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Statement for the Record of

The American Society of Civil Engineers

on

"Examining the Role and Effectiveness of Building Codes in Mitigating Against Disasters"

Subcommittee on Economic Development, Public Buildings, and Emergency Management
Committee on Transportation and Infrastructure
U.S. House of Representatives

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Introduction

The American Society of Civil Engineers [1](ASCE) thanks the Subcommittee on Economic Development, Public Buildings, and Emergency Management for holding this hearing on the efficiency of building codes in mitigating the impacts of disasters. ASCE has long advocated for resilience in the nation's-built environment and the development, adoption, funding, and enforcement of modern national model building codes and the consensus standards on which they are based.

Civil engineers are responsible for the planning, design, construction, operations, and maintenance of physical infrastructure, including all of the buildings in which we live, work and play; energy generation and distribution facilities; transportation networks; water supply and sanitation systems; flood control structures; and communication infrastructure. Most infrastructure is designed and built to provide long service lives (50 to 100 years) and are expected to remain functional, durable, and safe. However, the increasing frequency and intensity of natural disasters, combined with increasing population densities and reduced community funding resources, as well as system interdependencies, have demonstrated increasing and significant vulnerabilities in the nation's infrastructure.

To ensure the nation's infrastructure systems continue to provide critical services and acceptably low risks of failures over time, engineers, designers, planners, and policymakers must incorporate system resilience into the decision-making process. Our nation's infrastructure system is only as strong as its weakest link — if our roadways become too rough or flooded to travel, if our bridges close to heavier traffic like ambulances, if a region's energy grid is devastated by high winds, or if our levees protect one community at the expense of the one next door, the economy grinds to a halt. Therefore, the foundational step in building smarter and improving resilience is first assessing the nation's existing infrastructure needs and conditions.

Every four years, ASCE publishes its *Report Card for America's Infrastructure*, which grades the nation's major infrastructure categories using a simple "A" to "F" school report card format. The most recent Report Card[2], released in March 2021, evaluated 17 categories of infrastructure, and reflected an overall "C-" grade. This grade marks an increase from the "D+" recorded in 2017, indicating the country has made some progress in recent years due to a focus on resources and use of minimum standards. The 2025 Report Card for America's Infrastructure will be released in March of 2025.

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[1] ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents more than 160,000 civil engineers individually in private practice, government, industry, and academia who are dedicated to the advancement of the science and profession of civil engineering. ASCE is a non-profit educational and professional society organized under Part 1.501(c) (3) of the Internal Revenue Code. www.asce.org

[2] https://infrastructurereportcard.org/

Among the policy solutions offered to raise the grades in 2021, is the need to incentivize and enforce the use of codes and standards, which can mitigate risks of human-caused or environmental events such as hurricanes, fires, sea level rise, and more.

In fact, modern, enforced building codes are the single most effective method of creating disaster resilience in communities. In its federally mandated, 2020 Mitigation Saves report, the National Institute of Building Sciences (NIBS) has concluded that adopting the latest building code requirements is not only affordable, but saves $11 per $1 invested. Furthermore, NIBS concludes that building codes have greatly improved disaster resilience, while adding only about 1% to construction costs relative to 1990 standards and that the greatest benefits accrue to communities using the most recent code editions.

Furthermore, a recent FEMA study entitled Building Codes Save, included an analysis that clearly demonstrated that over a 20-year period, cities and counties that have adopted and enforced modern building codes have avoided at least $132 billion in losses from natural disasters. Simply stated, building codes work.

Therefore, ASCE strongly supports the following:

- Adoption of a modern, effective national model building code at the state and local levels.
- Federal incentive programs encouraging state and local agencies to adopt building codes.
- Implementation of current building codes and increase resources and funding for enforcement.
- Creation and or improvement of model building codes and supporting standards.
- Funding for research that is necessary for the development of model building codes, such as functional recovery standards and environmental hazard development.

Background

Model building codes are developed by experienced volunteer professionals working together under a multi-step, consensus-based process. Most professional engineering organizations maintain code development committees that initiate code provisions based on the practice in their technical areas and are often augmented by research. Topics for code provisions are often introduced in case study reports or research papers. In time, many of these provisions are gathered and published as design guidelines. Eventually the guidelines are transformed into standards and incorporated into the model code. For many years, local, state, and federal governments have maintained a strong and effective reliance on the non-government sector for development and maintenance of the standards at use across all sectors of our economy.

There is a high level of interdependence between the viability of local communities and the national economy. The traditional assumption that local jurisdictions could determine the level of safety and quality to which they would build has yielded to the recognition that uniform national standards are needed to assure that the economic impact to the nation is controlled. These national standards are best delivered in a modern, effective national model code that local jurisdictions should be encouraged to adopt and enforce.

Modern building codes and ASCE standards are tailored to hazards faced in specific locations and are designed to mitigate against the most prevailing risks. Additionally, the setting of state and local building codes is not effective unless accompanied by enforcement.

ASCE Standards

ASCE engages in the standards setting on a large scale. ASCE Standards provide technical guidelines for promoting safety, reliability, productivity, and efficiency in civil engineering. Many of our standards are referenced by model building codes and adopted by state and local jurisdiction. They also provide guidance for design projects around the world. Accredited by the American National Standards Institute (ANSI), ASCE has a rigorous, formal, and open process with internal and external oversite. Standards are created or updated by a balanced, volunteer standards committee, followed by a public review period.

Developing standards that incorporate the best available environmental hazard data and undergo a comprehensive consensus and public process help ensure that buildings and other structures are safe and resilient to environmental and human-caused hazards. Following ASCE standards improves community resilience and can help reduce the risk of damage, injury, and loss of life during anticipated and extreme events. More resilient infrastructure can also minimize the cost associated with rebuilding after damaging events.

The following ASCE documents offer a sound basis upon which model codes are developed:

• *ASCE/SEI 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures* currently an integral part of U.S. building codes, describes the means for determining soil, flood, tornado, tsunami, snow, rain, atmospheric ice, earthquake, and wind loads, and their combinations for resilient structural design.

• *ASCE/SEI 24, Flood Resistant Design and Construction* prescribes a standard for cost effectively increasing resiliency by reducing and eliminating risks to property from flood hazards and their effects.

• *ASCE/SEI 41, Seismic Evaluation and Retrofit of Existing Buildings* standardizes methods for the retrofit of existing buildings to increase resiliency in communities after a seismic event.

ASCE has furthered its reach of environmental hazard data distribution from design standard by creating and maintaining the ASCE Hazard Tool (ascehazardtool.org). The free tool provides quick, reliable way to look up hazard data for seven environmental hazards including tornado, wind, seismic, ice, rain, snow, flood, and tsunami, to determine multiple types of hazard loads for buildings and other structures. Such data is developed in partnership with agencies such as NOAA, FEMA, NIST, USGS, USACE.

The Role of Federal Programs in Developing Building Codes and Standards

ASCE urges federal, state, and local governments to adopt and incentivize the use of the most up-to-date codes and standards. Widespread adoption and enforcement of current codes and standards is the best way to ensure our infrastructure and communities are resilient against increasingly severe storms and other hazards.

Importantly, a number of federal programs are critical in implementing and supporting the nation's standards programs. These programs play a role in the nation's building code and standard setting enterprise and need continued Congressional support.

Next, created by Congress in 1977, the **National Earthquake Hazards Reduction Program** (NEHRP) has provided the resources and leadership necessary to create significant advances in understanding the precise risk earthquakes pose and the best ways to counter those risks. The multi-agency program, which includes the FEMA, U.S. Geological Survey (USGS), National Science Foundation (NSF), and National Institute of Standards and Technology (NIST) has engaged in seismic monitoring, mapping, research, testing, engineering, supporting code development, mitigation, and emergency preparedness. Although NEHRP is well known for its research programs, it is also the source for hundreds of new technologies, maps, design techniques, and standards that are used by design professionals every day to mitigate hazards and risks. NEHRP is a cost-effective and well-run program that has successfully reduced the risk of earthquakes.

For FY 2023 NEHRP was authorized at approximately $153 million, with actual funding of $166.8 with some additional Infrastructure Investment and Jobs Act funding. NEHRP research has contributed to the development of seismic design standards that are widely used in the construction industry. These standards have helped to make buildings more earthquake-resilient, which has saved lives and reduced economic losses. Specifically, NEHRP has contributed to ASCE 41, Seismic Evaluation and Retrofit of Existing Buildings. Additionally. NEHRP has helped to improve earthquake mitigation and response planning through the use of realistic earthquake scenarios.

Finally, created by Congress in 2004 and modeled after NEHRP, the **National Windstorm Impact Reduction Program (NWIRP)** coordinates windstorm related research activities at the National Oceanographic and Atmospheric Administration (NOAA), NSF, NIST, and FEMA. NWIRP has made strides in increasing the understanding of the impact of wind on structures. This includes significant

improvements in hurricane forecasts and increased tornado warning times; advancements in the science of wind mapping to inform engineering-based design standards; improved coordination practices and research support for post windstorm investigations; and implementation of post windstorm research-based recommendations into codes, standards, and practices. However, despite the best efforts of the agencies involved, NWIRP has not received the funding needed to reach its potential.

Authorized through FY 2017 at $21.6 million, NWIRP has never received any direct authorization. However, utilizing existing program funding, NWIRP has worked to improve building codes and standards to make structures more resistant to tornadoes and hurricanes. For example, NWIRP research led to the adoption of new requirements for tornado-resistant design in the 2022 version of ASCE 7

Both NEHRP and NWIRP authorizations have expired and ASCE encourages Congress to act to reauthorize these two critical programs. The Senate Commerce Committee has approved S. 3606, the National Earthquake Hazards Reduction Program Reauthorization Act and it is waiting for floor action. The House Science Committee is marking up H.R. 9723, the National Windstorm Impact Reduction Program Reauthorization Act of 2024. ASCE strongly encourages members of the Committee to work with their colleagues to reauthorize these important programs.

In addition to authorized programs such as NEHRP and NWIRP that support code and standard development, programs that support adoption are also critical. The **Federal Emergency Management Agency (FEMA)** has a number of programs that support building codes adoption and enforcement. The **Building Resilient Infrastructure and Communities (BRIC) Program** is a critical tool in helping state and local governments reduce their risk of future hazard events. Not only does the BRIC program fund pragmatic disaster risk management strategies that protect our nation’s communities and safeguard infrastructure systems, but it is a prudent use of taxpayer dollars. The BRIC program requires that projects receiving its grants must meet either of the two most recent versions of relevant consensus-based codes, specifications, and standards. By ensuring the use of the most up-to-date codes and standards, the BRIC program is an excellent example for how federal programs can effectively utilize the nation’s limited disaster recovery dollars in the face of more severe weather events.

FEMA introduced BRIC in FY2020 in response to the Disaster Recovery Reform Act of 2018 and is primarily funded by setting aside 6% of federal post-disaster grant funding. That funding has been supplemented with $500 million available in FY2020, $1 billion available in FY2021, $2.29 billion in FY 2022, $1 billion in FY 2023, and $1 billion in FY 2024. On July 1, 2024, FEMA announced the selections for the fiscal year 2023 Building Resilient Infrastructure and Communities cycle. During FY 2023, BRIC allowed up to an additional $2 million per state and territory to be dedicated for building code activities. This is called the State and Territory Building Codes Plus-Up. In addition, BRIC will

allow up to $25 million to be dedicated for building code activities for federally recognized tribes called the Tribal Building Codes Plus-Up. Under the BRIC Building Code Plus-Up, state, territory or federally recognized tribal governments may carry out eligible building code adoption and enforcement activities such as:

- Implement adoption and/or implementation of codes that reduce risk.
- Enhance existing adopted codes to incorporate more current requirements or higher standards.
- Develop professional workforce capabilities relating to building codes through technical assistance and training.

Conclusion

ASCE once again thanks the Subcommittee on Economic Development, Public Buildings, and Emergency Management for holding this hearing and highlighting the importance of building codes and standards to ensure the resilience of the nation's infrastructure.

While the federal government does not directly develop building codes or standards, it plays a critical role to ensure standards development organizations have access to the necessary environmental hazards data developed by federal agencies such as NOA, NIST, FEMA, USGS and USACE. Federal programs such as FEMA BRIC are critical to support and encourage modern code and standard adoptions in communities across the country, which ensures equity in our national built environment.

Building codes are the most cost-effective way to safeguard our communities against both disasters and the routine operation of the built environment. These codes reduce casualties, minimize costs, and diminish damage by creating stronger buildings designed to withstand disasters. Building codes also help communities get back on their feet faster by minimizing indirect costs such as business interruptions and lost income.

ASCE remains committed to working with all levels of government to ensure our communities are resilient in the face of disasters and looks forward to working with Congress to identify how critical programs can further protect American lives, health, safety, and welfare.