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Mr. Chairman and Members of the Committee: I am Tom Smith, Deputy Executive Director and General Counsel of the American Society of Civil Engineers (ASCE). ASCE is pleased to offer this testimony in support of the proposed budgets of \$7.767 billion for the National Science Foundation (NSF) and \$1.001 billion for the National Institutes of Standards and Technology (NIST) for Fiscal Year 2012.

ASCE recognizes that Congress must make difficult funding decisions this year and that real cuts must be made. Both the plan put forth by the Co-Chairs of the National Commission on Fiscal Responsibility and the President's FY 2012 budget request recognizes the importance of investment in science and research.

ASCE believes that technological innovation has been the engine driving the nation's economic expansion for the last fifty years. ASCE firmly believes that by maintaining strong continuing and steadily increasing support for research and education, we will continue to enjoy the rewards of economic expansion. If we do not continue to invest in research and technology, we will lose our position in an ever more integrated and competitive world. Global competition increasingly requires the United States to make the necessary investments in science and engineering research and education.

If history is any guide, we already know the benefits of investment in science and technology. According to economic experts, science-driven technology is responsible for over 50 percent of the growth of the U.S. economy during the last half century. Robust, sustained investment in research and development is required for stimulating growth in high-wage industries, for generating new technologies in critical areas of need, including energy, transportation and manufacturing, and for preparing the workforce of tomorrow. The basic research funded by NSF, in engineering and all other areas of science, is the foundation of that investment in the future. Additionally, the targeted research and standards activities at NIST laboratories provide industry and the science and engineering community with the measurement capabilities, standards, evaluated reference data, and test methods that provide a common language needed at every stage of technical activity.

ASCE estimated in its *2009 Report Card for the Nation's Infrastructure* that \$2.2 trillion is needed over five years to meet national infrastructure needs. Spending at this rate, even through the use of innovative financing techniques, is unlikely. Research is needed to increase productivity and reduce costs through the development of innovative design, materials, construction methodologies, rehabilitation technologies, maintenance procedures, and operation techniques. Fragmentation of the design and construction

industry limits the support of long-term research efforts that could result in technological gains and innovation. Only the leadership and support of the federal government, through NSF and NIST, can these goals be realized.

I. The American Society of Civil Engineers

ASCE, founded in 1852, is the country's oldest national civil engineering organization representing more than 144,000 civil engineers in private practice, government, industry and academia dedicated to the advancement of the science and profession of civil engineering. ASCE is a 501(c)(3) non-profit educational and professional society. Research in civil engineering, properly conceived, conducted and implemented, should assure significant advances in the quality of life of individuals by providing essential service with minimal adverse effects on the environment by applying the principle of sustainable development and disaster resilience. Research should also provide new developments in civil engineering practice that will keep the profession dynamic.

II. National Science Foundation (NSF)

ASCE supports the Administration's FY 2012 request for NSF of \$7.767 billion, an increase of \$894.49 million (13 percent) over the FY 2010 Enacted level.

In recent years, Congress has increasingly recognized that to remain technologically and economically competitive, our country is dependent on long-term investment in federal research and education programs in science and engineering. The support that the federal government has provided for NSF in a period of budgetary stringency has helped this country retain its world leadership position in research and education in science and engineering. That position is under an unprecedented challenge from foreign nations newly committed to establishing leadership positions in research and technology development.

National investment in NSF research and education programs produces the new knowledge and the trained scientists and engineers indispensable to our future economic vitality and national security. ASCE strongly believes that Congress must maintain and increase that support.

Science, Technology, Engineering, and Mathematics (STEM) Education – ASCE encourages the continued federal commitment to math and science education by maintaining the peer reviewed Math and Science Partnerships (MSP's) at the NSF and supporting robust funding for both the U.S. Department of Education (ED) and the NSF Math and Science Partnership programs.

Our education system is not meeting the needs of our increasingly technological society. Many elementary, middle, and high school students do not receive adequate instruction in math and science, such that the possibility of studying engineering at the college level is effectively precluded. Moreover, many elementary, middle, and high school students receive little or no exposure to engineering. As a result, students who

have the aptitude to be successful engineers never have an opportunity to develop an interest in this career path. Consequently, too few well-qualified students are pursuing careers in civil engineering.

The President's request of \$231.37 million for K-12 STEM programs at NSF is a 15% decrease from FY 2010 enacted. ASCE strongly supports this request and urges Congress to carefully consider K-12 STEM funding throughout the federal government. Our nation's future competitiveness in the global marketplace is directly tied to the ability of our schools to prepare children in the STEM fields. Every well-planned and executed effort to improve the nation's student's performance in STEM fields will pay dividends in the future.

III. National Institute of Standards and Technology

ASCE strongly supports the Administration's FY 2012 proposal for \$1.001 billion for NIST, a 16.9 percent increase above NIST's FY 2010 appropriations.

NIST is a non-regulatory agency of the United States Department of Commerce. The institute's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life.

The well-being of the nation is affected every day by NIST's measurement and standards work. The quality of the water, air, and the food depends in part on that work. NIST standards ensure that consumers are confident in the quantity and quality of the product purchased, whether it is a gallon of gasoline or the amount of electricity used and stated in the monthly bill. Standards improve the accuracy of medical tests and treatments and help to make sure the nutritional content of what we are eating is appropriately labeled. Standards help to convict criminals and free the innocent through more accurate and faster DNA tests. Standards provide crucial timekeeping that we depend upon for navigation, telecommunications, financial transactions, and basic research. And standards improve the readiness of our first responders and our homeland security.

Scientific & Technical Research & Services (STRS) - These are NIST's core programs that provide the measurements and standards on which the nation's industry stands and grows. NIST laboratories provide industry and the science and engineering community with the measurement capabilities, standards, evaluated reference data, and test methods that provide a common language needed at every stage of technical activity. U.S. scientists rely on NIST's evaluated data services and measurement expertise for a host of basic and applied research activities. **ASCE supports the request of \$678.9 million to fund these vital programs.**

Engineering Laboratory – ASCE believes that the services provided by the Engineering Laboratory are invaluable to the building industry. EL works to improve the productivity of U.S. construction industries and serves as the premier fire research

laboratory in the U.S. It develops technologies to predict, measure, and test the performance of construction materials, components, and practices. EL is the nation's central laboratory for providing the tools (i.e. research and measurements) needed to rebuild the nation's infrastructure.

Laboratory activities include: fire science and fire safety engineering; building materials; computer-integrated construction practices; structural, mechanical and environmental engineering; and building economics. The laboratory conducts investigations at the scene of major fires and structural failures due to earthquakes, hurricanes or other causes. The knowledge gained from these investigations guides research and is applied to recommendations for design and construction practices to reduce future hazards.

Construction is one of the nation's largest industries, comparable in size to the health care and agricultural industries. Like those vital areas of the nation's economy, the construction industry needs research and development to enhance international competitiveness and increase public health and safety. Funding for construction-related research, from all sources, is a fraction of that available to the healthcare and agricultural industries. Due to the fragmented nature of the construction industry, the private sector does not have the resources to conduct the needed research and development on its own.

ASCE is pleased to see, and strongly supports, the Measurements and Standards to Support Advanced Infrastructure Delivery and Resilience with a \$10.6 million request.

Many of the nation's largest buildings and much of its infrastructure are concentrated in disaster-prone regions where hurricanes, earthquakes, floods and other hazards are common. The disaster resilience of our structures today is determined in large measure by the building codes, standards, materials, and practices used during their construction. With few exceptions, these legacy codes, standards, materials, and practices, which have evolved over several decades, are prescriptive i.e. not performance-based, oversimplified, and inconsistent.

To allow greater use of innovative structural systems and sustainable materials, there is a critical need to replace prescriptive codes with ones based instead on performance. There are gaps in the measurement science needed to improve the disaster resilience and sustainability of buildings and infrastructure exposed to natural and man-made hazards. Catastrophic failures in infrastructure cost the U.S. hundreds of billions of dollars in repairs and directly impact our personal and economic health. Additionally, there is a need to address the decline in the nation's construction productivity, which has averaged 0.6 percent per year over the past four decades. Construction industry leaders see the potential for improvements in construction productivity with integrated and automated processes using advanced technology.

National Construction Safety Team Act – Public Law 107-231 - created the National Construction Safety Team at NIST with the mandate to investigate major building failures within the United States. The investigations are conducted to establish the

technical causes of building failures and evaluate the technical aspects of emergency response. The goal is to recommend improvements to the way in which buildings are designed, constructed, maintained and used. ASCE supported this act; however ASCE believes that NIST must be provided with the necessary resources. The National Construction Safety Team (NCST) Advisory Committee, established by the Act, recommended the creation and funding of a NCST office. **ASCE urges Congress to appropriate at least \$1 million for such an office.**

III. Hazard Mitigation

Within the NSF and NIST, and other Federal agencies, there exist a number of small but critical programs designed to mitigate the impact of natural disasters. These critical programs such as the National Earthquake Hazards Reduction Program (NEHRP), the National Windstorm Impact Reduction Program and others hold the potential to save countless lives and billions of dollars. These programs deserve Congress's full attention and funding. NIST estimates that each year, the United States suffers \$52 billion in property damage, disruption of commerce, and lost lives due to natural disasters such as hurricanes, tornadoes, wildfires, earthquakes. A single major event—a big earthquake or hurricane— could cause some \$80 billion to \$200 billion in economic losses in the affected areas. The tragedy caused by Hurricanes Katrina and Rita in August and September 2005 underscores the growing risk to society from natural disasters.

National Earthquake Hazards Reduction Program (NEHRP) has provided the resources and leadership that have led to significant advances in understanding the risk earthquakes pose and the best ways to counter them. Under NEHRP, there has been a constant source of funding for seismic monitoring, mapping, research, testing, code development, mitigation and emergency preparedness. NIST has played a strong role in the leadership of the critical program and we urge Congress to continue to fund this critical office.

National Windstorm Impact Reduction Program - In October 2004, Public Law 108-360 authorized the creation of the National Windstorm Impact Reduction Program. As Katrina and other hurricanes, not to mention tornadoes and other severe storms, have so recently demonstrated, the nation is extremely vulnerable to the impact of severe wind events. NIST recently took steps to create a Wind Storm Office as part of their Disaster-Resilient Buildings, Infrastructure, and Communities Initiative.

ASCE strongly urges Congress to continue to fund these important programs and to support the new Disaster-Resilient Buildings, Infrastructure, and Communities Initiative request at \$10.6 million.

IV. Conclusion

Once again, thank you for the opportunity for ASCE to express its views. If you need more information, contact Martin Hight, ASCE Senior Manager of Government Relations at (202) 326-5125 or by e-mail at mhight@asce.org.