

INFRASTRUCTURE: THE COST OF DOING NOTHING

Government-University-Industry Research Roundtable

NRC Reports on Infrastructure*

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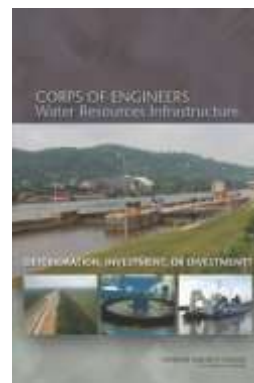


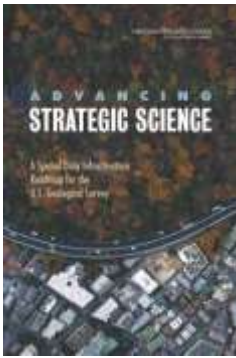
Underground Engineering For Sustainable Urban Development (DELS 2013)

For thousands of years, the underground has provided humans refuge, useful resources, physical support for surface structures, and a place for spiritual or artistic expression. More recently, many urban services have been placed underground. Over this time, humans have rarely considered how underground space can contribute to or be engineered to maximize its contribution to the sustainability of society. As human activities begin to change the planet and population struggle to maintain satisfactory standards of living, placing new infrastructure and related facilities underground may be the most successful way to encourage or support the redirection of urban development into sustainable patterns. Well maintained, resilient, and adequately performing underground infrastructure, therefore, becomes an essential part of sustainability, but much remains to be learned about improving the sustainability of underground infrastructure itself. At the request of the National Science Foundation (NSF), the National Research Council (NRC) conducted a study to consider sustainable underground development in the urban environment, to identify research needed to maximize opportunities for using underground space, and to enhance understanding among the public and technical communities of the role of underground engineering in urban sustainability.

Corps of Engineers Water Resources Infrastructure: Deterioration, Investment, or Divestment? (DELS 2012)

Over the past century, the U.S. Army Corps of Engineers has built a vast network of water management infrastructure that includes approximately 700 dams, 14,000 miles of levees, 12,000 miles of river navigation channels and control structures, harbors and ports, and other facilities. Historically, the construction of new infrastructure dominated the Corps' water resources budget and activities. Today, national water needs and priorities increasingly are shifting to operations, maintenance, and rehabilitation of existing infrastructure, much of which has exceeded its design life. However, since the mid-1980s federal funding for new project construction and major rehabilitation has declined steadily. As a result, much of the Corps' water resources infrastructure is deteriorating and wearing out faster than it is being replaced. *Corps of Engineers Water Resources Infrastructure: Deterioration, Investment, or Divestment?* explores the status of operations, maintenance, and rehabilitation of Corps water resources infrastructure, and identifies options for the Corps and the nation in setting maintenance and rehabilitation priorities.





Advancing Strategic Science: A Spatial Data Infrastructure Roadmap for the U.S. Geological Survey (DELS 2012)

Science is increasingly driven by data, and spatial data underpin the science directions laid out in the 2007 U.S. Geological Survey (USGS) Science Strategy. A robust framework of spatial data, metadata, tools, and a user community that is interactively connected to use spatial data in an efficient and flexible way-known as a spatial data infrastructure (SDI)- must be available for scientists and managers to find, use, and share spatial data both within and beyond the USGS. Over the last decade, the USGS has conducted breakthrough research that has overcome some of the challenges associated with implementing a large SDI. This report is intended to ground those efforts by providing a practical roadmap to full implementation of an SDI to enable the USGS to conduct strategic science.

NCFRP Report 16: Preserving and Protecting Freight Infrastructure and Routes (TRB 2012)

TRB's National Cooperative Freight Research Program (NCFRP) Report 16: Preserving and Protecting Freight Infrastructure and Routes provides guidance to decision makers involved in freight facility operations, freight transportation planning, and land use on how to avoid conflicting land uses or mitigate existing uses. The report provides information about freight transportation and its importance to people's everyday lives; illustrates the types of conflicts between freight and other land uses and their consequences; and provides tools and resources designed to help preserve facilities and corridors, including prevention or resolution of conflicts.



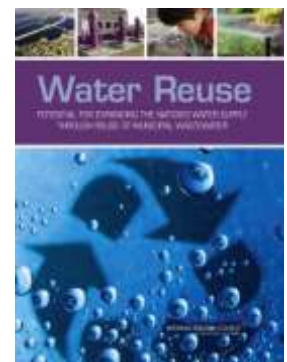
Predicting Outcomes of Investments in Maintenance and Repair of Federal Facilities (DEPS 2012)

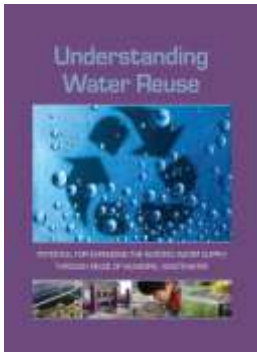
The deteriorating condition of federal facilities poses economic, safety, operational, and environmental risks to the federal government, to the achievement of the missions of federal agencies, and to the achievement of public policy goals. Primary factors underlying this deterioration are the age of federal facilities--about half are at least 50 years old--and decades of inadequate investment for their maintenance and repair. These issues are not new and there are no quick fixes. However, the current operating environment provides both the impetus and the opportunity to place investments in federal facilities' maintenance and repair on a new, more sustainable course for the 21st Century. Despite the magnitude of investments, funding for the maintenance and repair of federal facilities has been inadequate for many years, and myriad projects have been deferred. *Predicting Outcomes*

of Investments in Maintenance and Repair of Federal Facilities identifies processes and practices for transforming the current portfolio of federal facilities into one that is more economically, physically, and environmentally sustainable. This report addresses ways to predict or quantify the outcomes that can be expected from a given level of maintenance and repair investments in federal facilities or facilities' systems, and what strategies, measures, and data should be in place to determine the actual outcomes of facilities maintenance and repair investments.

Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater (DELS 2012)

Expanding water reuse--the use of treated wastewater for beneficial purposes including irrigation, industrial uses, and drinking water augmentation--could significantly increase the nation's total available water resources. *Water Reuse* presents a portfolio of treatment options available to mitigate water quality issues in reclaimed water along with new analysis suggesting that the risk of exposure to certain microbial and chemical contaminants from drinking reclaimed water does not appear to be any higher than the risk experienced in at least some current drinking water treatment systems, and may be orders of magnitude lower. This report recommends adjustments to the federal regulatory framework that could enhance public health protection for both planned and unplanned (or de facto) reuse and increase public confidence in water reuse.





Understanding Water Reuse: Potential for Expanding the Nation's Water Supply Through Reuse of Municipal Wastewater (Pack of 5 Booklets DELS 2012)

In communities all around the world, water supplies are coming under increasing pressure as population growth, climate change, pollution, and changes in land use affect water quantity and quality. To address existing and anticipated water shortages, many communities are working to increase existing water conservation and are seeking alternative sources of water. Water reuse- the sue of treated wastewater, or "reclaimed" water, for beneficial purposes such as drinking, irrigation, or industrial uses- is one option that has helped some communities significantly expand their water supplies.

NCHRP Report 679: Design of Concrete Structures Using High-Strength Steel Reinforcement (TRB 2011)

TRB's National Cooperative Highway Research Program (NCHRP) Report 679: Design of Concrete Structures Using High-Strength Steel Reinforcement evaluates the existing American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications relevant to the use of high-strength reinforcing steel and other grades of reinforcing steel having no discernible yield plateau. The report also includes recommended language to the AASHTO LRFD Bridge Design Specifications that will permit the use of high-strength reinforcing steel with specified yield strengths not greater than 100 ksi.



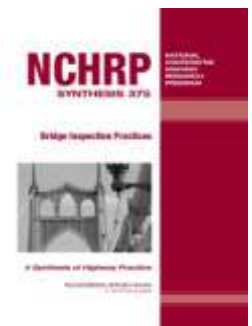
The Federal Investment in Highway Research, 2006-2009: Strengths and Weaknesses (TRB 2008)

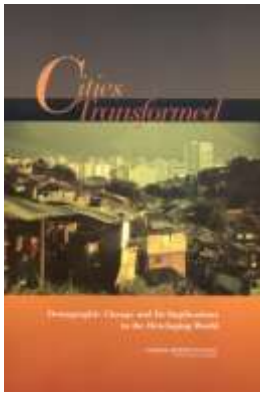
TRB Special Report 295, *The Federal Investment in Highway Research, 2006-2009: Strengths and Weaknesses* assesses how well the investments that Congress made in research programs through the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users comply with the principles articulated in the preface to the act's research title. The book contains findings and recommendations about specific research programs and calls for reliance on competition and merit review in awarding funds through the Federal Highway Administration and in selecting institutions for the University Transportation Centers program of the Research and Innovative Technology Administration.



NCHRP Synthesis 375: Bridge Inspection Practices (TRB 2008)

TRB's National Cooperative Highway Research Program (NCHRP) Synthesis 375: Bridge Inspection Practices examines bridge inspection practices in the United States and selected foreign countries. The report explores inspection personnel (staff titles and functions, qualifications, training and certification, inspection teams, and the assignment of teams to bridges), inspection types (focus, methods, and frequency), and inspection quality control and quality assurance. The report also reviews the uses agencies make of information gathered from bridge inspections, what triggers repairs, and plans for future development of inspection programs.





Cities Transformed: Demographic Change and Its Implications in the Developing World (DBASSE 2003)

Virtually all of the growth in the world's population for the foreseeable future will take place in the cities and towns of the developing world. Over the next twenty years, most developing countries will for the first time become more urban than rural. The benefits from urbanization cannot be overlooked, but the speed and sheer scale of this transformation present many challenges. A new cast of policy makers is emerging to take up the many responsibilities of urban governance as many national governments decentralize and devolve their functions, programs in poverty, health, education, and public services are increasingly being deposited in the hands of untested municipal and regional governments. Demographers have been surprisingly slow to devote attention to the implications of the urban transformation. Drawing from a wide variety of data sources, many of them previously inaccessible, **Cities Transformed** explores the implications of

various urban contexts for marriage, fertility, health, schooling, and children's lives. It should be of interest to all involved in city-level research, policy, planning, and investment.

Privatization of Water Services in the United States: An Assessment of Issues and Experience (DELS 2002)

In the quest to reduce costs and improve the efficiency of water and wastewater services, many communities in the United States are exploring the potential advantages of privatization of those services. Unlike other utility services, local governments have generally assumed responsibility for providing water services. Privatization of such services can include the outright sale of system assets, or various forms of public-private partnerships from the simple provision of supplies and services, to private design construction and operation of treatment plants and distribution systems. Many factors are contributing to the growing interest in the privatization of water services. Higher operating costs, more stringent federal water quality and waste effluent standards, greater customer demands for quality and reliability, and an aging water delivery and wastewater collection and treatment infrastructure are all challenging municipalities that may be short of funds or technical capabilities. For municipalities with limited capacities to meet these challenges, privatization can be a viable alternative.

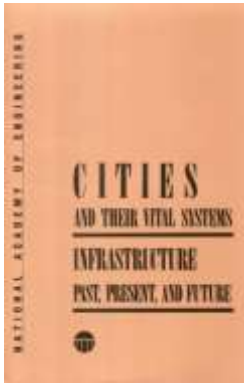


Measuring and Improving Infrastructure Performance (NRC 1995)

The nation's physical infrastructure facilitates movement of people and goods; provides safe water; provides energy when and where needed; removes wastes; enables rapid communications; and generally supports our economy and quality of life. Developing a framework for guiding attempts at measuring the performance of infrastructure systems and grappling with the concept of defining good performance are the major themes of this book. Focusing on urban regions, within a context of national policy, the volume provides the basis for further in-depth analysis and application at the local, regional, state, and national levels.

Toward Infrastructure Improvement (NRC 1994)

This book advises the federal government on a national infrastructure research agenda. It takes the position that the traditional disciplinary and institutional divisions among infrastructure modes and professions are largely historical artifacts that impose barriers to the development of new technology and encourages the government to embrace a more interdisciplinary approach. In order to be practical, the study focuses on infrastructure technologies that can be incorporated into or overlay current systems, allow for alternative future urban development, and are likely to have value cutting across the distinct functional modes of infrastructure. Finally, the report is organized according to seven broad cross-cutting areas that should promote interdisciplinary approaches to infrastructure problems: systems life-cycle management, analysis and decision tools, information management, condition assessment and monitoring technology, the science of materials performance and deterioration, construction equipment and procedures, and technology management.



Cities and Their Vital Systems: Infrastructure, Past, Present, and Future (NAE 1988)
Cities and Their Vital Systems asks basic questions about the longevity, utility, and nature of urban infrastructures; analyzes how they grow, interact, and change; and asks how, when, and at what cost they should be replaced. Among the topics discussed are problems arising from increasing air travel and airport congestion; the adequacy of water supplies and waste treatment; the impact of new technologies on construction; urban real estate values; and the field of "telematics," the combination of computers and telecommunications that makes money machines and national newspapers possible.

Perspectives on Urban Infrastructure (DELS 1984)

In this provocative volume, distinguished authorities on urban policy expose the myths surrounding today's "infrastructure crisis" in urban public works. Five in-depth papers examine the evolution of the public works system, the limitations of urban needs studies, the financing of public works projects, the impact of politics, and how technology is affecting the types of infrastructures needed for tomorrow's cities.



*The reports listed are a selection of NRC reports on infrastructure. To search a more complete selection of NRC reports, go to www.nap.edu.