROPOLITAN INFRASTRUCTURE SUPPLEMENT

REPORT CARD FOR MARYLAND'S INFRASTRUCTURE

BALTIMORE METROPOLITAN INFRASTRUCTURE SUPPLEMENT:

WASTEWATER

In the Baltimore metropolitan area, wastewater infrastructure systems have been deteriorating for decades. Not only are sustainable improvements to wastewater infrastructure needed, but proper ongoing operations and maintenance of these facilities are critical to protecting public health and the Chesapeake Bay.

INTRODUCTION

Wastewater infrastructure includes collection sewers, pumping stations and transmission mains, and treatment facilities. The aging urban infrastructure issues facing the Baltimore metropolitan area are also being faces by many of Maryland's cities and town.

Figure 1. Sludge and scum accumulation at the Back River Wastewater Treatment Plant.

CURRENT CONDITIONS

The wastewater system serving the Baltimore metropolitan area is an urban system serving a regional area, including Baltimore County and portions of Howard and Anne Arundel counties. Treatment is primarily accomplished primarily by two large wastewater treatment plants - Back River and Patapsco. The treatment plants are owned and operated by Baltimore City and are considered joint-use facilities with the counties.

Unlike many older urban systems in the Eastern and Midwest United States, the Baltimore City sewerage system was designed as separate sanitary sewers and storm drains. Thus, the very expensive, if not intractable, problem of separating combined sewers that exists in cities like Pittsburgh and Washington, D.C., does not exist in Baltimore City nor in the surrounding service area. A small number of combined sewers, located in western Baltimore City, were separated about 10 years ago.

Despite the benefits of the separation of sanitary sewerage from stormwater drainage, the system is very old and had been in a state of disrepair until a surge of capital projects in recent years. Approximately 15 years ago, Baltimore City and surrounding counties invested significant resources in the development of geographic information systems (GIS), comprehensive evaluations of the sewersheds, and development and execution of capital improvement projects. Through these efforts, approximately 60 permitted overflows have been eliminated.

Though a large majority of wet and dry weather sanitary sewer overflows have been eliminated through these efforts, such overflows persist. As seen in Figure 2, periodic sanitary sewer overflows continue to occur. Often these occur on small diameter lines and result from pipe blockages due to roots and grease buildup. These overflows typically result in relatively low volumes of wastewater being discharged to receiving streams. The culprit deficiencies are the result of poor preventive and routine maintenance.

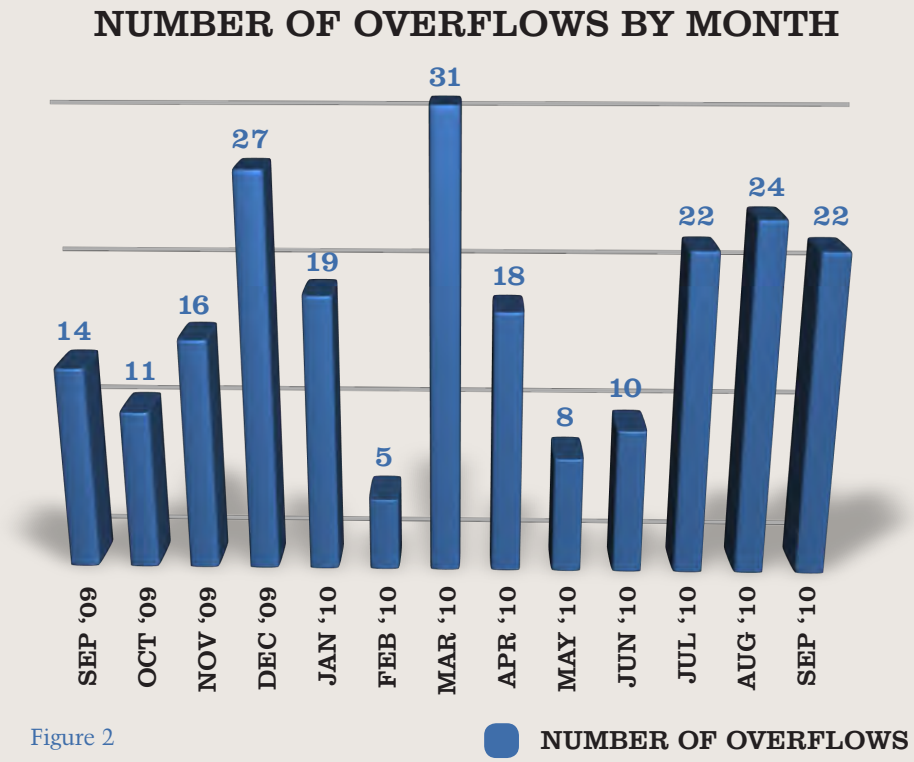

Figure 2

In response to the history of chronic sanitary sewage overflows over the years, in 2001, Baltimore City, the Maryland Department of the Environment (MDE), the United States Environmental Protection Agency (EPA), and the United States Department of Justice entered into a consent decree, a voluntary and binding agreement that requires the city to evaluate and upgrade the sewerage facilities operated and maintained by the city. A similar consent decree was later negotiated with Baltimore County. However, the county's compliance schedule lagged behind the city's schedule, making project coordination difficult. These consent decrees have required more than $100 million in expenditures for engineering alone, with the ultimate price tag for rehabilitation and repair expected to exceed $1 billion.

In addition to the consent decrees, federal regulations, in particular the proposed Chesapeake Bay total maximum daily load (TMDL), impose further regulatory pressure to comply with controls and elimination of sanitary sewer overflows.

The solution to overflows that occur as a combination of wet weather and surcharges in the system due to significant infiltration and inflow entering cracked and broken pipes generally requires significant expenditures of capital funds to either rehabilitate old pipes and manholes or build new ones. The economics of cost versus benefit to correct such defects can be expected to skyrocket when infrequent but high intensity storms must be accommodated by these deficient system components. The unfunded regulatory mandate to eliminate all such overflows and upgrade to a higher level of performance will necessitate increased spending in the near-term such that there are eventually reductions to funding for sustainable long-term maintenance.

Baltimore City officials note that current public works staffing for wastewater infrastructure maintenance, engineering, and management is inadequate to handle the tasks long-term. Department of Public Works officials expressed a long-term commitment to increase in-house capabilities, while continuing to rely on outside consultants in the near-term.

GRADE

The report card wastewater committee for the Maryland Section of ASCE obtained data related to wastewater in the Baltimore metropolitan area from various sources, including Baltimore City and County, MDE, the Maryland Department of Planning's Infrastructure Assessment Workgroup, and the EPA. The data obtained are similar to the information used on a national level in the development of ASCE's 2009 *Report Card for America's Infrastructure,* which assigned wastewater a grade of D-.

AFTER CONSIDERING THE AVAILABLE INFORMATION WASTEWATER IN THE BALTIMORE METROPOLITAN AREA IS ASSIGNED A GRADE OF "C".

RECOMMENDATIONS

Responsible jurisdictions have demonstrated commitment to the Baltimore metropolitan areas wastewater infrastructure as evidenced by past capital efforts and in responding to regulations for upgrading and maintaining the wastewater infrastructure system despite a lack of funding. The wastewater committee has the following recommendations for further improvement of the Baltimore metropolitan wastewater infrastructure system:

- Continue progress toward full compliance with state and federal regulations to reduce wet weather overflows and improve water and environmental quality.
- Increase state and federal investment, including the identification of a revenue stream to pay for pollution control in the Chesapeake Bay.
- Consider integrating the wastewater and stormwater plans.

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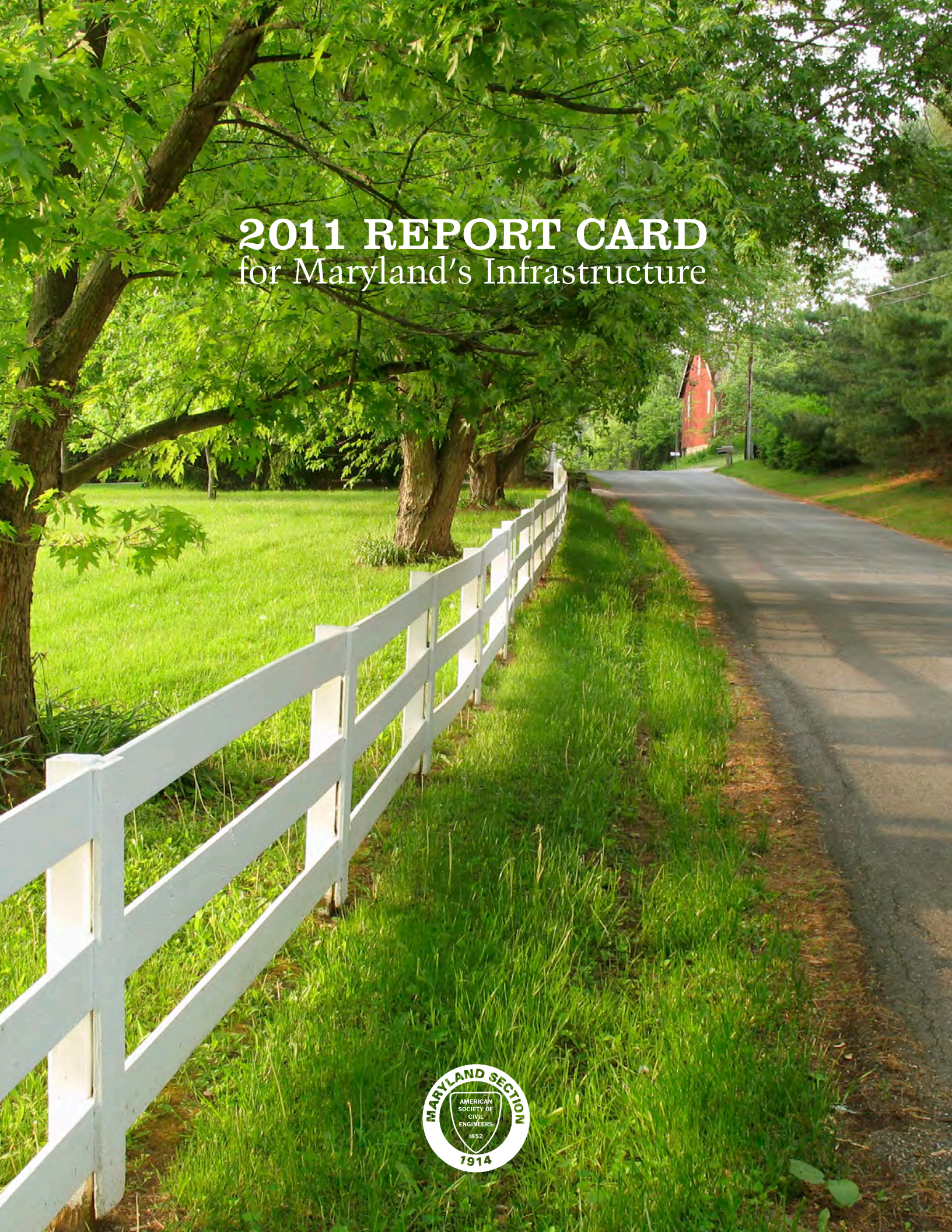

2011 REPORT CARD
for Maryland's Infrastructure

MARYLAND SECTION
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1914