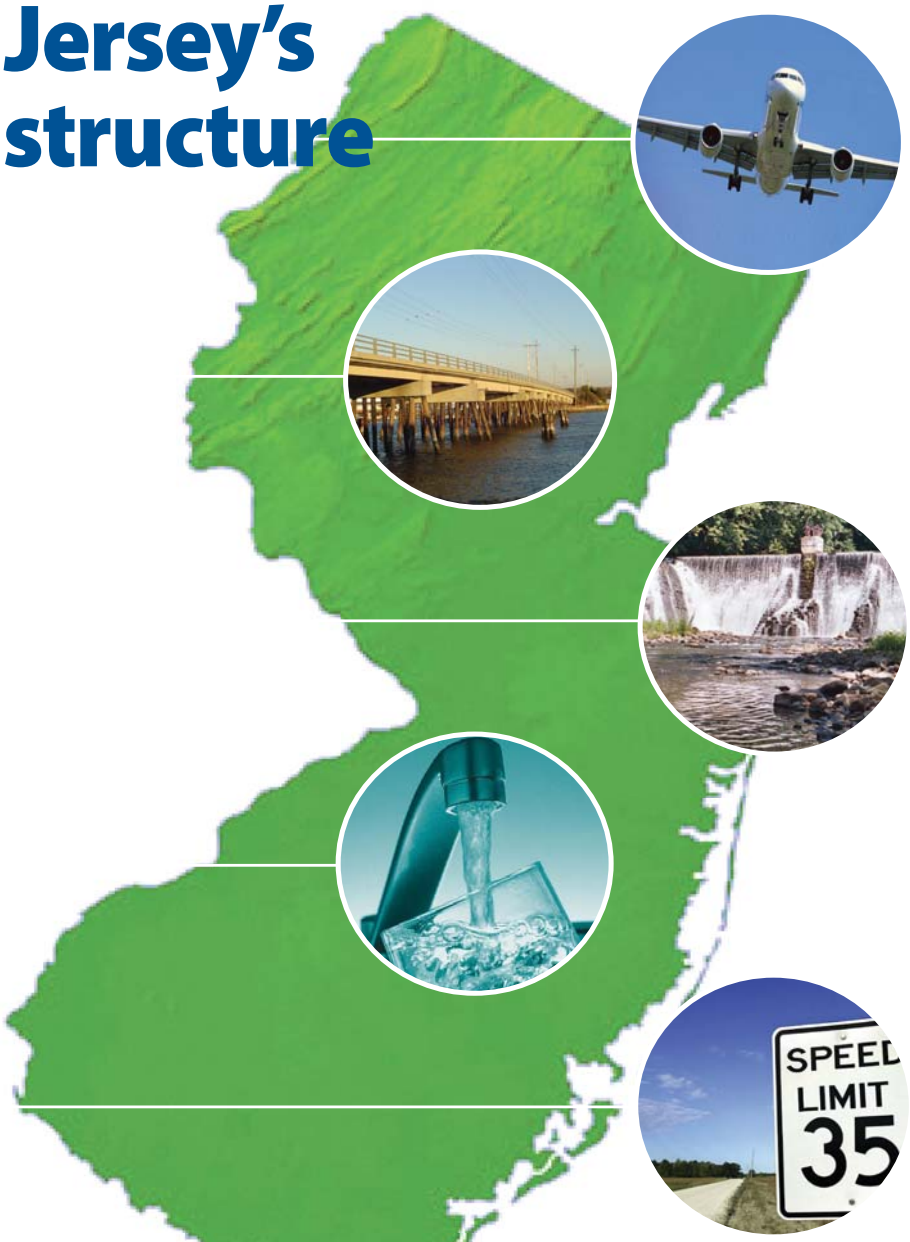
2007
Report Card for New Jersey's Infrastructure



ASCE
American Society of Civil Engineers

2007
Report Card

By the NJ Section – ASCE
New Jersey's Infrastructure
Report Card Committee

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EXECUTIVE SUMMARY

The New Jersey Section of the American Society of Civil Engineers (ASCE) represents over 4,000 civil engineering professionals who live and work in the State of New Jersey and its immediate surroundings. We realize the importance of the State's infrastructure to our citizens and to the nation in whole. The maintenance and improvement of the State's infrastructure is vital to our economy, health, and environment. As a civil service to the residents of our State, the New Jersey Section assembled an Infrastructure Report Card Committee to review available records and assess the condition of the critical components of the State's infrastructure.

It is our intent that this Infrastructure Report Card will raise public awareness of the impact crumbling infrastructure is having on our daily lives, and the many issues and decisions that face our State as we strive to maintain and improve our infrastructure. We believe discussion of the issues detailed in this report will lead to a greater understanding of the current and future needs of our State, prompting decision makers in our communities and in the legislature to formulate policies and provide the necessary funding to address New Jersey's infrastructure needs.

Mission Statement

The mission of the committee is – *"To prepare an assessment of infrastructure in order to build support for dedicated and consistent sources of funding to provide adequate infrastructure facilities which are in a state of good repair."*

Vision Statement

- Long Term: Provide a report on what is needed to meet the current and future needs of a growing State and to raise awareness of the importance of well-maintained, efficient, safe and secure infrastructure facilities and systems to protect and enhance our quality of life.
- Short Term: Educate the public and political leadership so that they will be supportive of developing, enacting and implementing the practices and funding mechanisms needed to realize our short term needs and long term vision.

Approach

The Report Card, prepared by the New Jersey Section, was modeled after the Report Card for America's Infrastructure released by ASCE National in 2005 (www.infrastructurereportcard.org).

A committee of 8 volunteer practicing and professional civil engineers from across the State were assembled to collect data, review and evaluate the information obtained and to develop the grades and recommendations.

Our New Jersey Infrastructure Report Card investigated the following infrastructure categories: State transportation systems (including roads, bridges, rail, aviation, ports, and navigable waters), dams, drinking water, wastewater, schools, and public parks and recreation. In an effort to maintain an objective and consistent perspective on the findings and grading, for each category, the committee called upon recognized public and private engineering professionals and appropriate agency leaders to evaluate their findings in order to develop a credible, defendable, and easily explainable conclusion that can be reported as a report card grade. The resulting report card informs the public and policy makers about the critical nature of New Jersey's infrastructure needs. It will serve as an ongoing guide for policy makers where funding needs are quantified and identified by infrastructure category.

The New Jersey Infrastructure Report Card effort followed the ASCE national report card's approach of issued letter grades based on established criteria used to analyze the various infrastructure categories. The national report card grades were based on the following scale:

Letter Grade	Numeric Range	Definition
A	90-100%	Exceptional
B	80-89%	Good
C	70-79%	Mediocre
D	41-69%	Poor
F	40% or lower	Failing

The New Jersey Section ASCE grading system considered two factors: 1) State of Repair and 2) Quality of life. In addition, unique performance criteria was developed for each infrastructure category evaluated based on the research performed and data developed. The committee strove to base the grades on a quantitative analysis whenever possible. Since the state of repair was not easily quantified for all categories, ASCE also considered the unmet need, or the percentage of funding provided for requested funding.

In some cases, category grades were adjusted if the expectations for a particular performance criterion did not meet the traditional grading scale, or if the data was incomplete. Due to the many factors that can impact infrastructure's overall performance, some categories were given individual grades in multiple areas of assessment, which were then averaged to create the overall category grade. In addition to numeric data, qualitative information was also used to make modifications to the grades. Also, for several infrastructure categories, hard data was not readily available in all areas, which required more subjective assessments to be made.

All grades were critiqued by the Review Panel for objectivity and consistency before being finalized and accepted by the New Jersey Section ASCE Board for publication.

Conclusion

New Jersey Infrastructure Report Card Conclusions are summarized in the following table:

Category*	Grade
Wastewater	D
Drinking Water	C
Parks and Recreation	C-
Dams	C-
Energy	C+
Aviation	D
Ports and Navigable Waterways	C
Roads	D
Bridges	D
CUMULATIVE NJ GPA	C-
* The analysis of Rails and Schools is continuing.	

It is critical that New Jersey develop and maintain a modern infrastructure that can accommodate the state's growth in population. This growth in population threatens our already overburdened public services such as Roads and Bridges, Schools, Energy, Drinking/Waste Water, Aviation, Waterways as well as Parks and Recreation. Further modernization of these systems in New Jersey is fundamental to providing a safe and operational infrastructure while improving the quality of life for the state's residents. Furthermore, planning and allocating funds for the continued forecasted growth in the State is essential as existing facilities and services become obsolete, overburdened or fall into disrepair. Fiscally responsible projects that are designed for the future population growth in the State need to be implemented with dedicated sustainable recourses.

The desired outcome from the development and publication of the New Jersey Infrastructure Report Card is for State legislature and U.S. Congress to allocate funding for State infrastructure at levels that meet the need identified by this Report Card; to support infrastructure funding that promotes economic growth and high levels of quality of life with local governments throughout the State; and to obtain New Jersey voter support for infrastructure funding initiatives and fees. It is the intent of the New Jersey Section to further our analysis and develop additional recommendations to "Raise the Grade" in each infrastructure category and provide guidance to decision makers in our communities and in the State legislature to formulate policies that will maintain and enhance the quality of life for the citizens of the State of New Jersey.

Wastewater (Grade D)

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Introduction

The history of wastewater treatment in the United States begins with passage of a bill in 1886 designed to prevent dumping of materials into New York Harbor which would impede navigation.[1] This was followed by a series of other well-intentioned regulations. Where these intentions failed was in determining who had authority over public waters at the Federal, State, or Local level, the absence of technology and efficient means for treating wastewater, and available funding for any quality standards established. The Clean Rivers Restoration Act under President Johnson established a basin-wide approach to planning, treatment, and regulation, but lacked sufficient funding. Similarly, the Nixon administration attempted to channel the environmental movement of the 1960s by proposing a $10 billion treatment plant construction program. The program was funded at only 40% by Federal dollars. The United States has long had a conscience to improve its waters, if not the funding to back its resolutions.

The Water Pollution Control Act Amendments of 1972 (the Clean Water Act) were designed to overcome the lack of funding and control evident in past programs. The Federal government was charged with funding 75% of the costs for building wastewater treatment facilities. It established water quality goals and enforcement procedures. It regulated all point discharges through a program called the National Pollutant Discharge Elimination System (NPDES). In 1981 New Jersey was given control of the NPDES program for New Jersey discharges. Since that time, the NJPDES program has grown to the point where it currently administers 5,233 active permits including 255 for municipal discharges and 422 for industrial discharges direct to surface waters.[2] The program has also expanded to include discharges to groundwater, stormwater collection system discharges, and indirect discharges. The Division of Water Quality Watershed Permitting Element is divided into 2 Point Source Bureaus which monitor active point source permits throughout the State. Over 15 billion gallons of wastewater are treated and discharged each day in New Jersey.[3]

The Outlook Today…

Since then, wastewater regulation programs have evolved from primary treatment standards which remove large items by sedimentation, to secondary and tertiary standards which use biological treatment techniques to remove organic material. Some states, including New Jersey, are looking to remove excessive nutrients through additional treatment steps. High levels of phosphorus and nitrogen in discharge waters have been blamed for increasing algae

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[1]Hammer, Mark J., and Viessman, Jr., *Warren. Water Supply and Pollution Control, 6th Ed.* Addison-Wesley Longman, Inc, 1998.

[2]NJ Department of Environmental Protection, Watershed Permitting Element website - http://www.nj.gov/dep/dwq/wspe.htm

[3] NJ Department of Environmental Protection, Bureaus of Point Source Permitting website - http://www.nj.gov/dep/dwq/psp1n2.htm

buildup in our rivers and streams. In New Jersey where a river may serve as both point of waste discharge and source of drinking water supply, high algae content can lead to increased drinking water treatment costs. The Environmental Protection Agency (EPA) is considering establishing maximum daily discharge standards for Region 2 (to which New Jersey belongs), independent of any more stringent controls which the State may develop.

Unfortunately, the trends of the past continue. While water quality in our State's streams and rivers has improved markedly over the past 40 years since the Clean Water Act was first passed, the public demands water of the highest quality for the protection of aquatic and wildlife and recreational purposes. Oftentimes the new water quality standards are handed down without any funding for construction of the treatment processes necessary to make them a reality. Sewerage authorities are faced with the option of raising sewerage tariffs or raising funds by bonding public projects.

Wastewater Collection and Transport Systems

Increasingly stringent water quality standards are only half of the equation. Just as significant as the treatment processes themselves, is the infrastructure that collects the sewerage and transports it to the treatment facilities.

150 years ago, combined sewers were designed to transport both sanitary sewage and stormwater flows to the treatment facilities. There currently remain 280 combined sewer overflow (CSO) points throughout 8 counties in New Jersey. When valuable capacity is taken up by storm flows, the wastewater treatment plants are forced to discharge raw and partially treated sewage into streams and rivers. The EPA estimates there are at least 40,000 raw sewage discharges nationwide each year. Beaches closings, shellfish restrictions, public and private property clean-ups are other potential side effects of sanitary sewer overflows.

In addition to overtaxed pipe networks the physical components are aging quickly. Most of the sewerage collection systems in New Jersey were installed 70 or more years ago but the expected useful life of pipe is only 50 years. Construction on the City of Newark collection system began in 1852.[4] While it may be possible to extend the life of a pipe to 75 or 100 years with good maintenance most of the infrastructure under our city streets is crumbling from neglect. Not only do pipe breaks disrupt the sewerage collection and conveyance systems but over time they may create giant sinkholes in our streets.

[4] History of the Newark Sewer System, http://www.ci.newark.nj.us/Water/sewerhistory.htm.

What is Being Done

New Jersey has regulations and programs in place to monitor point discharges and enforce compliance with quality standards. They also have plans and programs to identify and prioritize projects. Each sewage authority is required to prepare a Water Quality Management Plan which identifies the capacities and location of collection systems in the municipalities under its jurisdiction. Before the collection system can be expanded to accommodate new customers, the authority must evaluate the capacity of its treatment facilities and its ability to process additional flows. If necessary, new projects must be identified to increase the conveyance or treatment capacity of the system. The DEP then amasses these reports into 20 separate Area-Wide Water Quality Management Reports based on discharges to a common watershed. The projects are further prioritized within each area-wide report.

The State also monitors all existing CSOs and has developed an approach to control and fund improvement initiatives. Since 1990, all CSOs in New Jersey are required to have an NJPDES permit. The State prepared a CSO Long-Term Control planning process (LTCP) which was accepted by the EPA in 1998 and set the foundations for the NJ LTCP CSO Control Plan. This multi-phase plan laid out long-term goals for slowly bringing the CSOs within the state into compliance with the Clean Water Act and improving the overall quality of New Jersey's waters as required by National CSO regulations.

New Jersey makes low interest loan money available for wastewater and CSO improvements available through its Environmental Infrastructure Financing Program. The program works in partnership with the New Jersey Environmental Infrastructure Trust Program (EITP), an independent financing authority. Each program awards an equal amount of funding, subject to different interest rates and program requirements. Projects are prioritized and money award through an evaluation of the nature of the problem and potential damage to receiving waters. Currently, the highest priority projects are designed to eliminate untreated discharges to waters from CSOs and damaged pipelines. Other high priority projects are along coastal waterways, and those where the receiving waters do not meet the State's quality standards.[5] Since the creation of the program, more than $1.5 billion dollars in loan money have been awarded.[6]

Conclusion

The American Water Works Association, American Society of Civil Engineers, US Environmental Protection Agency, and numerous public advocacy watchdog groups have all identified the aging infrastructure as an area for concern. At the same time, federal funding for the New Jersey Clean Water State Revolving Fund has declined 51% to only $26.7 million in fiscal 2008, and applications for new projects have risen 29%. The current

[5] NJ DEP Municipal Finance and Construction Element website - http://www.state.nj.us/dep/dwq/mface.htm#funding

[6] Ibid NJ DEP Municipal Finance website

estimate to repair the wastewater infrastructure throughout the State is $15 billion.[7] Without intervention, sewerage demand is expected to exceed available treatment capacity by 2016.

The ASCE grading system considered two factors: 1) State of Repair and 2) Quality of life. ASCE based this portion of grading on the unmet need, or the percentage of funding provided for requested funding.

Based solely on the amount of funding available as compared to the amount of funding necessary, the ranking of the wastewater infrastructure would yield a grade of F. However, consideration was given to the numerous control programs, planning agencies, and loan and grant programs available throughout the State. It is because of programs like these that the quality of New Jersey's water has continued to improve. ASCE assigns a grade of D to Wastewater.

In order to raise the grade, New Jersey must take a moment to recognize that while controlling discharge water quality is important, the existing infrastructure is in need of critical repairs. As we continue to pass more stringent quality standards, money is diverted away from rehabilitation projects. The treatment facilities constructed over 40 years ago in response to the Clean Water Act have reached the end of their useful lives without consideration for additional treatment processes. Funding from State and Federal sources has traditionally gone to treatment facility upgrades, and not to conveyance system rehabilitation. As stated above, some of the pipe networks in New Jersey date back to the 1850s. Large diameter interceptor lines which deliver sewerage to the treatment plants may lie under critical roadways. The costs to repair these aging pipelines will be high. The costs of repairs if the pipes should fail completely are much higher.

[7] Fiscal 2008 Budget in Brief. NJ State Office of Management and Budget, Chapter 2, pg 42, Feb 22, 2007, http://www.state.nj.us/treasury/omb

Drinking Water (Grade C)

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Introduction

Are we investing enough in our drinking water infrastructure? A preliminary comparison of spending versus investment needs suggests that New Jersey has a drinking water infrastructure investment funding gap of at least $60 million per year. While water supply and treatment are integral to ensuring safe drinking water is provided to all New Jersey residents, the State's water distribution systems may require the most attention. Deteriorating distribution infrastructure threatens drinking water quality and wastes water and energy through leaks and main breaks. The State's drinking water infrastructure requires more capital and operations and maintenance (O&M) investments to ensure residents continue to be provided with water at an acceptable level of service - that is, water of acceptable quality, in acceptable quantity, with adequate pressure, and with an acceptable degree of service interruption.

Current Conditions

Supply: Public water systems[1] serve 80% of the State's residential population, while private domestic wells serve the remaining 20%. Central and northern New Jersey contain the 20 largest community water systems[2] serving 50% of the state population.

[1] A **public water system** provides water for human consumption through pipes or other constructed conveyances, and has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. A public water system is either a community water system or a non-community water system.

[2] A **community water system** is a public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Water is drawn from one of 45 surface water intakes at rivers, lakes, and reservoirs, or one of 2,434 groundwater wells. Southern New Jersey is mostly served by groundwater.

New Jersey faces many challenges in ensuring an adequate supply of clean water:

- **Population growth and regional shifts in population:** More than eight million people live within New Jersey's 7,836 square miles. The population grew by 60,000 from 1990 to 2000, and is projected to increase by another 60,500 by 2010[3].
- **Increasing consumption:** Groundwater quantity and quality problems are usually concentrated in areas with the greatest demand for groundwater use.
- **Overdevelopment** based on land use patterns that do not necessarily recognize areas of pristine water quality and sources of water supply.
- **Industrial contamination**.

The 2007 State of New Jersey Environmental Policies and Action Plan[4] identifies the "provision of clean and plentiful water" as a current priority which will have a concentrated focus over the next three years. Specific elements of the action plan include:

- Completing the statewide Water Supply Master Plan and implementing regulatory, education and compliance strategies to integrate its provisions into key DEP decision-making and programs as well as into local government and intergovernmental planning. Among other things, the Plan will update water supply availability for each of the 150 water supply planning areas utilizing the most up-to-date models to identify areas in current and projected surplus/deficit for the entire State.
- Ensuring the protection of public health by reviewing, updating and expanding existing safe drinking water requirements, as necessary. Development of strategies to regulate radon in drinking water should be completed by December 2008.
- Developing and implementing measures to protect and enhance the quality of surface and ground waters.

Treatment: While most New Jersey residents receive water from public water systems that operate without significant EPA violations, the number of systems in violation of regulations is trending upward. According to USEPA's 2004 National Public Water Systems Compliance Report, New Jersey's water systems were cited for a total of 17,776 violations – reflecting a 9% increase in total violations over 1999 levels. However, maximum contaminant level (MCL) violations only account for approximately 2% of

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[3] NJDEP. 2004. Draft Water Supply Action Plan 2003-04 - New Jersey Statewide Water Supply Planning Process. http://www.state.nj.us/dep/watershedmgt/DOCS/pdfs/WaterSupplyActionPlan03-04.pdf

[4] Jackson, L. 2007. NJDEP Priorities and Action Plan, NJDEP, Trenton, N.J.

total violations, while monitoring violations account for greater than 95% of total violations. Most of New Jersey's MCL violations are due to exceedances of acceptable total coliform[5] and nitrate levels.

The State's Capacity Development Program provides technical, managerial and financial assistance (through the Drinking Water State Revolving Fund Program) to help water systems with a history of significant non-compliance return to and remain in compliance with the Safe Drinking Water Act (SDWA) regulations. A 2005 report on the Capacity Development Program indicates that the number of systems with a significant non-compliance history decreased from 9% in 1997 to 2% in 2003. It is anticipated that total SDWA violations will decrease as more systems seek the assistance provided by the Program.

Distribution: Transmission and distribution systems generally account for most of a system's capital value. But invisibility often leads to funding for this buried infrastructure being usurped by more visible above ground projects. Consequently, residents are reminded of buried infrastructure when it is deteriorating or already in poor condition. When mains break and disrupt water service, flood basements and impede the flow of traffic, or when tap water has taste, odor and red water (due to iron corrosion) problems, the need for continued investments in underground infrastructure becomes more evident.

Most distribution piping installed in the US from the late 1800's until the late 1960's was manufactured from cast iron, and many of these pipes now need to be replaced. The oldest cast iron pipes, dating to the late 1800s, have an average life expectancy of about 120 years. Because of changing materials and manufacturing techniques, pipes laid in the 1920s have an average life expectancy of about 100 years, and pipes laid in the post-World War II boom can be expected to last about 75 years[6]. However, the rate of deterioration of a water system is not merely a function of material age[7]. The cumulative effect of the external forces acting on buried pipe is extremely important. For example, while 70 year-old unlined cast iron pipe may be expected to last for another 60 years in some systems, 50 year old pipe in a different location may already show signs of failure. Variations in temperature, internal and external corrosion, and the occurrence of hydraulic surges all impact the life expectancy of underground piping.

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[5] A group of bacteria whose presence in a water sample indicates the water may contain disease-causing organisms

[6] AWWA. 2001. Dawn of the Replacement Era –Reinvesting in Drinking Water Infrastructure.

[7] American Water Works Service Company (AWWSC) Engineering Department. 2002. Deteriorating Buried Infrastructure Management Challenges and Strategies.

The 2001 AWWA study "Dawn of the Replacement Era - Reinvesting in Drinking Water Infrastructure" recommends developing comprehensive local strategies to address infrastructure repair and replacement challenges. Specifically, the comprehensive strategy should include:

- Assessing the condition of the drinking water system infrastructure
- Strengthening research and development
- Working with the public to increase awareness of the challenge ahead, assess local rate structures, and adjust rates as necessary
- Building the managerial capacity of water systems

Future Outlook

The state's drinking water infrastructure requires capital and O&M investments to ensure NJ residents continue to be provided with water at an acceptable level of service. The projects supported by capital spending include constructing raw water intakes, impoundments, wells, treatment plants, and storage tanks; installing standby power generators; replacing aging and deteriorated water mains; and installing booster pumping stations to maintain adequate distribution system pressure. The projects supported by O&M spending include rehabilitating storage tanks, refurbishing pipes to remove build-up on pipe walls (Figure 1) and looping dead-end mains to avoid stagnant water.

(a) (b)

Figure 1. Water piping before **(a)** and after **(b)** cleaning and relining. *Photos supplied by Dennis Hart Executive Director, NJ Environmental Infrastructure Trust*

Based on responses to a 2003 survey, the EPA estimated $6.9 billion in capital investments would be needed over the next 20 years to install, upgrade and replace New

Jersey's drinking water infrastructure[8]. These investments are needed to preserve the physical integrity of water systems and ensure continued compliance with regulations. Approximately 54% of the investment estimate represents funding for current-needs projects. These near-term, high-priority projects (such as replacing distribution pipe with a history of leaks and breaks) enable a system to continue delivery of safe drinking water. The remaining 46% of the investment estimate represents funding for future-needs projects - projects that water systems do not currently need, but would expect to address in the next 20 years as part of routine rehabilitation or replacement of infrastructure for predictable events (such as reaching the end of a facility's service-life). The $6.9 billion estimate does not account for future-needs capital projects undertaken solely to accommodate future growth.

Are New Jersey's public water systems spending enough? A cursory review of capital investment data for four of New Jersey's water systems (three privately held and one municipality) suggests that additional capital investment may be required by New Jersey's water systems. The combined annual investment for these four utilities, which combined serve approximately 40% of the State's population, averages just over $200 million per year. Of the $6.9 billion in capital investments required by New Jersey's systems over the next 20 years, $5.1 billion is needed for transmission and distribution systems. This $5.1 billion translates into an annualized cost of approximately $560 million per year (in 2003 dollars). Assuming that the required investment is proportional to population served, the four systems surveyed fall short of the required annual investment. Given that privately held utilities typically have larger capital investments than publicly owned water systems, and that the investment estimates obtained for this analysis were primarily based on information from privately held utilities, the data suggests that the funding gap for New Jersey's water systems may well exceed $60 million per year.

The analysis provides a starting point for determining the magnitude of the drinking water infrastructure funding gap. While the data available represents a reasonable effort to quantify the funding gap, more detailed statewide data would assist in better quantifying the problem and projecting the impact of potential remedies.

Policy Recommendation

- Appropriate capital expenditures toward the development of comprehensive asset management programs are required. The development of asset inventory databases with asset conditions is essential to any asset management program. In the short term, these expenditures will be significant and demand comprehensive reconnaissance efforts and data processing work. However, long-term savings can be realized when future capital investments are allocated more efficiently.

[8] USEPA. 2003 Drinking Water Infrastructure Needs Survey and Assessment, Final Report to Congress. EPA 816-R-05-001, June 2005.

Conclusion

Based on the data and discussion presented, ASCE assigned a Grade of C to New Jersey's Drinking Water Infrastructure. The ASCE grading system primarily considered funding levels for drinking water infrastructure. Grades were based on the following scale:

A = 90 – 100%
B = 80 – 89%
C = 70 – 79%
D = 41 – 69%
F = 40% or lower

The preliminary funding gap analysis determined a need of $560 million annually versus spending of approximately $500 million annually, which would correspond to a "B" for New Jersey's drinking water infrastructure. However, the limited data used to obtain this estimate presents uncertainty. Also, in 2005, ASCE graded the National Drinking Water Infrastructure with a "D-"[9]. To account for uncertainty and the lower national grades, ASCE adjusted the grade given to New Jersey's Drinking Water Infrastructure to a "C".

[9] http://www.asce.org/reportcard/2005/page.cfm?id=24

Public Parks and Recreation (Grade C-)

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Introduction

New Jersey is known as the Garden State. Its parks and recreation serve as homage to the nickname. Protected trails, forests, parks, creeks and rivers provide residents with multiple outlets to enjoy nature. New Jersey preserves and protects 42 parks, 11 forests and 3 recreation areas through both State and private programs.

History of Park Legislation and Funding in New Jersey

New Jersey became the first state to establish a County Park System. In 1895, The Essex County Park Commission was created and 60 acres of land in Newark was acquired to create the Branch Brook Park. The commission hired the Olmstead Brothers to design the park, now a national historic site. The State has continued to set precedent by setting up the Green Acres Program (GAP). In 1961 the program was created to manage the preservation and conservation of open space. From 1961 through 1995, New Jersey's voters overwhelmingly approved nine bond issues, earmarking over $1.4 billion for land acquisition and park development. On November 3, 1998, New Jersey voters approved a referendum, which created a stable source of funding for open space, farmland, and historic preservation and recreation development, and on June 30, 1999, the Garden State Preservation Trust (GSPT) Act was signed into law. The bill established, for the first time in history, a source of funding for preservation efforts. The funding offered $98 million a year over a 10-year period.[1] The trust fund recently became depleted, and the State sought to find continued funding. In a July 2007 letter to Municipal and County Clerks, GAP announced that Governor Corzine and the State Legislature allocated $20 million from the State's FY 2008 budget to continue to fund land acquisition and the development of outdoor park and recreational facilities.

[1]Green Acres Website – http://www.state.nj.us/dep/greenacres/

On July 31, 2007, Governor Corzine signed a bill that authorized a Public Question on the November 6 ballot seeking voter approval to issue $200 million in bonds to keep the GSPT program going while work continues to find a permanent, stable funding source. The initiative also provides for an expanded Blue Acres program, which funds the purchase of flood-prone properties.

In concert with State programs, County and local government units have provided an increased boost to the preservation effort through local open space funding taxes. New Jersey Counties raised an estimated $117 million in open space taxes in 2003.[2]

In 2006, the National Park Service (NPS) Land & Water Conservation Fund released its State Assistance Program Annual Report. The NPS reports New Jersey's unmet need for land & water conservation funds for the past fiscal year at $394 million.

The following programs are entrusted to regulate funding:

Green Acres Program

To date GAP has preserved more than 1.2 million acres of open space and farmland in communities across the State. As stated in its website "The Green Acres Program serves as the real estate agent for the Department of Environmental Protection (DEP), acquiring land - much of which has been offered for sale by property owners - that becomes part of the system of state parks, forests, natural areas, and wildlife management areas."[3]

Similar to other public works programs, GAP appropriates funding for open space acquisition and park development projects on the basis of an application and approval process. Applications are subject to a competitive ranking system.[4] The ranking system considers 9 factors:

Priority System Factors:

1. Open Space Needs
2. Service Area Facility Needs
3. Environmental Protection
4. Historic Resource Preservation
5. Public Participation/Support/Planning
6. Project Quality
7. Project Priorities
8. First Time Applicant
9. Facility Design Sensitivity and Site Suitability

Each factor is assigned a value of points. The applicant is awarded points on the basis of meeting each factor criteria. Applicants are encouraged to analyze their properties for such factors as wetlands, dunes, endangered species, mature forested areas and other

[2] State Comprehensive Open Recreation Plan, 2003

[3] Green Acres Website – http://www.state.nj.us/dep/greenacres/

[4] NJDEP Green Acres Program Local Government Assistance Application Land Acquisition and Park Development

significant natural resources, which may affect land development prior to applying. The program also encourages the applicant to use sustainable design principles as delineated in the US Green Building Council's (USBGCs) Leadership in Energy and Environmental Design (LEED™) Green Building Rating System for New Construction and Major Renovations Version 2.1.

Competition for funding has increased in recent years, creating funding gaps. Applicants whose project cannot be fully funded may apply for a loan through the Environmental Infrastructure Financing Program (EIFP). The EIFP offers low interest loans for projects that protect or improve water quality, including most land acquisition projects. As with other GAP funding sources, competition for this funding has also increased.

The unmet need is represented by the average requests compared with the average funding approvals from 2000-2006. Local governments requested an average of $490 million compared with only $90 million in approved funding (19%). Non-profit requests averaged $94 million dollars compared with only $17 million in approved funding (18%). As stated above, the GSPT provides for the GAP program as well as other State programs dedicated to similar preservation. [5]

New Jersey Historic Trust

As one of the original colonies, New Jersey is full of history and heritage. Examples of generations past can be found in local communities and municipalities throughout the 21 Counties. Their preservation is entrusted to the New Jersey Historic Trust (NJHT). The trust was created in 1967 to protect historic resources throughout the State. Funding for this program is provided through the GSPT in the way of a $6 million dollar authorization.[6] In addition to the GSPT, New Jersey Legislation signed the Garden State Historic Preservation Trust (GSHPT) Fund into law in June 30, 1999 to provide additional funding for the preservation needs of properties throughout the State.

The Historic Trust offers applicants two types of grants. The Historic Sites Management grant is a small loan that provides the applicant with sufficient funding to plan exercises that promote the management of a historic site. For 2008 the funding level for these grants has been set at $5,000 to $50,000. The Capital Preservation Grants provide funding for construction expenses related to the preservation, restoration or rehabilitation of historic sites and associated with architectural and engineering expenses. Again, for 2008 the funding level for these types of grants has been set up to $750,000. [7]

Despite the available funding, throughout the decade there have been unmet funding requests. From 2000-2005, of the $92 million dollars requested only $37 million dollars was made available; approximately 60% unmet application dollars. In 2006, of the $36 million requested, only $10.5 million dollars was made available; over 70% unmet application dollars. [8]

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[5] http://www.state.nj.us/gspt/
[6] http://www.state.nj.us/gspt/
[7] http://www.njht.org/dca/njht/
[8] http://www.state.nj.us/gspt/

Other Preservation Programs

The New Jersey Natural Lands Trust Program (NJNLTP) is a private agency assigned to protect lands created in 1968 as an independent agency to protect lands in their natural condition for public enjoyment. To date, NJNLTP is responsible for over 22,000 acres located throughout the State. The trust works together with various NJDEP programs including Green Acres to acquire lands for protection. In 2005, the trust acquired lands from a third of an acre to over 1,200 acres. The trust also maintains the lands, planting new trees, cleaning up trash and other maintenance. The trust accomplishes this goal in part through the help of volunteers. In 2005, the NJNLTP volunteers logged in over 2,000 hours.[9]

Another State program, the New Jersey Trails Program was established with the passage of the New Jersey Trails System Act in 1974, leading to the development of over 600 miles of trails. In December 2006, Department of Environmental Protection Commissioner Lisa P. Jackson announced that over $1.7 million in federal grant money was designated to maintain and improve trails in the State.

Other programs include the Farmland Preservation Program, the D&R Greenway Land Trust, New Jersey Conservation Foundation, New Jersey Audubon Society, the New Jersey Trail Plan and the various County Parks Systems. An example County Parks System, the Monmouth County Parks System (MCPS) operates on a budget funded through the open space tax along with donations, contributions, grants (from GAP) as well as volunteer hours. In 2006 the Park System revenue topped $33 million, with $34.8 million in expenditures and a total fund balance under $9 million. The 2006 donations and grants total $2.7 million, with approximately $1 million in grants appropriated by GAP. With this funding, The MCPS has protected and maintained over 14,000 acres in Monmouth County and has set a goal to protect a total of 19,099 acres. However, its efforts to protect the remaining 27% of Monmouth County lands require the continued funding source of GAP through the GSPT fund.

Other Factors Affecting Public Parks and Recreation

New Jersey's efforts to protect open space, forests, farmlands, historic sites and parks for recreation often suffer setbacks by way of various factors. Although funding may be the topic of choice, other factors contribute equally to deterring preservation efforts. In 1990, the Garden State was home to a population 7.7 million. By 2000, the State population jumped to over 8.4 million, an increase of over 9%.[10] The Department of Labor estimated a population growth of over 1 million by 2020.[11] The population density is now over 1,000 people per square mile, making it the most densely populated state. Given the population growth, it is important to consider the possibility of "build-out" of available land within the next 40 years. [12]

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[9] http://nj.gov/dep/njnlt/
[10] US Bureau of the Census: 1990 and 2000 Censuses of Population and Housing
[11] State Comprehensive Open Recreation Plan, 2003
[12] State Comprehensive Open Recreation Plan, 2003

Compound the issue of population with availability of urban open space; 94% of the New Jersey population lives in an urban area.[13] The clear need for open space and recreation for Urban Centers in New Jersey led to the development of the Urban Aid Funding category in the GAP regulations. The effort to provide recreation will rely on the redevelopment of parks and the acquisition of lands for preservation. One solution utilized in recent years is the remediation of brownfields[14], which has also led to improving the quality of life in many Urban Centers.

Another key issue is the demand for the New Jersey Shore, which is the biggest tourist attraction in the State. Various state beaches rely on shore visitor fees to fund rebuilding projects. In addition, shore businesses rely on visitors to support the local economy. In addition, the appeal of owning land and residing on the shore has continued to thrive. According to the 2003 State Comprehensive Open Recreation Plan (SCORP):[15]

> *The demand for building lots in coastal communities, especially on the barrier islands is, in a word, fierce. The State Plan estimates that only 199 acres of undeveloped land remains on New Jersey's barrier islands. Coastal municipalities can see their summer population double and even triple. These communities are also witnessing the teardowns of existing homes with larger homes being constructed.*
>
> *Access to the water remains an issue in some coastal communities, and the need for adequate parking and related facilities is increasing as more people engage in that quintessential New Jersey summer activity, going down the shore.*
>
> *Maintenance and recreational opportunities on open space are just as important as acquisition. The backlog of needed repairs is about $250 million just in the State parks. Historic buildings in State parks such as Batsto and Ringwood are in major disrepair. Yet every year the count of visitors to State parks increases by 300,000. This creates a flow of State tax revenue of about $150 million. The parks are a neglected economic development tool.*

Such high demand puts increased stress on an aging system. Maintenance, restoration and rehabilitation of parks and recreation centers by local units and counties continue to be under-funded. In many instances, volunteer groups are called to maintain park grounds by picking up garbage or planting flowers and saplings. Unfortunately, the main infrastructure, including buildings, boathouses, docks, restrooms and recreation centers continue to be neglected and are in disrepair.

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[13] US Bureau of the Census and New Jersey Future

[14] A brownfield is defined under NJ state law (N.J.S.A. 58:10B-23.d) as "any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant."

[15] Garden State Preservation Trust Draft Stewardship Report, Sept 20, 2006

Conclusion

The funding need and the race for acquisition of open lands pose great challenges to the continued success of the various Programs dedicated to Public Parks and Recreation in New Jersey. The Garden State's history and heritage continue to battle urban sprawl, racing to acquire historic sites and prevent their destruction. Counties, such as Monmouth County, set goals to acquire open space ahead of overdevelopment. All these factors contribute to the overall grade.

According to the 2003 SCORP, the primary goal of the plan is *"To preserve sufficient amounts of open space for current and future public use and to utilize the environmental protection amenities of open space to protect important natural resources for the enhancement of the quality of life in New Jersey."* [16]

The ASCE grading system considered two factors: 1) State of Repair and 2) Quality of life. Since the state of repair of parks and open space is not easily quantified, ASCE based this portion of grading on the unmet need, or the percentage of funding provided for requested funding.

As previously stated, in 2006 GAP met only 19% of funding requests. In 2006 the NJHT met only 30% of funding requests, both corresponding to a grade of "F". However, to account for quality of life, ASCE considered the success New Jersey has achieved historically through programming focused on open space preservation, historic preservation, farmland preservation, and the implementation of County Park Commission and open space taxes. As a pioneer state in open space preservation, much of the work was accomplished throughout the late 19th and early 20th centuries. The Essex County Parks System, the Green Acres Program and the Garden State Preservation Trust are all quality programs that continue to serve as stewards to New Jersey open space. Based on the work done during the 19th and 20th century, the grade was raised to a grade of "D". The government's recent support for open space, through the resolution to include a Public Question for additional funding in the form of a $200 million bond provides reason to further raise the grade.

Based on the above discussion, ASCE further modifies and assigns a grade of C- to Public Parks and Recreation.

[16] State Comprehensive Open Recreation Plan, 2003

Dams (Grade C-)

2007 Report Card for New Jersey's Infrastructure

Introduction

Dams have been around for thousands of years. Their use is basic in nature, but vital to human survival. Their value in our day-to-day lives is often overlooked and seldom given the deserved attention. Despite the little attention we pay to this type of structure, it continues to provide our society with a source of water, irrigation, flood protection, recreation and beauty. Continued deterioration of these structures through insufficient funding to support rehabilitation and remediation efforts has left this nation and the State of New Jersey in particular, with dams failing to meet dam safety standards. The result is higher potential for loss of life, property and infrastructure damage, as well as drinking water deficits.

Lake Solitude Dam, Hunterdon County

History of the Dam Safety Program

In 1912, New Jersey initiated the Dam Safety Program to control the construction, inspection and repair of existing dam structures. In 1981, laws were amended to provide further control over the regulation of dams. By 2005, the State had provided the Dam Safety Program with increased authority over dams. Currently, Dam Safety has the authority to inspect dams and, if appropriate, may lower the water levels, impose fines or even order the removal of a dam. Unfortunately, ordering a removal of a dam requires funding beyond current levels.

According to the NJ Dam Safety and Flood Control[1]:

> The primary goal of the program is to ensure the safety and integrity of dams in New Jersey and, thereby, protect people and property from the consequences of dam failures. In the past 25 years, our nation has experienced a number of dam failures that resulted in the loss of life and extensive property damage.

[1] http://www.state.nj.us/dep/damsafety/

Fortunately, New Jersey has not had the misfortune of experiencing a catastrophic dam failure but there have been an increasing number of small dam failures. This is largely attributed to the lack of maintenance and inspection, as well as the fact that many of the dams in the state are nearing the end of their design life.

Regulation

As stated above, the program regulates the inspection, repair and construction of dams. The process entails the inspection of existing dams by a Licensed Professional Engineer, review of the inspection report, issuance of a repair order to fix the dam, preparation of plans and specifications, the issuance of a permit and construction of repairs.

The program evaluates and classifies dams in order of potential damage in the event of a failure. According to N.J.A.C. 7:20-1.8 dams are classified into 4 classes; Class I, II, III and IV. The definitions of each class are provided below:

Class I dams are **High Hazard** Potential dams, which include those dams, the failure of which may cause the probable loss of life or extensive property damage.

Union Lake Dam - Millville, New Jersey

Class II dams are **Significant Hazard** Potential dams, which include those dams, the failure of which may cause significant damage to property and project operation, but loss of human life is not envisioned. This classification applies to predominantly rural, agricultural areas.

Damage to the Jefferson Bridge over Edwards Run
Millville, New Jersey

Class III dams are **Low Hazard** Potential dams, which include those dams, the failure of which would cause loss of the dam itself but little or no additional damage to other property.

Class IV dams are **Small** Dams, which include any project which impounds less than 15 acre-feet of water to the top of dam, has less than 15 feet height-of-dam and which has a drainage area above the dam of 150 acres or less in extent. No dam may be included in Class IV if it meets the criteria for Class I or II. Dam owners may request consideration for

their dam to be classified as a Class III dam upon submission of a positive report and demonstration proving low hazard.

History of Dam Failures in New Jersey

During rainfall, water is controlled through dams, regulating its release and preventing flood damage. Large amounts of rainfall flex their destructive power by swelling rivers and raising lake waters damaging or causing complete failure of dams already in need of repair. The three storms described below resulted in the complete failure of 20 dams, damaging 62 other dams and totaling an estimated $729 million in property damage.

September 16, 1999 – 3 dams completely failed and 21 others were damaged when Tropical Storm Floyd and a storm system from the west combined. Up to 8 inches of rain fell during the storm event in towns and counties in the Raritan Valley. Localized areas in New Jersey received over 14 inches of rain. Property damage to New Jersey from flooding associated with Tropical Storm Floyd is estimated at $500 million.[2]

August 11, 2000 – 4 dams completely failed and 26 others were damaged when over 14 inches of rain fell in a 24 hour period in Sparta Township and 7 to 8 inches in areas other of Sussex and Morris County. Damages were estimated at $179 million.[3]

July 13, 2004 - 13 dams completely failed and 15 others were damaged when 13 inches of rain fell within 12 hours in several towns and counties in southern New Jersey. Sewer overflows due to flood waters posed significant health risk. Damages were estimated at $50 million.[4]

Tomahawk Lake Dam Failure – August 11, 2000
Sparta, New Jersey

Performance

According to statistics from the Association of State Dam Safety Officials (ASDSO), New Jersey currently owns and maintains 1,716 dams, of which 214 are classified High Hazard dams. Dam Safety placed a priority on larger dams with the highest potential loss of life. As of September 2007, only 67 high hazard dams are deficient. In addition, 243 of the over 400 significant hazard dams are deficient. A total of 310 high hazard and significant hazard dams are in need of funding. Dam Safety estimates the need for repairing these dams at $300 million dollars. According to ASDSO[5]:

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[2] *New York Times*, 16 October 1999
[3] http://www.state.nj.us/dep/damsafety/
[4] *Engineering Times*, August/September 2004
[5] ASDSO and NJDEP – Bureau of Dam Safety & Flood Control.

New Jersey requires that the owner/operator of a dam undertake required dam safety inspections. At this moment, 110 of the 214 (51%) high hazard dam owners have undertaken current safety inspections. The rest have received an order from the Department to undertake their regular inspections. 206 of the 214 high hazard dams have Emergency Action Plans (defined as plans to be enacted in the event of a catastrophic failure of a dam).

High Hazard and Significant Hazard Dams labeled as deficient and in need of repair by County:

County	High hazard	Significant hazard
Atlantic	2	5
Bergen	1	6
Burlington	2	24
Camden	1	14
Cap May	0	4
Cumberland	1	12
Essex	1	3
Gloucester	3	16
Hunterdon	2	7
Mercer	1	3
Middlesex	0	3
Monmouth	5	13
Morris	8	44
Ocean	3	4
Passaic	15	16
Salem	1	17
Somerset	1	5
Sussex	18	38
Union	0	1
Warren	2	8
Totals:	**67**	**243**

In addition to the repair of high hazard and significant hazard dams, low hazard dams are also in need of repair. Dam Safety estimates that an additional $250 million are needed to repair these dams.

Funding Requirements

New Jersey is credited with having one of the best programs in the nation, but the failures are a reminder that funding for stronger programs and enforcement are needed to prevent or lessen the impact of torrential rains[6].

Based on the classification criteria, the State set out to inspect, document, provide engineering solutions and repair dams. The 1992 Dam Restoration and Clean Water Trust

[6] http://www.damsafety.org/

Fund set up through the Green Acres, Clean Water, Farmland and Historic Preservation Bond Act of 1992, provided the state with sufficient funds to repair 20 high hazard dams. In 2003, another bond was issued in the amount of $95 million in low interest loans for public and private dams. An additional $15 million was also provided for State-Owned dams. In 2004, the entire 2003 bond was appropriated.

On August 2, 2007, the full House Committee on Transportation and Infrastructure voted HR 3224 out of committee. No date is set for floor action. H.R. 3224 would authorize federal appropriations totaling $201 million over the 2008-2012 period for the Federal Emergency Management Agency (FEMA) to make grants to states to repair, replace, reconstruct or remove structurally deficient dams. Assuming appropriation of the specified amounts, The Congressional Budget Office (CBO) estimates that implementing H.R. 3224 would cost $103 million over the 2008-2012 period and $98 million after 2012. Enacting H.R. 3224 would have no effect on direct spending or revenues.

H.R. 3224 would authorize the appropriation of $201 million over the 2008-2012 period for FEMA to make grants to states for a maximum of 65 percent of the costs to repair, replace, reconstruct, or remove publicly owned dams determined to be deficient. The bill would define deficient dams as those failing to meet minimum state standards and that pose an unacceptable level of risk to the public. One-third of the funds authorized by the bill would be equally divided among all states that apply for assistance. The remaining two-thirds would be awarded based on the number of deficient dams within a state compared to all other state applicants.

Former (2001-2002) ASDSO President John Moyle, who heads New Jersey's Bureau of Dam Safety & Flood Control, told committee members of the need for passage of the Dam Rehabilitation and Repair Act (H.R. 1098), legislation that would authorize funds to repair and rehabilitate the nation's most critical publicly owned dams. The proposed Federal contribution from H.R. 1098 to New Jersey is estimated at $4.4 Million Dollars.

Conclusion

In addition to repair, Dam owners are required to inspect dams for damage and or disrepair. According to New Jersey State Legislature Office of Legislative Services Office of the Auditor, 70% of the State's 1,713 dams are not in compliance with the inspection requirements outlined in NJAC 7:20-1.11. A number of these dams are classified as High Hazard or Significant Hazard[7]. Although this figure raises concern, New Jersey High Hazard dams continue to be a focus for the Bureau of Dam Safety. "Approximately 30 (of 214) High Hazard dam owners need to upgrade their structures to meet minimum engineering and safety standards."[8]

The ASCE grading system based the grading of dams on the percentage of High Hazard and Significant Hazard Dams in need of funding for repair. Of the 214 High Hazard dams in New Jersey only 67 were deficient and only 30 need to secure funding for repair. Of

[7] New Jersey State Legislature Office of Legislative Services Office of the Auditor March, 2007
[8] John Moyle, Manager – Bureau of Dam Safety and Flood Control

the 400 Significant Hazard dams only 200 were deficient. Based on these figures 62.5% of High Hazard or Significant Hazard dams are in a state of good repair or are funded for repair, constituting a grade of "D". However, The New Jersey Dam Safety program has continued to improve their ability to enforce engineering and safety standards. According to the Bureau of Dam Safety and Flood Control[9]:

> The Safe Dam Act was amended in August 2005 to strengthen the Department's enforcement powers by providing administrative penalties and enforcement procedures when dam owners/operators fail to adhere to established safety standards. Penalties for violations may include fines of up to $25,000 per day and/or the removal of the dam.
>
> New rules for implementing this program have been drafted and should be published in the New Jersey Register in January 2008. This should result in an enhanced enforcement program.

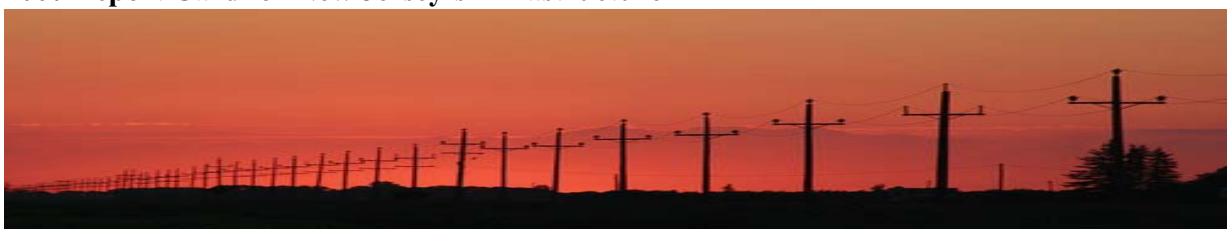
Rainbow Lake Dam Failure – April 15, 2007
Pittsgrove (Salem County), New Jersey

Based on the continued pursuit for improved regulation of dams, ASCE assigns a grade of C- to the area of Dams.

[9] John Moyle, Manager – Bureau of Dam Safety and Flood Control

Energy (Grade C+)

2007 Report Card for New Jersey's Infrastructure



Introduction

In 2004 New Jersey consumed 2,519.9 trillion BTU of energy, ranking 13th out of 50 states. Energy consumption per capita was 293.9 million BTU, ranking 40th. New Jersey feeds its energy demand through the following fuel sources:[1]

Fuel Source Type	Percent
Petroleum	48.9%
Natural Gas	24.7%
Nuclear Energy	12.8%
Interstate Electric Flow	8.0%
Coal	4.2%
Biomass	1.5%
Hydroelectric Power	0.0004%
Other	0.04%

The New York Harbor area between New York and New Jersey has over 40 million barrels of refined product storage capacity (much of which is in New Jersey), making it the largest petroleum product hub in the United States. The largest of the four U.S. Northeast Heating Oil Reserve sites is located in Woodbridge, New Jersey. The Salem Nuclear Power Plant is one of the highest-capacity power plants in the nation. New Jersey's Oyster Creek Nuclear Power Plant, whose reactor first came online in 1969, is the oldest operating nuclear plant in United States.

Electricity

The three basic functions within the electric power industry are generation, transmission, and distribution. Generation is the production of electricity. Generation typically occurs at power plants that are large-scale plants of oil, coal, or nuclear. It should be noted recently new forms of electric generation such as distributed generation and renewable resources such as wind, biomass and solar are playing a more significant role in power generation in New Jersey. Transmission is the transport of electricity to areas of distribution. Transmission lines are mostly Alternating Current (AC), transformers, and other components. Distribution refers to the local lines and facilities that provide direct

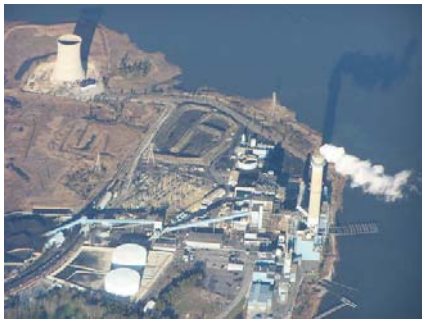
[1] State of New Jersey Energy Master Plan Website – http://nj.gov/emp/energy/facts

access of electricity to the consumer. The total sales of electricity in New Jersey in MWH per sector is:[2]

Sector	Total Sales	Percentage of Sales
Commercial	38,073,559 MWH	50%
Residential	28, 020,125 MWH	36%
Industrial	11,209,578 MWH	14%
Transportation	289,905 MWH	0%

In 1999 New Jersey and other states restructured the electric power industry in conjunction with federal policies. This brought the deregulation of electric generation and the establishment of an electricity wholesale market. Power plant owners apply to the Federal Energy Regulatory Commission (FERC) which grants them the ability to sell their electricity at market based rates. The transmission and distribution of electricity in New Jersey is done through four companies: Public Service Electric and Gas (PSE&G), Jersey Central Power & Light Company (JCP&L), Atlantic City Electric Company, and Rockland Electric Company.

New Jersey is part of the larger power grid of the Mid-Atlantic Area Council (MAAC) which serves as a regional reliability organization. The Pennsylvania –New Jersey-Maryland Interconnect (PJM) is the regional transmission organization (RTO) which ensures the reliability of the largest centrally dispatched electric grid in the world. As part of this regional power grid, New Jersey's electricity supply factors, including costs, reliability, and environmental impacts, are linked and influenced by the happenings in other neighboring or nearby states.



The amount of capacity available in New Jersey depends on the required level of electricity reliability as determined by the PJM based on MAAC reliability requirements. Electricity reliability requirements have been enforced by voluntary agreement among electricity providers. However, in response to the 2003 blackout, the Federal Energy Policy Act (EPACT) of 2005 provides mandatory electricity reliability requirements which will be enforceable under federal law.

New Jersey's electricity generating capacity increased from 15,837 MW in 1990 to 18,384 MW in 2002.[3] In the PJM region demand for electricity is increasing at approximately 1.4% per year. Currently there is a slight surplus of electricity, but according to MAAC estimates, the margin is expected to tighten over the next several years requiring either new generation facilities or greater energy efficiency. In New Jersey, electric energy usage is expected to increase at a rate of 1.52% annual growth rate from 78.342 million MWHs in 2004 to 99.728 MWHs in 2020. Under a campaign to reduce energy consumption by 20% in 2020, annual usage will drop by 19.946 million MWHs in 2020 for a total of 79.782 million MWHs of energy consumed.[4] With the

[2] EIA, State Electricity Sales by Sector, 1990-2004
[3] EIA, State Electricity Profiles 1999 and 2002, January 2004
[4] State of New Jersey Energy Master Plan Website – http://nj.gov/emp/energy/facts

potential retirement of the Oyster Creek Nuclear Plant in 2009, the oldest nuclear power plant operating in the U.S., and other plants in New Jersey, we will need to construct additional energy generation and transmission and distribution infrastructure or import more electricity from other states within the PJM which in itself will necessitate the need for new transmission infrastructure in the State. The PJM has recently taken a more significant role in the long term planning that traditionally was conducted by utility companies and state regulators. The PJM is also increasing its investment in the transmission infrastructure as part of its Regional Transmission Expansion Plan (RTEP) within its 13-state region which includes New Jersey providing $464 million in 2005.

Gas

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety is responsible for the safety, reliability, and environmental soundness of New Jersey's interstate and the nation's pipeline infrastructure. The State of New Jersey regulates and inspects all intrastate pipelines through the Bureau of Pipeline Safety within the New Jersey Board of Public Utilities. Statistics provided by the Office of Pipeline Safety present a downward trend in the energy loss, costs, injuries and deaths associated with hazardous liquid pipeline accidents over the past three years. In New Jersey there are 56 miles of Hazardous Liquid pipelines, 1,456 miles of Gas Transmission pipelines, and 32,759 miles of Gas Transmission pipelines for a total of 34,781 miles of pipelines in New Jersey.[5]

There is consideration for the construction of a Liquid Natural Gas (LNG) Facility nineteen miles off the coast of Sandy Hook New Jersey which would allow the shipment of liquefied natural gas to the New York / New Jersey metropolitan area for the use of electric generation and heating. This $1.7 billion, 62.5 acre facility is very controversial and is the subject of much debate. If approved, the project will take five years to build. Another LNG Facility is being considered in Logan Township, NJ near Philadelphia.

New Jersey's Renewable Sources and Clean Energy Program

New Jersey is leading the nation in the implementation of renewable energy sources and clean energy programs. The New Jersey Board of Public Utilities (BPU) adopted a Renewable Portfolio Standard (RPS) in 1999 to encourage the use of renewable energy in the production of electricity. This electricity restructuring legislation called the Electric Discount and Energy Competition Act (EDECA) supports investments in energy efficiency and renewable energy over an eight-year period through the "Societal Benefits Charge" (SBC) collected from all electric public utility customers. A separate Universal Service Fund (USF) provides assistance for low-income programs. The SBC funds New Jersey's Clean

[5] PHMSA Office of Pipeline Safety Website - http://primis.phmsa.dot.gov/comm/reports/safety/

Energy Program that was established on March 9, 2001 by the New Jersey BPU. The BPU directed program funding of $358 million for the years 2001 through 2003: $115 million for 2001; $119 million for 2002; and $124 million for 2003. Of this funding, 75% targeted energy efficiency programs. The remaining 25% of the SBC funding supports Class I renewables. Class I renewables include solar, wind, fuel cells, geothermal technologies, wave or tidal action, methane gas from landfills, and sustainable biomass facilities.

In 2006, the BPU raised the RPS requirements for Class I Renewable Energy resources from 4% by 2008 to 20% by 2020. Assuming the loss of significant generation capacity in the State, renewable sources of energy may play a significant role in meeting New Jersey future energy demand.

Conclusion

New Jersey's existing energy infrastructure meets the needs of its population. Over time demand will increase requiring a need to provide greater generation capacity, upgrade and improve transmission and distribution infrastructure. Challenges New Jersey faces include the possible closure of the Oyster Creek nuclear generating facility and the need to find replacement energy sources, the construction of new infrastructure to support urban load centers, the construction of additional renewable energy generation, and the possible construction of new LNG facilities.

To better plan for New Jersey's increasing energy demand, the NJ BPU is beginning a project to create an Energy Information Center (EIC) at the Center for Energy, Economic and Environmental Policy (CEEEP) at Rutgers University. The creation of this data base will greatly improve the ability to gather New Jersey energy data in order to update the State's Energy Master Plan. The PJM, of which New Jersey is a part of is taking a more active role in the long term planning to help meet future energy demands. The PJM is also making a significant investment to improve transmission infrastructure to meet future demand.

New Jersey is the largest and most important petroleum hub in the northeast United States having six oil refineries and the petroleum storage capacity of 40 million barrels. New Jersey is exploring the potential of constructing infrastructure for the importing of Liquefied Natural Gas (LNG) to help meet growing energy demand.

New Jersey is a leader in the implementation and use of renewable energy sources. In addition, New Jersey has initiated energy programs which are aimed to reduce energy consumption over time. In 2005 ASCE graded the U.S. Energy Infrastructure and the National Power Grid a "D". With its current diversified energy sources, exploration of potential new energy sources, PJM's increased investment in transmission infrastructure, and commitment to renewable energy and efficiency programs, New Jersey's energy infrastructure can be reasonably graded above the national average at a C+.

Aviation (Grade D)

2007 Report Card for New Jersey's Infrastructure

Introduction

New Jersey's airports are victims of their own success due to the increase in passenger service over the past 10 years. The capacity of our existing airports to handle the current and projected volumes is critical to the quality of air service in New Jersey. Our airports currently cannot handle the next generation of jet airliners. The Airbus A380 will require widened runways, taxiways and special docking equipment for the plane, which has a wingspan almost the length of an American football field. In addition, the modernization of the radar based air traffic control system is warranted to improve capacity of our current airports. This report is prorated to account for volume disparities between the larger and smaller airports serving New Jersey. Although there are numerous airports in our neighboring states, this report is limited to the larger airports located within New Jersey.

Data and Assessments

As stated above, various criteria are utilized in assessing the rating of aviation in New Jersey. Different weighting has been assigned to each of the criteria in order to develop a representative measure for this conditions report. Newark Liberty International Airport (EWR) accommodates approximately 96% of the volume of New Jersey airports that handle jet airliner traffic. Teterboro Airport (TEB) and Atlantic City International Airport (ACY) account for 3.5% of the remaining volume with a small fraction being distributed to Morristown Municipal Airport (MMU), Trenton Mercer Airport (TTN) and Essex County Airport (CDW). Because of the volume disparity between EWR and the remaining airports, the findings are weighted heavily toward the largest airport.

Air travel and traffic have rebounded regionally to pre-September 11, 2001 levels and are projected to grow 4.3% annually through 2015. Currently EWR ranks first in the nation as the most delayed airport for arrivals. EWR also ranks third in the nation for the most delayed airport for departures[1]. With the anticipated projections of air travel growth, the lack of available land to expand the current facility and the current delays experienced, a crisis situation is developing as demand outpaces capacity.

Modernization of the air traffic control system from a radar based system to a satellite based system could improve efficiencies within the network, but this would only provide short term relief of the over congestion of the existing facilities. Recently the Port Authority of New York and New Jersey has voted to buy the lease to the former Stewart Air Force Base in Newburgh, N.Y. (Stewart International Airport - SWF) with the plan to adapt the airport to expand its commercial flight capacity. This could produce relief from the overall metropolitan area congestion, but since this airport is located more than 60 miles away from Newark Airport, only a relatively small fraction of the NJ population would benefit. This would only occur after upgrades and commercialization of the airport took place. In addition, Atlantic City Airport (112 miles away from Newark Airport and 58 miles

[1] http://www.thnt.com/apps/pbcs.dll/article?AID=/20070830/NEWS/70830021

from Philadelphia International Airport) has taken some of the increasing volume burden as it has seen a rise in passenger service of over 40 percent from a period a year ago.

Our existing airports do not have the ability to handle existing and projected volumes of passenger air traffic. Newark Airport is essentially land-locked preventing expansion and no improvements can be made for bad weather operations unless the FAA reduces the runway-to-runway separation standard.[2] Dedicated user fees and trust funds are needed to finance infrastructure needs. Short and long term modernization and planning is required in order to mitigate the adverse effects of overcrowding of New Jersey's airports.

What is needed?

Most of the funding for aviation comes from the federal level. As such, nationally the following actions are needed that will have a positive impact on the state of aviation throughout the country including New Jersey:

- Congress needs to preserve the current firewalls to allow for full use of trust fund revenues for investment in the nation's aviation transportation system.
- Focus the Airport and Airway Trust Fund expenditures on capital improvement.
- The Airport and Airway Trust Fund should not be used to pay for security costs, but specifically used for air traffic and airport maintenance and improvement. Trust fund balances should not exceed necessary funds to meet obligations plus an appropriate reserve. Revenue Aligned Budget Authority (RABA), which allows for the allocation of all trust fund revenues, should be established in the Airport Trust Fund.
- Permanently extend and increase user fees to adequately fund the Airport Improvement Program (AIP) through the Airport and Airway Trust Fund as detailed in the National Plan of Integrated Airport Systems ($41.2 billion over 5 years). All monies collected from user fees should be deposited in the Airport Trust Fund and that the Airport Trust Fund is removed from the unified federal budget.
- Increase in the passenger facility charge (PFC) cap from $4.50 to at least $7.50 to allow airports to raise needed funds for improving the nation's aviation infrastructure.
- The Airport and Airway Trust Fund balances must be managed to maximize investment in the nation's aviation infrastructure.
- Reauthorization of the program before the current legislation expires on September 30, 2007 to ensure predictability and stability in airport improvement funding. The reauthorization should maintain the current funding guarantees.

Conclusion

Since September 11, 2001, there have been numerous state-of-the-art enhancements to our nation's airports. These improvements may be seen as an inconvenience to some passengers, but most people are willing to comply with the security protocol as a concession to the way our changing world must confront the possibility of future assaults upon our way of life.

[2] Jonathan C. (Jon) Esslinger, P.E., F.ASCE - Director, Transportation & Development Institute, ASCE

The functionality on New Jersey's airports is a difficult issue to confront. New Jersey's largest airport (Newark - EWR) processes passengers as efficiently and effectively as any of its large airport counterparts. But, as with any mode of transportation, once the capacity of the facility is reached, delays and overburdening of the system are encountered. Plans to reduce the burden include the utilization of Stewart International Airport for increased area passenger service.

The ASCE grading system considered two factors: 1) Functionality (ability to handle current and projected volumes) and 2) Safety. Grades were based on the following scale:

A = 90 – 100%
B = 80 – 89%
C = 70 – 79%
D = 41 – 69%
F = 40% or lower

Due to the very poor track record with delays of arriving and departing flights, a substandard rating has been assigned. Plans are in place to relieve some of the capacity issues which are encouraging, but more long term strategic planning and investments are needed to improve our current situation. Based on the data and discussion presented here, ASCE assigns a Grade of D to New Jersey Aviation.

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Ports and Navigable Waterways (Grade C)

2007 Report Card for New Jersey's Infrastructure

Introduction

New Jersey is an important international gateway for both people and freight moving into and out of the United States. There are major seaports and marine terminals located in the northern and the southern regions of the state. They directly serve the immediate 26 county region providing 122,547 direct jobs and 110,000 indirect jobs, contributing more than $15.5 billion in economic activity annually to the region, and more than $2 billion in state and local tax revenues. International waterborne cargo includes bulk cargo (salt, Belgium block, lumber, etc.), liquid bulk cargo (food oil, petroleum products, etc.), containerized general cargo, and automobiles. The primary seaport for the northern region is at Port Newark-Elizabeth Marine Terminal Complex in Essex and Union Counties and at the Global/MOTBY complex in Hudson County, all on New York Harbor. The predominant seaport complex in the south is the South Jersey Port Corporation along the Delaware River at Camden in Camden County in New Jersey.

An evaluation of the adequacy of New Jersey's maritime infrastructure must be considered in terms of waterway access, availability of terminals, and efficiency of movement at intermodal[1] connectors. For containerized freight, it is also important to consider adequacy of international distribution centers to bring this cargo into the domestic freight transportation system. These elements will be analyzed from both the perspective of available capacity (which is related to the service timeframe) and the level of current investment (capital as well as maintenance dollars). This report card analyzes both of these parameters, integrates the findings, and evaluates the condition and performance characteristics of these infrastructure components.

With respect to capital investments for maritime infrastructure, a planning, design and construction period of 10 years is considered minimum and 20 years more likely for major infrastructure development. Hence a planning horizon of 2026 has been select as the point in the future to evaluate current capital construction and projects in-place. Estimates of problematic levels of service are suggested but not necessarily of concern for business interruption, just are the points where there is a potential eroding of productivity (because of congestion, system inefficiency, etc.) and negative impact on economic performance.

North Jersey Ports

The North Jersey maritime port and rail yard system is currently the largest center for the import/export and transfer of container freight on the east coast, and the second largest (after Los Angeles/Long Beach) in the United States. Foreign-Trade Zone No. 49 (FTZ 49), administered by The Port Authority of New York and New Jersey, ranked number one in the country out of 250 foreign-trade zones for foreign-value of merchandise

[1] Intermodal denotes the infrastructure associates with barges, railroads and trucking.

received for fiscal year 2004 according to the recently released Foreign-Trade Zone Board.

Last year (2006) was a record-breaking for the Port of New York and New Jersey, which handled more international cargo than ever before, and, for the first time, surpassed the $149 billion mark in the total value of all cargo handled. The Port's container traffic has had an average annual growth of over 7% per year for over a decade. It has more than doubled from about 1.3 million total containers in 1996 to 2.8 million in 2005. At this rate of growth from the new high of 3 million in 2006, the cargo volumes will double again by 2016. By 2026, the number entering the Port could be approximately 11.6 million containers.

To meet the projected increases in volume of cargo coming through the North Jersey ports, a $2.7 billion investment is reconfiguring existing terminals, deepening the harbor's channels and berths, and improving inland intermodal access by truck and rail. Approximately $1.6 billion of this investment is for the U.S. Army Corps of Engineers (USACE) to construct navigation improvements to provide adequate channel and berth access (50-foot draft) for the newest portion of the containership fleet. With this construction, channel and berth depth are not expected to be a limitation through 2026 and beyond. However, there will be an air draft impediment for the containership fleet because of the current height of the Bayonne Bridge, which has a vertical clearance of 151 feet. It is anticipated that the larger vessels will require an air draft of between 185 and 215 feet to enter and leave Newark Bay through the Kill van Kull. A new bridge is estimated to cost approximately $1 billion. The anticipated completion of the enlarged Panama Canal in 2014 will probably further aggravate this chokepoint situation.

Turning to channel maintenance dredging activities, these are the responsibility of the USACE to 45-feet. Maintenance of channels deeper than 45 feet is cost shared with the local sponsor (the Port Authority of New York and New Jersey in this case). Currently, dredged maintenance material is both placed in the ocean at the Historic Area Remediation Site (HARS) and on land when unsuitable for ocean placement. More than a million cubic yards per year falls into this latter category. Currently, the USACE's annual O&M (operations and maintenance) funding from the U.S. Congress does not adequately provide the money needed to complete all of the harbor's maintenance requirements. Each year some projects must be deferred. This problem will grow unless there is a significant increase in the budget for New York Harbor O&M program, particularly after the capital program is completed early in the next decade.

With the current investment and improvements in productivity, the container terminals and their on-dock rail capabilities are anticipated to be adequate to 2026. The impact of additional container exports may impact terminal congestion if volumes grow more rapidly than currently forecasted.

With respect to landside access, currently North Jersey's marine terminals generate nearly 22,000 truck movements each day. According to recent projections, the number of container-related trucks generated by port activity could increase to upwards of 62,000 per

day and non-container trucks to approximately 11,000 per day by 2026. A series of eleven (11) projects, are in various stages of project implementation in order to relieve projected volumes of rail and truck traffic in this region. This project known as "Portway Phase I" include numerous roadway network and rail enhancements to increase safety and support seamless connections by separating heavy truck traffic flows from other traffic flows and permitting trains to move through the region without congestion. Some of the projects have been designed for years and are waiting funding, particularly several of the regional rail improvements.

Warehousing and distribution centers need to be located in convenience places for the cargo owners to move their goods to market. Construction of these facilities is typically under the control of private entities. However, because of the need for efficient connections between the seaport and these first points-of-rest, public agencies must work with the private parties to create good connectivity. Local road and highway connectivity is crucial in the truck dominated northern port complex, but rail connectivity may also be important.

Continued funding of the Portway project and others like it by NJ Department of Transportation and other agencies is vital to the success of the intermodal infrastructure necessary to maintain smooth flow of cargo movement to the inland warehouses and distribution centers. With respect to warehousing and distribution centers, the report card does not specifically address their adequacy to handle the forecasted cargo volumes because this infrastructure is typically constructed and held by the private sector as mentioned. However without sufficient capacity in this component, the rest of the system cannot fully meet its design potential to serve the region and the nation's demand for freight.

Northern Seaport Complex Report Card

INFRASTRUCTURE	CAPITAL INVESTMENT	MAINTENANCE
Waterways		
- Channel Depth	A	D
- Bridge Clearance	D+	--
Terminal Capacity	A-	B
Intermodal Connectors		
- Roads	C-	C
- Rail	C-	C

South Jersey Ports

The Port of Camden was established in 1834. Its waterway access is through a 103-mile, 40-foot deep navigation channel from Philadelphia to the mouth of the Delaware Bay. The Delaware River Ports (from Philadelphia and Camden, N.J. to Wilmington, Del.) handle more than 100 million tons of goods annually and are home to the largest petrochemical complex on the East Coast. Philadelphia alone is the world's largest freshwater port. Most of the goods handled at these ports are imported breakbulk and bulk cargoes that are

transferred to trucks and trains that move the freight within a 200 to 300-mile radius. Cargoes include lumber, steel and cocoa. In 2006, the Port of Camden hit a new record with a total cargo volume in excess of 3.8 million tons. The Delaware River Port Authority forecasts a 2 to 2.5 fold increase in cargo of all types over the next 20 years and has planned investments of $650 million for terminal development to receive this cargo.

Nevertheless, the port faces a significant infrastructure challenge in its waterway. For over ten years, the USACE has tried to convince the concerned stakeholders that deepening the main channel of the Delaware River to 45 feet is in the public interest, does not threaten the Delaware River ecosystem and is economically justified. Criticism from the US Government Accountability Office (GAO), State and Federal Regulatory Agencies, Federal and State elected officials, economic and environmental experts, environmental organizations, community organizations and the public, have prevented this project from beginning. Most East Coast ports have deepened or are in the process of deepening their channels to more than 40 feet. The current depth limitation makes the Delaware River Channel the shallowest channel among competitive ports. The current USACE cost estimate for this project is $277 million with $185 million being paid by the federal government (lacking budgetary support from the President) and $92 million being paid by the Delaware River Port Authority. Failure to deepen the Delaware will make all river ports in three states unable to accept the most modern container ships, relegating them to secondary status. Already most petroleum ships must be lightered (loads reduced) in order to transit the channel. This expensive and potentially environmentally damaging practice would be eliminated with deeper water.

With respect to landside access, the South Jersey Port Corporation, with a grant from NJ Department of Transportation, is investing in road and rail improvements. Construction is underway to install a loop track, build a new crane rail crossing and upgrade track at the Beckett Street and Broadway terminals. The $2.5 million capital investments are expected to double the number of railcars processed in a year. Investments in other intermodal connectors, including local roads, are still needed.

Southern Seaport Complex Report Card

INFRASTRUCTURE	CAPITAL INVESTMENT	MAINTENANCE
Waterways	D-	C+
Terminals	B+	B
Intermodal Connectors		
Roads	C-	C
Rail	D+	C

There is an opportunity for greater synergy between North Jersey ports and the South Jersey ports. The ports to the north are concentrating on efficiently handling containers and automobiles whereas the south Jersey ports are concentrating on providing niche services for breakbulk and bulk cargoes. Finding ways to provide the transportation connections between the two areas would provide the state with a greater opportunity to leverage the import and export freight handling capabilities and capacities of each to

minimize congestion, improve reliability to cargo owners and keep transportation costs low. This partnership could be a win-win for both regions of the state while providing new economic development opportunities along the corridor connecting these gateways.

Conclusion

Investments in New Jersey's seaports and waterways are necessary as the expansion of facilities must keep pace with projected freight growth, particularly the container facilities. The various agencies and authorities' plan and continue to plan for the future transportation infrastructure requirements for freight. There may be a possibility of linking the two seaport regions in the north and the south to leverage greater market share, productivity and more jobs for the state. Leadership from Trenton is needed to help guide the development of this potential economic bridge.

In general, there are sufficient capital investments to keep pace with the demand for infrastructure capacity in the channels, terminals and intermodal connectors. If additional investment is needed, it is at the locations between the port areas and the main road and rail routes to eliminate chokepoints. However, continued system monitoring and additional planning will be necessary to ensure that the available transportation capacity at New Jersey's seaports, waterways and intermodal connectors is adequate to meet the demands for international gateways both for import as well as export cargo over the coming decades.

Further, it is equally important that the current system of channels, terminals, and the supporting intermodal infrastructure is adequately funded and maintained to provide efficient and effective transportation services. Public agencies will have to partner with private entities to ensure that international and regional distribution centers are not overburdened.

The ASCE grading system considered three factors: 1) State of Repair 2) Functionality and 3) Planning and available funding. ASCE assigns a Grade of C to New Jersey Ports and Navigable Waterways.

Raising the Grade

The plans for the future expansion and modernization of the current facilities must be fully funded. This funding must be effectively utilized and should come from a variety of sources both public and private.

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Roads (Grade D)

2007 Report Card for New Jersey's Infrastructure

Introduction

The New Jersey roadway system is vital to the State and the nation. The New Jersey Turnpike and the State's Interstate System are the primary links from much of the continental U.S. to New York and New England. Our roads accommodate over 75 billion vehicle miles traveled each year and total approximately 36,000 centerline miles. New Jersey roads are owned and maintained by the NJDOT, Authorities, Counties, Municipalities, and Parks. This Report Card evaluation is primarily based on information found within the New Jersey FY 2008-2012 Statewide Capital Investment Strategy (CIS) of March 30, 2007.

Current Road Conditions

New Jersey's highways are among the worst in the country. Approximately 49% of the State highway system is deficient based on roughness and surface distress measurements.[1] Over the past decade pavement repair and maintenance work have been under funded resulting in a large backlog of roadway segments in poor or mediocre condition. Growing congestion on our roads continues to be a problem. In 2002 Northern New Jersey was ranked 7th of annual hours of delay per traveler of the 85 urban areas studied by the Texas Transportation Institute. New Jersey has the most densely traveled lane-miles, when compared to other states in the northeast corridor.

Percentage of NJ roads in state that are poor or mediocre: 79 percent.

In 2005 New Jersey motorists paid a total of $3.6 billion dollars in extra vehicle repairs and operating costs due to poor road conditions, this equates to $613 per New Jersey motorist. This was up from the $1.4 billion dollars in 2003 and is the largest 2-year increase of any state in the nation. Repair costs are approximately $554 dollars a year for each and every New Jersey motorist, this is almost double the cost per motorist for the states surrounding New Jersey. Approximately 79% of New Jersey Roads

[1] NJ FY 2008-2012 Statewide Capital Investment Strategy

are considered to be in either poor or mediocre condition.[2] This is twice the amount of those reported in surrounding states.

NJDOT's evaluation of the New Jersey State highway system is based on State roads and stored in the Pavement Management System. The Pavement Technology Unit analyzes this data to determine current pavement conditions. Two primary indicators of pavement condition are International Roughness Index (IRI) and Surface Distress Index (SDI). IRI estimates roughness by using lasers to determine the actual variations in the pavement surface from a perfectly flat condition, measured in inches per mile. SDI assesses surface distress and visible deterioration by evaluating cracking, patching, faulting, shoulder drop, and joint deterioration. SDI is reported on a scale of 0 to 5 (5 is a perfect pavement free of any distress). A recent analysis utilized 2005 data to evaluate the State highway system consisting of approximately 2,344 centerline miles (4,600 two-way miles) of roadway that are state-owned and maintained. This amounted to approximately 8,300 lane miles of mainline roadway. The current functional adequacy of NJ State Highway System is as follows:[3]

- 10% - GOOD
- 8% - FAIR
- 33% - MEDIOCRE
- 16% - DEFICIENT ROUGH ONLY
- 22% - DEFICIENT DISTRESS ONLY
- 11% - DEFICIENT ROUGH & DISTRESSED

The results underscore the severity of the deficiency backlog (49% of the system)

The aging of New Jersey roadway drainage systems is a concern. NJDOT is developing a drainage management system (DMS) which will identify, evaluate, and prioritize drainage problems on the State highway system. More information on this system is provided in the CIS. There are currently 200 drainage problems identified and ranked by the DMS statewide, and approximately 20 drainage projects are currently scheduled for work in NJDOT's Capital Program. NJDOT has budgeted $20 million per year in order to reduce the total backlog of roadway drainage problems by half over the next 10 years.

The total number of vehicular crashes in New Jersey declined by 3% between 2004 and 2005. Compared with other states in the Northeast, New Jersey has one of the lowest fatality rates.

Future Improvements

New Jersey State Government recognizes the challenges of roadway preservation. There is a lack of adequate funding to dramatically reduce the backlog of roadways in need of improvement in the near future. The following pavement

[2] The Road Information Program (TRIP)
[3] NJDOT Pavement Management System, 2005 Data

Capital Investment Strategy (CIS) guidelines and recommendations have been made:

- As an investment strategy, State highway infrastructure preservation projects are top priority.

- As a primary goal, program an investment level that maintains the existing system to insure safe, reliable travel for users of the State highway system, and continue to program all eligible, affordable pavement preservation projects in FY 2007 and FY 2008 at a funding level of approximately $290 million per year. This is the annual funding commitment necessary over the next ten years to significantly improve the State highway riding quality by eliminating one-half of the current backlog of deficient pavement sections.

NJDOT is continuing to pursue its Safety First Program as a top priority. This program is working in reducing vehicular crashes and related property damage, injuries, and fatalities.

New Jersey is pursuing various methods to combat congestion including Major Capacity Increases as currently being under taken on the New Jersey Turnpike and Garden State Parkway. Highway operational improvements are being performed at intersections they include the construction of grade separated interchanges, signalized intersections, minor geometric improvements, and signal timing enhancements. The State is investing in Intelligent Transportation Systems (ITS), and Transportation Demand Management which encourages the use of alternative modes to transportation besides the single occupant motor vehicle.

Conclusion

Since most of the data described the state of the infrastructure in terms of percentages, ASCE used a grading system based on percentages of roads rated in good condition or better. Using the NJDOT Pavement Management System, 2005 Data identifying only 10% of the State Highway system in GOOD condition, Roads should receive a grade of "F". However the grade should be raised to reflect the success of improving roadway safety trends, and the policies the State continues to pursue which is promoting safety on our roadways. Also increased funding levels for roads and the State's CIS guidelines and recommendations to improve highway infrastructure as presented in its FY 2008-2012 Statewide Capital Investment Strategy of March 30, 2007 should improve the state roadway system. Therefore ASCE has adjusted the grade given to the New Jersey State Roads upwards to a "D".

Bridges (Grade D)

2007 Report Card for New Jersey's Infrastructure

Introduction and Overview

New Jersey has 6,420 bridges in its inventory as defined by the National Bridge Inventory (NBI), 2006. This includes all state, local, and municipal bridges 20 feet and longer.

The bridge inventory can be further broken down into bridge ownership categories, state, local, private or special agencies. Currently New Jersey has 2,683 bridges that are state maintained, 2,549 maintained by local governments, 14 are privately maintained and 24 are maintained by special agencies. New Jersey also has 1,164 toll bridges.[1]

In terms of route importance and bridges, New Jersey's bridge inventory includes 2,504 bridges that are part of the National Highway System (NHS). The NHS is defined as roadways important to the nation's economy, defense, and mobility. When looking at the condition and ratings of bridges, the NHS bridges will be looked at separately since they are of a higher importance and function on a national level.

Inspection Frequency/Methods

All New Jersey Bridges are inspected on a reoccurring frequency in accordance with the National Bridge Inspection Standards (NBIS). Inspection data for all bridges is compiled in a manner consistent with the NBIS and entered into the NBI. This data is used as the basis for grading of New Jersey Bridges.

NBIS Rating System

The NBIS through Federal Highway Administration (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) documents provides guidelines for rating and documenting the condition and general attributes of bridges and defines the scope of bridge inspections. Standard condition evaluations are documented for individual bridge components as well as ratings for the functional aspects of the bridge. These ratings are weighted and combined into an overall Sufficiency

[1] NJDOT August 9, 2007 Interim Bridge Report, Pg.3.

Rating for a bridge on a 0 to 100 scale. This rating can be used to make general observations on the condition of a bridge or an inventory of bridges. ASCE used sufficiency ratings and the number of bridges determined to be functionally obsolete or structurally deficient as a basis for grading New Jersey bridges.

Sufficiency: The factors considered in determining a sufficiency rating are: S1 - Structural Adequacy and Safety (55% maximum), S2 - Serviceability and Functional Obsolescence (30% maximum), S3 - Essentiality for Public Use (15% maximum), and S4 - Special Reductions (detour length, traffic safety features, and structure type-13% maximum).

In addition to the sufficiency rating, the NBIS provides criteria to define a bridge as structurally deficient or functionally obsolete, which triggers the need for remedial action.:

Structurally Deficient: A bridge that is structurally deficient (SD) is safe to carry reduced traffic loads but is approaching the condition where replacement or rehabilitation will be necessary. A bridge is structurally deficient if its deck, superstructure, or substructure is rated less than or equal to 4 (poor) or if the overall structure evaluation for load capacity or waterway adequacy is less than or equal to 2 (critical). Note a bridge's structural condition is given a rating between 9 (excellent) and 0 (representing a failed condition). In a worse case scenario a structurally deficient bridge may be closed to traffic.

Functionally Obsolete: A bridge that is functionally obsolete (FO) is safe to carry traffic but has less than the desirable geometric conditions required by current standards. A bridge is functionally obsolete if the deck geometry, underclearances, approach roadway alignment, overall structural evaluation for load capacity, or waterway adequacy rates less than or equal to 3 (serious).

Condition Assessment of the New Jersey Bridge Inventory

The number of New Jersey bridges listed as either structurally deficient or functionally obsolete since 1996 is shown below. Results are shown for NHS and non-NHS bridges.[2]

New Jersey							
NHS Highway Bridges							
		Structurally Deficient		Functionally Obsolete		Total of Both	
Year	Total # of Bridges	#	%	#	%	#	%
1996	2,644	371	14.03	533	20.16	904	34.19
1997	2,656	306	11.52	528	19.88	834	31.40
1998	2,682	268	9.99	540	20.13	808	30.13
1999	2,688	239	8.89	544	20.24	783	29.13
2000	2,492	174	6.98	492	19.74	666	26.73
2001	2,501	173	6.92	500	19.99	673	26.91
2002	2,523	184	7.29	497	19.70	681	26.99
2003	2,508	181	7.22	498	19.86	679	27.07
2004	2,519	170	6.75	520	20.64	690	27.39
2005	2,507	176	7.02	527	21.02	703	28.04
2006	2,504	179	7.15	542	21.65	721	28.79

New Jersey							
Non - NHS Highway Bridges							
		Structurally Deficient		Functionally Obsolete		Total of Both	
Year	Total # of Bridges	#	%	#	%	#	%
1996	3,608	869	24.09	838	23.23	1707	47.31
1997	3,626	830	22.89	879	24.24	1709	47.13
1998	3,633	807	22.21	861	23.70	1668	45.91
1999	3,653	758	20.75	854	23.38	1612	44.13
2000	3,858	791	20.50	910	23.59	1701	44.09
2001	3,865	757	19.59	920	23.80	1677	43.39
2002	3,852	722	18.74	933	24.22	1655	42.96
2003	3,869	673	17.39	943	24.37	1616	41.77
2004	3,965	720	18.16	960	24.21	1680	42.37
2005	3,938	662	16.81	976	24.78	1638	41.59
2006	3,916	581	14.84	990	25.28	1571	40.12

[2] Source for the following three tables is the National Bridge Inventory

New Jersey							
ALL SYSTEMS Bridges							
Year	Total # of Bridges	Structurally Deficient		Functionally Obsolete		Total of Both	
		#	%	#	%	#	%
1996	6,252	1240	19.83	1371	21.93	2611	41.76
1997	6,282	1136	18.08	1407	22.40	2543	40.48
1998	6,315	1075	17.02	1401	22.19	2476	39.21
1999	6,341	997	15.72	1398	22.05	2395	37.77
2000	6,350	965	15.20	1402	22.08	2367	37.28
2001	6,366	930	14.61	1420	22.31	2350	36.91
2002	6,375	906	14.21	1430	22.43	2336	36.64
2003	6,377	854	13.39	1441	22.60	2295	35.99
2004	6,484	890	13.73	1480	22.83	2370	36.55
2005	6,445	838	13.00	1503	23.32	2341	36.32
2006	6,420	760	11.84	1532	23.86	2292	35.70

The results show that the percentage of deficient bridges in New Jersey has decreased and the percentage of New Jersey obsolete bridges has remained relatively steady since 1996, while the size of the inventory has stayed relatively constant.

Based on a 2007 NJDOT Interim Bridge Report[3], out of New Jersey's approximate 6,400 bridges, 58% of bridges (3708) have a sufficiency rating greater than 80, 34% (2174) have a sufficiency rating between 50 and 80, and 8% of bridges (552) have a sufficiency rating less than 50. The national statistics are 56% (346,638) for SR> 80, 29% (178,539) with a SR between 50 and 80 and 16% (97,460) with a SR lower than 50[4].

In addition to the general NBI rating information, it should be noted that New Jersey has taken steps to ensure that its bridges are safe, its bridges are in a state of good repair and bridge deterioration is slowed down. While the Department of Transportation's scour retrofit program is still ongoing, high risk scour vulnerable bridges have been identified and are receiving remedial action. In addition NJDOT implements several programs (Bridge Rehabilitation and Replacement, Bridge Deck Rehabilitation, Bridge Preservation and Preventive Maintenance) aimed at maintaining and improving bridge conditions.

Bridge conditions in New Jersey are below desirable standards. Thirty-six percent of the state's bridges are structurally deficient or functionally obsolete based on combined 2006 data from previous tables. The 2006 nationwide average for bridges either deficient or obsolete is approximately twenty-five percent.

[3] NJDOT August 9, 2007 Interim Bridge Report
[4] ASCE 2006 Pennsylvania Report Card

Funding Outlook and Need

The deficiencies cited in this report are not a reflection of the effectiveness of state and local transportation agencies, but of a lack of adequate funding and the effects of aging transportation infrastructure. Nearly one-third ($2.2 billion) of NJDOT's FY 2001 to FY 2005 $6.8 billion Capital Program is allocated towards achieving a state of good repair and maintaining capital assets[5]. The program includes reducing or eliminating the backlog of structurally deficient bridges and implementation of preventive maintenance programs for bridges.

New Jersey's 2010 Programmatic Approach establishes direction for transportation infrastructure investment to offset the effects of aging and deterioration. NJDOT's Capital Investment Strategy along with New Jersey FIRST plan calls for fixing the existing transportation system first and bringing the transportation system to a state of good repair by 2010. But New Jersey's projected population and employment growth will increase demand on the State's transportation system still further. NJ's Outlook for 2025 estimates capital needs, required to maintain and expand the transportation network, between FY 2001 and FY 2010 at $35.4 billion. The cumulative capital costs will grow to $85.8 billion by FY 2025. (These amounts include NJDOT's and NJ TRANSIT's portion of capital costs.)

NJ's transportation infrastructure is vital to New Jersey's economic growth and prosperity. Appropriate levels of funding must be provided to address the State's critical needs, improve mobility and ensure the safety and reliability of the transportation system. For the next five years, starting in FY 2007, New Jersey is proposing a $1.6 billion annual capital program, but even higher levels of funding are needed to reduce the backlog of bridge needs and reverse the rate of bridge deterioration. An increase to $675M per year is required[6]. A total annual investment of at least $1.7B would be required to eliminate the deficient backlog over the next ten years[7].

Conclusion

Based on the NBI data presented here, trends and most significantly the bridge repair and rehabilitation funding outlook, ASCE assigns a Grade of D to New Jersey Bridges. Grades were assigned on the basis of condition and funding versus need. At the current rate of funding levels, the number of structurally deficient and functionally obsolete bridges is expected to increase, given the ongoing aging and deterioration process.

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[5] www.state.nj.us/transportation/works/njchoices/ (NJ Long Range Transportation Plan) Transportation Choices 2025/ New Jersey's Five Year Capital program, pg. 67.
[6] NJDOT FY 2008-2012 Statewide Capital Investment Strategy (3/30/07), Pg.36.
[7] NJDOT FY 2008-2012 Statewide Capital Investment Strategy (3/30/07), Pg.36.

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Infrastructure Conditions Report Card Committee Members

Andrés M. Roda, PE, M.ASCE - Project Manager, French and Parrello Associates, P.A.
Mr. Andrés Roda has 9 years experience in bridge and roadway design. He was recently promoted to Project Manager at French and Parrello Associates, P.A. where he manages road and bridge design projects. Mr. Roda has worked on NJDOT, County and Municipal improvement projects. Mr. Roda has been active with ASCE for over 3 years. Mr. Roda has served in the Central Jersey Branch as Treasurer, President-Elect, President and Newsletter Editor. Mr. Roda has also served in the NJ Section as Vice-President, is the incoming Section President and serves as the Infrastructure Conditions Report Card Committee Chair. Mr. Roda holds a Bachelors and Masters degree in Civil and Environmental Engineering from Rutgers University.

Kala Fleming, PhD., A.M.ASCE – Environmental Engineer American Water
Kala Fleming is an Environmental Engineer with American Water. Ms. Fleming earned her Masters and Doctorate degrees in Environmental Engineering from the University of Wisconsin-Madison. She has seven years of research experience in projects related to water treatment and water distribution system hydraulics, chemistry and microbiology. Her experience includes managing projects focused on surge modeling and mitigation, pressure monitoring, and water age management; investigating nitrification control; and research on UV disinfection and disinfection by-product formation kinetics. Ms. Fleming has served on a variety of professional committees and recently contributed to AWWA RF's expert panel on strategic initiatives for distribution system water quality. She has also served as ad hoc reviewer for the *Journal of Water Resources Planning and*

Management and *Water Research* and is a member of the ASCE, the American Water Works Association and the International Water Association.

Jean G. Hansen, P.E., PMP, CFCC, M.ASCE - Senior Associate, The Nielsen-Wurster Group, Inc.
Ms. Hansen has performed Dispute Resolution, Risk Management, and Management Consulting engagements for projects in the building, transportation, infrastructure, and process industries, on behalf of owners and contractors in both private and public sectors for over 20 years. She has testified before Boards of Claims and in mediation regarding schedule and specific issue matters and prepared expert witness testimony for domestic and international arbitrations and litigation. Ms. Hansen has eight years experience in construction management of industrial and commercial projects. She joined ASCE as a student chapter member while earning her Bachelors in Civil Engineering at Union College in Schenectady, NY. Ms. Hansen is Past President of both the Central Jersey Branch and New Jersey Section ASCE, and currently serves as a Branch Director, member of the Student Activities Committee and is active in the 2008 NJ Regional Future City Program.

Peter W. Singhofen, PE, M.ASCE – Supervising Engineer, T & M Associates
Mr. Singhofen has sixteen years of experience in the inspection, analysis, rehabilitation and design of bridges, buildings and foundations for various counties, state agencies, U.S. government as well as private sector projects. He currently works at T & M Associates as a Supervising Engineer where he manages several projects. Mr. Singhofen has been a member of ASCE for nineteen years, has served as Branch Secretary, currently serves as Branch Treasurer, Section Director and Section Head of Government Relations. He holds a Bachelors degree in Civil Engineering from Widener University, Chester, PA.

Teresa L. Peterson, PE, CME, M.ASCE – Project Manager, Gannett Fleming, Inc.
Ms. Peterson has over 7 years experience in water and wastewater design serving private clients, municipalities, and government agencies. She manages projects though all phases including planning and master utility studies, feasibility analysis, design, permitting, and construction. Ms. Peterson has been active with ASCE endeavors in New Jersey for over 4 years. She held the position of Younger Member Group President with the North Jersey Branch for 3 years and is in the incoming President-Elect for the Branch. She has participated at the Section level as a co-chair for Engineer's Week activities for the past 3 years. Ms. Peterson holds a Bachelors degree in Systems Engineering from the University of Pennsylvania.

Joseph E. Solis, PE, M.ASCE – Associate, Hardesty and Hanover, LLP
Mr. Joseph E. Solis has over 27 years of experience as a Structural Engineer, 24 of those have been with Hardesty & Hanover, LLP serving as Associate (since 1995), Project Manager, Project Engineer and Engineer in the design of a variety of bridges. He has been involved in design, analysis, inspection, evaluation, upgrading and rehabilitation of several fixed and movable bridges, as well as the development of Contract Documents for new structures. Lifelong resident of New Jersey and member of ASCE, Mr. Solis has a Bachelor of Engineering Degree from Stevens Institute of Technology and a Master of

Science Degree from Carnegie Mellon University. Mr. Solis is a registered Professional Engineer in the States of NJ, NY and Florida.

Shival B. Tailor, EIT, A.M.ASCE - Assistant Project Manager, Turner Construction Company

Mr. Tailor has over 8 years of experience in Civil and Structural engineering including real-time Construction Project Management. Since joined with Turner Construction Company's consulting group, Mr. Tailor has been working on school and educational facilities related projects. He is involved in planning, pre-construction and construction phases. He maintains active memberships in organizations such as ASCE and IE (India). Mr. Tailor has worked on structural and civil engineering design projects involving grocery stores, movie theatres, shooting ranges, and preparing structural inspection reports, writing specifications for building remediation projects for residential communities involving structural defects and water penetrations. Mr. Tailor has also worked on Civil engineering projects involved application process for Soil and sediment control, Soil conservation districts, EPA and DEP approvals, preparing site analysis/building stability reports and performing and preparing traffic analysis reports using highway capacity software. Mr. Tailor has been with ASCE since 2001 and pursuing PE registration and Master's degree in Civil Engineering from NJIT.

New Jersey Section ASCE
Blue-Ribbon Panel of Experts

Jeffery H. Bottger, C.L.A., A.S.L.A. Group Manager, Landscape Architecture, Associate, T&M Associates

Mr. Bottger joined T&M Associates in 1976 and was among the first group of Landscape Architects to be certified in New Jersey. He has served as Client Manager, Project Planner or Landscape Architect for more than 200 parks ranging from 1 to 3,000 acre sites. Mr. Bottger has played a key role in the preparation and project management of numerous park and recreation master plans for township and county park systems. He has also prepared landscape plans for numerous banks, corporate campuses, hotels, shopping centers, schools and residential communities throughout New Jersey. Mr. Bottger is currently serving as the Borough Arborist in Spring Lake, NJ. Mr. Bottger received his BS in Landscape Architecture from Rutgers University in 1968 and his MLA in Landscape Architecture from University of California at Berkeley in 1970.

Harry A. Capers, Jr., P.E. Corporate Bridge Engineer, Arora and Associates, P.C.

Mr. Capers is responsible for oversight of all highway bridge work in the firm's six offices He also serves as the Quality Assurance Manager for the firm. He currently chairs the Transportation Research Board (TRB) Committee AFF10 on General Structures and also the TRB Subcommittee AHD35-01 on Safety and Security of Bridges and Structures. He also chairs several National Co-operative Highway Research Program expert panels, and serves as an industry advisor to the New Jersey Institute of Technology and to the Multi-disciplinary Center for Earthquake Engineering at the State University of New York in Buffalo, NY. Prior to his retirement from public service in

2006, Mr. Capers served over 32 years with the New Jersey Department of Transportation as Chief Bridge Engineer and was responsible for all highway structures and geotechnical design work. Mr. Capers has served as a member of AASHTO Subcommittee on Bridges and Structures (SCOBS), Chairman of its Technical Committee on Loads and Load Distribution, Committee on Tunnel Design, and was Vice-Chairman of the Technical Committee on Seismic Design from 1996 until his retirement. He received a Master of Science degree in Civil Engineering from Polytechnic University, Brooklyn, NY and a Master of Public Administration from Rutgers University, Newark, NJ. He has authored/co-authored twenty-four papers in national and international publications. Mr. Capers is a registered professional engineer in New Jersey and New York.

Andrew W. Herrmann, P.E., F.ASCE, Managing Partner, Hardesty & Hanover, LLP

During Mr. Herrmann's 34 year career he has been responsible for many of the firm's major fixed and movable bridge projects. His experience covers inspection, rating, design, rehabilitation, and construction of bridges. He is past president of NYC's Metropolitan Section and past chair of the Structural Division's Technical Administrative Committee on Bridges. He was co-chair of the 2005 SEI Structures Congress in NYC and served on the Advisory Council for ASCE's 2001, 2003, and 2005 Report Cards for America's Infrastructure. He is presently the ASCE District 1 Director. He earned a bachelor's degree in civil engineering from Valparaiso University and a Master's in Civil Engineering from Polytechnic Institute. He is a Professional Engineer in 26 states and Ontario.

William C. Pyontek, P.E., P.P., French and Parrello Associates, P.A.

Mr. Pyontek has nearly 30 years experience in the project management and structural inspection, design and construction of Water Resource and Transportation projects. He has performed inspections of numerous dams according to NJDEP Dam Safety Standards, and has managed the design of several dam rehabilitation projects in New Jersey and Pennsylvania. Mr. Pyontek received his Bachelor of Engineering in Civil Engineering (BECE) from Stevens Institute of Technology in Hoboken, NJ in 1977, and graduated with a Masters of Science degree in Civil Engineering (MSCE) from New Jersey Institute of Technology in Newark, NJ in 1981, where he specialized in Structural Design. Mr. Pyontek is currently employed by French and Parrello Associates, P.A. in Wall, NJ as a Principal Engineer, where he manages dam and canal projects, as well as bridge projects. He is a Professional Engineer licensed in New Jersey and Pennsylvania, as well as a licensed Professional Planner in New Jersey. He is a member of the Association of State Dam Safety Officials, the American Society of Civil Engineers, the Structural Engineering Institute and the American Institute of Steel Construction.

Thomas H. Wakeman III, Eng.Sc.D., Deputy Director - Center for Maritime Systems, Research Professor - Department of Civil, Environmental, and Ocean Engineering, Stevens Institute of Technology, Hoboken, New Jersey.

Dr. Wakeman is a Research Professor in the Department of Civil, Environmental, and Ocean Engineering, Stevens Institute of Technology. Previously, Dr. Wakeman was with the Port Authority of New York and New Jersey, Port Commerce Department for 12 years and with the United States Army Corps of Engineers, San Francisco and Sacramento Districts, for 22 years. Dr. Wakeman has extensive experience in dredging, port development and water resources. His profession affiliations include ASCE, PIANC, and the Transportation Research Board (TRB). Dr. Wakeman has a MA in Marine Biology from San Francisco State University, MS in Civil Engineering from University of California, Davis, and an Eng.Sc.D. in Civil and Environmental Engineering from Columbia University, New York. His publications include co-editor of 2 books and more than 90 technical papers.

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