



Designing for a Resilient America:

A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure

November 30-December 1, 2010
Washington DC



Homeland
Security

Science and Technology

DESIGNING FOR A RESILIENT AMERICA

**A Stakeholder Summit on
High Performance Resilient Buildings and Related Infrastructure**

Sponsored by

**The U.S. Department of Homeland Security
Science and Technology Directorate
Infrastructure Protection and Disaster Management Division
High Performance Integrated Design Resilience Program**

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Disclaimer

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Executive Summary

Given the gravity of manmade and natural hazard events of the last decade, designing buildings that not only offer resistance, but continue to function after a catastrophic event are significant challenges to government and the building industry. The National Infrastructure Advisory Council (NIAC) has recommended better understanding of the role of design and construction in infrastructure resilience. At the recently held *Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure*, national hazards and building experts developed comprehensive recommendations for increasing resiliency in six areas. These need the attention of the highest levels of government - the President, Congress, and ranking staff of the Department of Homeland Security and other Federal agencies.

Role of Government

An Executive Order or Presidential Directive is needed to promote major resiliency initiatives and research. The Department of Homeland Security (DHS) should be directed to take the lead in coordination with other Federal agencies for developing resiliency designs, criteria, metrics, tools, codes, and performance standards. The Stafford Disaster Relief and Emergency Assistance Act and the SAFETY Act should be updated to include provisions for all hazards and resiliency.

Public/Private Partnerships

Public/private partnerships should increase coordinated action, and support resiliency legislation and the development of criteria and guidelines. A Presidential Advisory Committee should be established with broad representation from business.

Codes and Standards

Codes and standards organizations and relevant Federal committees should participate in an effort to support development of an integrated suite of code and standard provisions that integrate resilience into design, construction, and operations of buildings and infrastructure.

Research and Development

Federal agencies should coordinate future research and development (R&D) activities, including supporting R&D on the economic benefits of resilience, and establish a DHS Center of Excellence for collecting and analyzing data, and for supporting studies.

Design Practice and Performance Outcomes

Federal agencies, states, professional societies and communities should advance the application, enforcement, and certification of resilient design for buildings and infrastructure.

Education and Outreach

Resilience education and training curricula written by professional organizations, and outreach developed by all those involved in promoting resiliency, should be prepared for professionals and technical staff in the building industry.

Introduction

The World Trade Center Towers, the Murrah Federal Building in Oklahoma City, and Hurricane Katrina are just three reminders of how manmade and natural hazard events in the United States can rapidly destroy buildings and generate casualties. Many other examples of buildings destroyed by manmade hazards are found in the Global Terrorism Database¹. Additional destruction by hurricanes, just one of the potential deadly natural disasters, is catalogued over time by NOAA². Buildings are central to the lives of United States citizens who work, live, worship, heal, or recreate in some form. Over the past decade, the U.S. Government has focused on improving the security and resiliency of the Nation's buildings and related infrastructure. Following the September 11 attacks of 2001, much of that emphasis was on protecting Federal and high-risk facilities. In more recent years, especially following Hurricane Katrina in 2005, this priority has expanded to making all buildings more resilient to both manmade and natural disasters.

Designing buildings that can resist hazards and continue to provide their primary functions (e.g., safe shelter and critical operations) after all types of destructive events is a major challenge to the design professions, the owners and operators of buildings, and those in Federal, State and local governments responsible for homeland security. A measure of the need for resilience is expressed in the sheer size of our building inventory. There were nearly five million commercial buildings in the U.S. in 2003³ and nearly 130 million units of housing stock in 2009⁴. The Federal Government, the largest owner of structures in the country, owns over half a million buildings⁵.

The NIAC provides the President of the United States, through the Secretary of Homeland Security, with advice on the security of the 18 critical infrastructure sectors and their information systems. The Council has recognized that:

Government should endeavor to better understand the role of design and construction in infrastructure resilience. Application of this understanding will help to shape the policy, R&D funding, and incentives that can spur technological innovation as well as the robust design and construction of critical infrastructures needed for resilience⁶.

¹ <http://www.start.umd.edu/gtd/>

² Eric S. Blake, Edward N. Rappaport, Christopher W. Landsea (2007-04-15). *The Deadliest Costliest and Most Intense United States Tropical Cyclones from 1851 to 2006 (and other frequently requested hurricane facts)*, National Hurricane Center, National Oceanic and Atmospheric Administration.

³ <http://www.eia.doe.gov/emeu/cbecs2003/introduction.html>. *2003 Commercial Buildings Energy Consumption Survey—Overview of Commercial Buildings Characteristics*. Energy Information Administration.

⁴ U.S. Census Bureau, *State & County Quick Facts*.

⁵ U.S. Green Building Council, *Flier for Government Summit 2011: Fuel for a Clean Energy Economy*.

⁶ The National Infrastructure Advisory Council, *Critical Infrastructure Resilience: Final Report and Recommendations*, September 2009, p. 26.

The NIAC has defined resilient infrastructure thusly:

*Infrastructure resilience has the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient infrastructure or enterprise depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event.*⁷

With the President's Council highlighting the need for improved resilience, it became clear that before Federal agencies and industry could fully tackle the issue, there needed to be an understanding of the current state of the Nation's infrastructure and a roadmap of what needed to be done to achieve infrastructure resilience.

This challenge was the basis for convening *Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure*. The Summit, held on November 30-December 1, 2010, at the American Institute of Architects Headquarters in Washington, D.C., was attended by 82 experts from the building industry, Federal agencies, state and local governments, universities, and professional and trade organizations. (Please see the appendices for the agenda and list of participants.)

The timeliness of the Summit was underscored when President Barack Obama officially proclaimed December *Critical Infrastructure Protection Month* on the same day that the Summit began. In doing so, the President reaffirmed that critical infrastructure protection is an essential element of a resilient and secure nation. The proclamation demonstrated his commitment, and the Nation's, to delivering the information, tools, and resources necessary to ensure that essential infrastructure is secure and capable of withstanding disruption.

This report is intended to bring the collective recommendations from *Designing for a Resilient America* to the President, members of Congress, and senior representatives from Federal Government departments and agencies, and to issue a call for action by government and industry to address the critical requirements of resiliency. Eighteen specific recommendations that resulted from the Summit follow in the next chapter.

Beyond this report, organizations represented by participants at the Summit with a stake in resiliency will continue to present these recommendations to key decision makers. In the near term, the participants will develop a framework for coordinating short-, medium-, and long-term objectives with attendant timelines. Short-term objectives will emphasize leveraging existing best practices, partnerships and outreach activities; medium-term will emphasize the development of performance metrics, and new practices; and long-term objectives will emphasize applying lessons learned, and the evaluation of economic benefits.

⁷ The National Infrastructure Advisory Council, *Critical Infrastructure Resilience: Final Report and Recommendations*, September 2009, p. 8.

Overview of Resilient Design

Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure focused on understanding issues concerning the resilience of buildings and related infrastructure, and discerning possible strategies for the Federal departments and agencies to pursue in creating a resilient America. Many speakers at the Summit addressed the resilience of U.S. buildings and infrastructure against manmade attacks and natural hazard events with four design-related approaches: high performance, codes and standards, continuity of operations, and integrated design. These approaches support resilience in buildings through promoting good initial design and construction for new facilities, effective retrofit for existing facilities, and appropriate operational programs to ensure that mitigation plans are in place, and building systems operate as required.

High Performance

In 2007, the U.S. Congress passed the Energy Independence and Security Act (EISA) of 2007 (Public Law 110-140), which defines high performance as “the integration and optimization on a life cycle basis of all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality and operational considerations.” The positive attention surrounding this law provides the public and private sectors with opportunities to promote the integration, compilation, and harmonization of building standards to ensure acceptable and appropriate levels of performance based on requirements for buildings to withstand all hazards.

Since then, high performance requirements that affect resiliency for buildings have come under development, for example, through the initiation of an advanced materials program that provides for the coordination and cooperation of Federal laboratories and universities to develop new advanced materials and products that exhibit comprehensive high-performance attributes, and can be used to increase the performance levels of the built environment. In addition, programs are being directed at developing metrics, benchmarks, validation standards and verification methods for measuring high performance and providing high-performance based design guidance and standards to the design and engineering communities.

Codes and Standards

A principal consideration of the Summit was that U.S. building codes and standards set minimum requirements, primarily for health and life safety, that are well-established and enforced by thousands of jurisdictions across the country backed by state legislation. Such regulations are met by substantial portions of the design, construction, and manufacturing communities. However, building owners and developers have few compelling reasons to

require buildings to exceed these minimum levels of performance. Since higher level resilience is not currently incorporated in these minimum requirements, there is limited design guidance available to the building community on providing enhanced safety to the built environment. In response, new institutions, standards initiatives, regulations writing, and requirements for financing are starting to incorporate resilience and high performance factors into the design and construction process.

Continuity of Operations

Resiliency is significantly related not just to the ability to reduce the magnitude and duration of disruptive events, but the ability to maintain critical operations and functions in the face of crisis, to respond and manage a crisis or disruption as it unfolds, and to return to and reconstitute normal operations as quickly and efficiently as possible after a disruptive event. The ability to anticipate acts of terrorism or disasters, to plan for those in systematic ways, and to implement means of rapid recovery is the most recent evolution in building practices and processes, and decision-making. Additional adjustments in codes and standards are needed to guarantee the continued operation of critical buildings and infrastructure, e.g., 24-hour critical care hospitals, highways and bridges critical to evacuation plans, and government facilities integral to the operations and security of the homeland. The continued operation of resilient critical facilities will save lives and have enormous cost savings in the aftermath of a destructive event.

Integrated Design

There is a national need to work toward designing the nation's infrastructure in an integrated way to withstand all hazards (natural and man-made), taking into account high performance and continuity of operations, to support rapid recovery from a disruptive event. Integrated design and urban planning are being achieved through rapid and inexpensive assessment of the anticipated all-hazards performance of the built environment and using these results in developing standards and guidance for providing enhanced building and infrastructure protection. Such a process allows for the design of a built environment that meets the full and comprehensive range of performance attributes at the highest levels and in the most cost effective manner.

Federal Agency Involvement with Resiliency

DHS, the General Services Administration, the Department of Veteran Affairs, the National Institute of Standards and technology, and many other Federal Government departments and agencies have provided positive attention to these four important concepts. DHS in particular has had the opportunity to support programs with three primary paradigms: 1) it is possible to provide a built environment that has the highest level of performance and resiliency

in a comprehensive and cost effective manner; 2) to achieve this, all facets of the process from design to operation must be integrated; and 3) high performance and integrated design infrastructure can achieve resilience to potentially disruptive events. For example, blast resistance and security technologies have been released, and integrated rapid visual screening tools are being used to measure resiliency in addition to risk to take into account all hazards effects.

The recommendations in the next chapter describe concrete action for carrying these concepts and programs further to achieve resiliency in our nation's buildings and infrastructure.

Recommendations

Role of Government

Executive and Legislative Action Executive branch and Congressional leadership should stimulate national commitment to achieving resilient buildings and infrastructure.

Recommendations:

1. By Executive Order or Presidential Directive promote major resiliency initiatives for the use of metrics, criteria, and analysis tools for resilient design and product development through public/private collaboration, resiliency-focused research, identification of gaps, development, and demonstration activities.
2. Work with Congress to:
 - a) Update the Stafford Disaster Relief and Emergency Assistance Act⁸ to include provisions for community resiliency planning and evaluation in an all hazards approach as a prerequisite to receiving Federal grant monies, including establishing a national infrastructure bank to be used to finance resiliency projects, and
 - b) Address SAFETY Act⁹ liability issues for building designers, engineers, product manufacturers, and owners of resilient built infrastructure through validated metrics, standards, criteria, and analysis tools.

Many Federal agencies are already designing and retrofitting buildings and infrastructure with some degree of resiliency included. However, an Executive Order would serve to standardize the approaches used and provide agencies with a justification to delineate annual budget line items that address resilient design and construction. Presidential Executive Order 13514¹⁰ recently mandated the Federal leadership role for green sustainable Federal buildings. Similarly, a Presidential Executive Order promoting the use of resilient design for Federal facilities would accelerate the adoption of resiliency objectives by those design and construction firms doing business with the Federal Government.

⁸ *The Robert T. Stafford Disaster Relief and Emergency Assistance Act*, signed into law November 23, 1988, constitutes the statutory authority for most Federal disaster response activities especially as they pertain to FEMA and FEMA programs.

⁹ *The Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act)*.

¹⁰ EO 13514, “*Federal Leadership in Environmental, Energy, and Economic Performance*”, signed on October 5, 2009.

A new resiliency qualification requirement in legislation for emergency funds provided under the Stafford Act would serve to educate local communities about resilient design objectives by requiring that they be addressed in community mandatory disaster mitigation and response plans.

Federal Agency Leadership and Cooperation Current cooperation on resilience initiatives is uneven and characterized by mission-oriented silos among different Federal agencies or within the agencies themselves. Instead, they need to work together to effectively develop a coordinated and integrated approach to resiliency.

Recommendation:

3. As part of an Executive Order or Presidential Directive, DHS should take the lead with in coordination other Federal agencies in coordinating public/private collaborations, interagency cooperation, subject matter experts and academe to develop resilient designs, validated criteria, metrics, analysis tools, codes, and performance standards.

DHS has a major role in identifying research needed, developing tools and criteria, and assisting local jurisdictions in adopting new codes by providing appropriate resources and training. Guidance and support from DHS will accelerate the level of acceptance by state and local governments, communities and planning groups. DHS can lead the way in defining, promoting, and facilitating communications between the public and private sectors, bringing the perspective of each to bear in an integrative manner, and continuing to develop state-of-the-art tools and software for building professionals. Additionally, DHS can collaborate with national accreditation boards (practice and education boards) to influence state laws related to training and certification requirements. The “One DHS” approach—unifying the various agencies and directorates of the department—will send a message to owners, communities, and others that the Federal Government will act in a unified and consistent manner on policies related to resilient design.

DHS must transparently define resilience criteria for all hazards performance. This will necessitate expanding the expertise of its staff and the forging of a collaborative development effort with designers, engineers, owners, operators, building code developers, and state and local government officials. Based on detailed and validated criteria, these entities and other stakeholders can then develop the quantitative measures to assess resiliency and performance, support creation of financial incentives, or provide justification for increased valuations. This

type of guidance also will be required to introduce resiliency objectives into community-level disaster mitigation and response plans as required by the Stafford Act.

Public/Private Partnerships

Existing governmental and private sector groups are working to advance a comprehensive, integrated all hazards and high performance approach to enhance the security and resilience of buildings and infrastructure. To be more effective and avoid duplication of effort, the Federal Government and the private sector, including non-profit organizations, professional societies, and trade associations, should enhance partnerships to collaborate in defining the metrics, benchmarks, tools, and criteria needed to advance resiliency objectives and support codes and standards development for the built environment. Businesses and local and regional public/private partnerships also are essential resources to assure community involvement, and leverage to better disseminate information on resiliency and put it into practice.

Recommendations:

4. Public/Private partnerships should immediately engage in the creation of the metrics, criteria, design and economic tools, and analysis techniques necessary to develop a validated business case for integrated resilient design and provide the basis for SAFETY Act liability protection. These partnerships should continue to involve government, university, industry international experts as well as mayors of selected cities, and representatives from the National Governors Association to foster resilience for the building industry. They should leverage work previously undertaken or currently being performed (this is especially true for local or regional partnerships).
5. A Presidential Advisory Committee should be established on resiliency to take advantage of representatives from existing private sector organizations, including the Business Roundtable, U.S. Chamber of Commerce, Business Executives for National Security, Security Consensus Operational Readiness Evaluation (SCORE) network, The Infrastructure Security Partnership (TISP), and other appropriate individuals and organizations.
6. The ongoing Sector Partnership Structure (Sector Coordinating Councils and Government Coordinating Councils), administered by DHS, should engage the commercial building sector, especially insurance, banking, finance, and the codes and standards organizations, to ensure that decision-making in all sectors breaks down the “stovepipes” that bar uniform approaches and common consideration of resiliency.

Codes and Standards

Traditionally, building codes have regulated life safety issues. New building codes and standards should extend beyond life-safety aspects to include resilient design concepts in a performance-based approach as well as continuity of operations¹¹. They should rely on common and widely adopted methods of measurement, provide a flexible framework to address different facility types, address types of structures (from residential to large commercial and industrial structures), and recognize the differing levels of performance that are required. Uniform adoption of resiliency objectives by jurisdictions requires including resiliency requirements in the current model building codes, educating regulators and their constituents, and incentivizing the application, inspection, and regulation of resiliency approaches. This process begins with the development of criteria, codes, and standards that address resiliency objectives and the supporting tools and validation for their use.

Given that state and local governments have jurisdiction over building codes, the role of the Federal Government is limited in mandating changes. Opportunities do exist, however, to effect changes in zoning, local planning, and urban planning requirements by providing guidance to communities and jurisdictions on how and where to design and locate buildings and infrastructure to encourage best practices for life safety, security, resiliency, and other objectives.

Recommendations:

7. Relevant codes and standards organizations [e.g., the International Code Council (ICC), National Fire Protection Association (NFPA), and ASTM International (formerly known as the American Society for Testing and Materials) and others] should participate in an effort to support development of an integrated suite of standards, codes, and guidelines that support resiliency for buildings and infrastructure with clear guidance on design criteria and concepts.
8. The Interagency Committee on Standards Policy (ICSP) and the American National Standards Institute's Homeland Security Standards Panel (ANSI-HSSP) should coordinate the development of resiliency standards across various standards development organizations for facilities. These two organizations bring together a broad range of Federal agencies and standards development organizations necessary to ensure efficient alignment of goals and standard development responsibilities. Other groups such as the Federal Facilities Council (of the National

¹¹ The International Organization for Standardization (ISO) may provide guidance on relevant criteria.

Academies' National Research Council), and the Federal Real Property Council can provide effective venues for collaboration.

Research and Development

Research and development plays a crucial role in developing tools and techniques for improving resiliency. Universities, Federal agencies, national laboratories and centers of excellence should be engaged in the advancement of resiliency efforts.

Recommendations:

9. The Infrastructure Subcommittee of the National Science and Technology Council (NSTC) should coordinate future R&D activities across Federal agencies. The NSTC should define a research and development agenda, address gaps in existing technologies, and create the body of knowledge required to effectively integrate protection and resiliency from all hazards for buildings and infrastructure. Specifically, efforts should be undertaken to integrate resilience in the risk assessment process, including defining the desired end state. The effects of aging on the resiliency of infrastructure should be investigated to identify existing vulnerabilities. Research conducted over the last 30 years by the earthquake community is highly regarded research and should be examined.
10. The DHS Science and Technology Directorate in partnership with the U.S. Chamber of Commerce, insurance groups, and engineering societies should support R&D on the economic benefits of resilience, including the effectiveness of expenditures and return on investment.
11. DHS should establish a Center of Excellence for Resilient Design and Operations closely tied with public and private sector partners to bring focused attention to filling data needs, synthesizing existing data, focusing on tools, and conducting studies.

Design Practice and Performance Outcomes

The Nation's built environment is a central element of the Nation's economic and physical security and requires the ability to continue operations after a disaster. Essential to the built environment is implementation of superior operational and functional performance that cost-effectively integrates security, resiliency, sustainability, and occupant productivity, health, and safety factors. Practices that improve the performance of the Nation's built environment can be improved considerably. The use of integrated design teams that include building owners,

designers, engineers, procurement and budget staff, and contractors is paramount and essential to implement resilient design.

Certification programs for facilities involve third-party independent assessments to provide the owner, buyer, occupants, and community with a measure of facility performance or quality of design. These programs, with appropriate training and if properly conducted, would allow valuations of building designs to be more market-driven for attributes such as sustainability or resilience to allow faster recovery after a disruption or disaster. The most commonly recognized certification program for buildings, Leadership in Energy and Environmental Design (LEED) managed by the U.S. Green Building Council, has worldwide recognition and can act as a model for educating the building community on the benefits of resilient building design.

Recommendations:

12. An interagency memorandum of understanding (MOU) should be implemented among all Federal agencies involved in urban planning, design, construction and operations related to buildings and infrastructure.¹² The MOU should establish an Interagency Resilience Working Group to identify and share tools and best practices, and coordinate the implementation of resilient design activities for Federal buildings.
13. DHS should support state and local planning and regulatory entities to advance the application and enforcement of resilient design for buildings and infrastructure in communities.
14. Professional societies and trade organizations such as the American Society of Civil Engineers (ASCE) and the American Institute of Architects (AIA) should work to integrate resilience into design, construction and operations of buildings and infrastructure, develop resiliency assessment tools and define professional certifications for those performing physical security assessments, business impact analyses, and cyber-related resiliency functions.¹³
15. Urban and community planning and zoning organizations should develop strategies to build in resilience to all hazards for maintaining the functionality of infrastructure.
16. Certification programs should be prepared for educating professionals and implemented to assess resiliency as part of building performance. Certification

¹² Agencies that would likely participate include: DHS, DOE, VA, HHS, GSA, HUD, NIST, Army Corps, OMB, EPA, DOT, DOD and others. Such an interagency working group could be created through the NSTC or by Presidential Executive Order.

¹³ These certifications may include liability protection granted under the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act).

programs should provide incentives to the design community to promote and sustain resiliency.

Education and Outreach

There is a need to train architects, engineers and others in the building industry in resilience design and operation, both at the collegiate and professional levels. For example, the American Institute of Architects (AIA) and the American Society of Civil Engineers (ASCE) have been developing state chapter level programs for training design professionals that are a simple and inexpensive way to make the Nation and its infrastructure more resilient.

Effective outreach and communications with the myriad players in the building industry is a critical component for introducing resilient design. The high-performance green building movement is one example of a successful approach that engages stakeholders around a key issue. This effort has transformed the building products market, business community, and asset owners in the design and construction of high performance buildings.

Recommendations:

17. Educational and training curricula should be prepared for professionals and technical staff (including architects, engineers and others in the building industry) on resilient design concepts, best practices, and criteria.
18. Outreach and dissemination activities should be developed and implemented to make those in the building and infrastructure industries aware of resilience¹⁴. Public and private sector organizations should share existing work and best practices developed broadly among private sector and governmental partners.

¹⁴ One successful outreach effort could involve awards to incentivize and recognize achievements in high performance and resilient design. The Malcolm Baldrige Awards, sponsored by the National Institute of Standards and Technology to improve the competitiveness and performance of U.S. organizations, could serve as a model.

Appendix One: Attendees

Invited Participants

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Appendix Two: Agenda



U.S. Department of Homeland Security

Designing for a Resilient America: **A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure**

**The American Institute of Architects
Board Room, Second Level
1735 New York Avenue, NW
Washington, DC**

November 30-December 1, 2010

November 30

8:00 am **Registration and Coffee**
Second Floor Foyer

8:30 **Summit Welcome**

- *Henry Green, Hon. AIA, National Institute of Building Sciences*
- *Paul Welch, Jr., Hon. AIA, The American Institute of Architects*
- *Christopher Doyle, Director, Infrastructure Protection & Disaster Management Division, Science and Technology Directorate, Department of Homeland Security*

- 8:50 **Welcome on Behalf of the Department of Homeland Security**
- *David Heyman, Assistant Secretary, Office of Policy, Department of Homeland Security*
- 9:20 **Creating a Culture of Resilience**
- *Brian Kamoie, JD, MPH, Senior Director for Preparedness Policy, National Security Staff, The White House*
- 10:00 **Break**
- 10:20 **Overview of Resilience Programs within DHS**
Department of Homeland Security, *Moderated by: David Kaufman Director, Office of Policy and Program Analysis, FEMA*
- *National Protection and Programs Directorate, Sue Armstrong, Deputy Assistant Secretary, Office of Infrastructure Protection; Rich Marshall, Director, Global Cyber Security Management, National Cyber Security Division*
 - *Science and Technology Directorate, Christopher Doyle, Director, Infrastructure Protection & Disaster Management Division*
 - *Federal Emergency Management Agency, Sandra Knight, Deputy Federal Insurance and Mitigation Administrator*
- 11:20 **Overview of Resilience Programs at Federal Agencies**
- *General Services Administration, Charles Matta, Director, Strategic Programs & Professional Resources, Public Buildings Service*
 - *National Institute of Standards and Technologies, S. Shyam Sunder, Director, Engineering Laboratory*
- 11:50 **Rebuilding a Resilient America**
- *Stephen E. Flynn, President of the Center for National Policy and CISAC Consulting Professor*
- 12:30 pm **Lunch**
- 1:20 **Principles of High Performance Integrated Design**
- *Get Moy, Vice President, AECOM and Chairman, High-Performance Building Council, NIBS*

- 1:50 **Overview of Resilience Programs at Federal Agencies (Cont)**
- *Department of Veterans Affairs, Lloyd Siegel, Director, Strategic Management, Office of Construction & Facilities Management*
 - *Army Corps of Engineers, Stacey Hirata, Chief, Installation Support & Public Works Sector, Critical Infrastructure Assurance*
- 2:50 **Break**
- 3:15 **Introduction to Working Group Objectives and Procedures**
- 3:30 **Working Group Session I: Understanding the Issues**
 Working groups develop commentary on issues of resilience for buildings and related infrastructure
- *Attributes of resilience for buildings and infrastructure*
 - *Integration and interdependencies of resilience with security, energy, environmental and other building requirements*
 - *Identification of design and construction practice issues*
 - *Identification of institutional and organizational interactions (government, industry and academe)*
 - *Identification of interdependencies and issues at the intersection between natural and human-caused hazards and sustainability for buildings and related infrastructure*
 - *Identification of issues at the intersection between physical and cyber security*
- 5:30 **Recess**
- 7:00 **Optional Dinner (on own) at PJ Clarke’s Restaurant, 1600 K Street, NW, Washington**

December 1

- 8:30 am **Welcome**

- 8:40 **Case Study—An Integrated Approach to Resiliency in Arlington County**
- *Michael Chipley, President, The PMC Group LLC*
 - *Charlotte Franklin, Deputy Coordinator, Resiliency, Preparedness, Partnerships, Arlington Office of Emergency Management*
- 9:10 **Working Groups Report Out from Session I**
- 9:50 **Break**
- 10:10 **Working Group Session II: Developing Strategies for Integrating Resilience into Buildings and Related Infrastructure**
- Working groups develop commentary on how to incorporate resilience into buildings, related infrastructure, and other aspects identified by the first working group sessions.
- *Codes and standards, public and private incentives, Federal criteria and guidelines, other regulatory means*
 - *Validation and certification programs and metrics to evaluate*
 - *Improving design and construction practice to achieve high performing buildings and infrastructure*
 - *Federal interagency cooperation to foster resilience for buildings and infrastructure such as an interagency memorandum of understanding*
 - *Encouraging partnerships among all levels of government, industry and academe*
 - *Interdependencies including resilience for cyber communication within the physical environment*
- 12:00 noon **Lunch**
- Case Study--New DHS Headquarters at St. Elizabeth's**
- *Jane Engvall, AIA, Chief Architect, Headquarters Consolidation, DHS CAO Headquarters Management & Development and Gill Thompson, Chief, HQ Physical Security Division, DHS*
- 1:00 pm **Working Groups Report Out from Session II**

1:40

Working Group Session III: Moving the Agenda Forward

Working groups discuss and develop recommendations for moving forward. Groups focus on developing 3-5 recommendations that could be sent forward for implementation. Subjects may include:

- *Improving Federal interagency cooperation*
- *Developing and implementing an interagency MOU*
- *Developing and implementing verification and certification initiative*
- *Developing a strong business case portfolio*
- *Developing public and private incentives*
- *Augmenting outreach and dissemination programs*
- *Making institutional and policy changes to enhance resilience*

3:00

Working Groups Report Out

3:40

Summit Summary

4:00

Adjourn

DESIGNING FOR A RESILIENT AMERICA

**A Stakeholder Summit on
High Performance Resilient Buildings and Related Infrastructure**

Sponsored by

**The U.S. Department of Homeland Security
Science and Technology Directorate
Infrastructure Protection and Disaster Management Division
High Performance Integrated Design Resilience Program**

Planning by

**The U.S. Department of Homeland Security
Office of Policy Development**

Organized by

The National Institute of Building Sciences

Held at

The American Institute of Architects

Washington, DC

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Disclaimer

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Executive Summary

Given the gravity of manmade and natural hazard events of the last decade, designing buildings that not only offer resistance, but continue to function after a catastrophic event are significant challenges to government and the building industry. The National Infrastructure Advisory Council (NIAC) has recommended better understanding of the role of design and construction in infrastructure resilience. At the recently held *Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure*, national hazards and building experts developed comprehensive recommendations for increasing resiliency in six areas. These need the attention of the highest levels of government - the President, Congress and ranking staff of the Department of Homeland Security and other Federal agencies.

Role of Government

An Executive Order or Presidential Directive is needed to promote major resiliency initiatives and research. The Department of Homeland Security (DHS) should be directed to take the lead with other Federal agencies for developing resiliency designs, criteria, metrics, tools, codes, and performance standards. The Stafford Disaster Relief and Emergency Assistance Act and the SAFETY Act should be updated to include provisions for all hazards and resiliency.

Public/Private Partnerships

Public/private partnerships should increase coordinated action, and support resiliency legislation, and development of criteria and guidelines. A Presidential Advisory Committee should be established with broad representation from business.

Codes and Standards

Codes and standards organizations and relevant Federal committees should participate in an effort to support development of an integrated suite of code and standard provisions that integrate resilience into design, construction and operations of buildings and infrastructure.

Research and Development

Federal agencies should coordinate future research and development (R&D) activities, including supporting R&D on the economic benefits of resilience, and establish a DHS Center of Excellence for collecting and analyzing data, and for supporting studies.

Design Practice and Performance Outcomes

Federal agencies, states, professional societies and communities should advance the application, enforcement, and certification of resilient design for buildings and infrastructure.

Education and Outreach

Resilience education and training curricula written by professional organizations, and outreach developed by all those involved in promoting resiliency should be prepared for professionals and technical staff in the building industry.

Introduction

The World Trade Center Towers, the Murrah Federal Building in Oklahoma City and Hurricane Katrina are just three reminders of how manmade and natural hazard events in the United States can rapidly destroy buildings and generate casualties. Many other examples of buildings destroyed by manmade hazards are found in the Global Terrorism Database¹. Additional destruction by hurricanes, just one of the potential deadly natural disasters, is catalogued over time by NOAA². Buildings are central to the lives of U.S. citizens who work, live, worship, heal, or recreate in some form. Over the past decade, the U.S. Government has focused on improving the security and resiliency of the nation's buildings and related infrastructure. Following the September 11 attacks of 2001, much of that emphasis was on protecting Federal and high-risk facilities. In more recent years, especially following Hurricane Katrina in 2005, this priority has expanded to making all buildings more resilient to both manmade and natural disasters.

Designing buildings that can resist hazards and continue to provide their primary functions (e.g., safe shelter and critical operations) after all types of destructive events is a major challenge to the design professions, the owners and operators of buildings, and those in Federal, state and local governments responsible for homeland security. A measure of the need for resilience is expressed in the sheer size of our building inventory. There were nearly five million commercial buildings in the United States in 2003³ and nearly 130 million units of housing stock in 2009⁴. The Federal Government, the largest owner of structures in the country, owns over half a million buildings⁵.

The National Infrastructure Advisory Council (NIAC) provides the President of the United States, through the Secretary of Homeland Security, with advice on the security of the 18 critical infrastructure sectors and their information systems. The Council has recognized that:

Government should endeavor to better understand the role of design and construction in infrastructure resilience. Application of this understanding will help to shape the policy, R&D funding, and incentives that can spur technological innovation as well as the robust design and construction of critical infrastructures needed for resilience⁶.

¹ <http://www.start.umd.edu/gtd/>

² Eric S. Blake, Edward N. Rappaport, Christopher W. Landsea (2007-04-15). *The Deadliest Costliest and Most Intense United States Tropical Cyclones from 1851 to 2006 (and other frequently requested hurricane facts)*, National Hurricane Center, National Oceanic and Atmospheric Administration.

³ <http://www.eia.doe.gov/emeu/cbecs2003/introduction.html>. *2003 Commercial Buildings Energy Consumption Survey—Overview of Commercial Buildings Characteristics*. Energy Information Administration.

⁴ U.S. Census Bureau, *State & County Quick Facts*.

⁵ U.S. Green Building Council, Flier for Government Summit 2011: *Fuel for a Clean Energy Economy*.

⁶ The National Infrastructure Advisory Council, *Critical Infrastructure Resilience: Final Report and Recommendations*, September 2009, p. 26.

The NIAC has defined resilient infrastructure thusly:

*Infrastructure resilience has the ability to reduce the magnitude and/or duration of disruptive events. The effectiveness of a resilient infrastructure or enterprise depends upon its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event.*⁷

With the President's Council highlighting the need for improved resilience, it became clear that before Federal agencies and industry could fully tackle the issue, there needed to be an understanding of the current state of the nation's infrastructure and a roadmap of what needed to be done to achieve infrastructure resilience.

This challenge was the basis for convening *Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure*. The Summit, held on November 30-December 1, 2010, at the American Institute of Architects Headquarters in Washington, D.C., was attended by 82 experts from the building industry, Federal agencies, state and local governments, universities, and professional and trade organizations. (Please see the appendices for the agenda and list of participants.)

The timeliness of the Summit was underscored when President Barack Obama officially proclaimed December *Critical Infrastructure Protection Month* on the same day that the Summit began. In doing so, the President reaffirmed that critical infrastructure protection is an essential element of a resilient and secure nation. The proclamation demonstrated his commitment, and the nation's, to delivering the information, tools and resources necessary to ensure that essential infrastructure is secure and capable of withstanding disruption.

This report is intended to bring the collective recommendations from *Designing for a Resilient America* to the President, members of Congress and senior representatives from Federal Government Departments and Agencies, and to issue a call for action by government and industry to address the critical requirements of resiliency. Eighteen specific recommendations that resulted from the Summit follow in the next chapter.

Beyond this report, organizations represented by participants at the Summit with a stake in resiliency will continue to present these recommendations to key decision makers. In the near term, the participants will develop a framework for coordinating short-, medium-, and long-term objectives with attendant timelines. Short-term objectives will emphasize leveraging existing best practices, partnerships and outreach activities; medium-term will emphasize the development of performance metrics, and new practices; and long-term objectives will emphasize applying lessons learned, and the evaluation of economic benefits.

⁷ The National Infrastructure Advisory Council, *Critical Infrastructure Resilience: Final Report and Recommendations*, September 2009, p. 8.

Overview of Resilient Design

Designing for a Resilient America: A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure focused on understanding issues concerning the resilience of buildings and related infrastructure, and discerning possible strategies for the Federal departments and agencies to pursue in creating a resilient America. Many speakers at the Summit addressed the resilience of U.S. buildings and infrastructure against manmade attacks and natural hazard events with four design-related approaches: high performance, codes and standards, continuity of operations, and integrated design. These approaches support resilience in buildings through promoting good initial design and construction for new facilities, effective retrofit for existing facilities, and appropriate operational programs to ensure that mitigation plans are in place, and building systems operate as required.

High Performance

In 2007, the U.S. Congress passed the Energy Independence and Security Act (EISA) of 2007 (Public Law 110-140), which defines high performance as “the integration and optimization on a life cycle basis of all major high performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality and operational considerations.” The positive attention surrounding this important law provides the public and private sectors with opportunities to promote the integration, compilation, and harmonization of building standards to ensure acceptable and appropriate levels of performance based on requirements for buildings to withstand all hazards.

Since then, high performance requirements that affect resiliency for buildings have come under development, for example, through the initiation of an advanced materials program that provides for the coordination and cooperation of Federal laboratories and universities to develop new advanced materials and products that exhibit comprehensive high-performance attributes, and can be used to increase the performance levels of the built environment. In addition, programs are being directed at developing metrics, benchmarks, validation standards and verification methods for measuring high performance and providing high-performance based design guidance and standards to the design and engineering communities.

Codes and Standards

A principal consideration of the Summit was that U.S. building codes and standards set minimum requirements, primarily for health and life safety, that are well-established and enforced by thousands of jurisdictions across the country backed by state legislation. Such regulations are met by substantial portions of the design, construction and manufacturing communities. However, building owners and developers have few compelling reasons to

require buildings to exceed these minimum levels of performance. Since higher level resilience is not currently incorporated in these minimum requirements, there is limited design guidance available to the building community on providing enhanced safety to the built environment. In response new institutions, standards initiatives, regulations writing, and requirements for financing are starting to incorporate resilience and high performance factors into the design and construction process.

Continuity of Operations

Resiliency is significantly related not just to the ability to reduce the magnitude and duration of disruptive events, but the ability to maintain critical operations and functions in the face of crisis, to respond and manage a crisis or disruption as it unfolds, and to return to and reconstitute normal operations as quickly and efficiently as possible after a disruptive event. The ability to anticipate acts of terrorism or disasters, to plan for those in systematic ways, and to implement means of rapid recovery is the most recent evolution in building practices and processes, and decision-making. Additional adjustments in codes and standards are needed to guarantee the continued operation of critical buildings and infrastructure, e.g., 24-hour critical care hospitals, the highways and bridges critical to evacuation plans, and the government facilities integral to the operations and security of the homeland. The continued operation of resilient critical facilities will save lives and have enormous cost savings in the aftermath of a destructive event.

Integrated Design

There is a national need to work toward designing the nation's infrastructure in an integrated way to withstand all hazards (natural and man-made), taking into account high performance and continuity of operations, to support rapid recovery from a disruptive event. Integrated design and urban planning are being achieved through rapid and inexpensive assessment of the anticipated all-hazards performance of the built environment and using these results in developing standards and guidance for providing enhanced building and infrastructure protection. Such a process allows for the design of a built environment that meets the full and comprehensive range of performance attributes at the highest levels and in the most cost effective manner.

Federal Agency Involvement with Resiliency

DHS, the General Services Administration, the Department of Veteran Affairs, and many other Federal Government departments and agencies have provided positive attention to these four important concepts. The DHS in particular has had the opportunity to support programs with three primary paradigms: 1) it is possible to provide a built environment that has the highest level of performance and resiliency in a comprehensive and cost effective manner; 2) to achieve

this, all facets of the process from design to operation must be integrated, and 3) high performance and integrated design infrastructure can achieve resilience to potentially disruptive events. For example, blast resistance and security technologies have been released, and integrated rapid visual screening tools are being used to measure resiliency in addition to risk to take into account all hazards effects.

The recommendations in the next chapter describe concrete action for carrying these concepts and programs further to achieve resiliency in our nation's buildings and infrastructure.

Recommendations

Role of Government

Executive and Legislative Action Executive branch and Congressional leadership should stimulate national commitment to achieving resilient buildings and infrastructure.

Recommendations:

1. By Executive Order or Presidential Directive promote major resiliency initiatives for the use of metrics, criteria, and analysis tools for resilient design and product development through public/private collaboration, resiliency-focused research, identification of gaps, development, and demonstration activities.
2. Work with Congress to:
 - a) Update the Stafford Disaster Relief and Emergency Assistance Act⁸ to include provisions for community resiliency planning and evaluation in an all hazards approach as a prerequisite to receiving Federal grant monies, including establishing a national infrastructure bank to be used to finance resiliency projects, and
 - b) Address SAFETY Act⁹ liability issues for building designers, engineers, product manufacturers, and owners of resilient built infrastructure through validated metrics, standards, criteria, and analysis tools.

Many Federal agencies are already designing and retrofitting buildings and infrastructure with some degree of resiliency included. However, an Executive Order would serve to standardize the approaches used and provide agencies with a justification to delineate annual budget line items that address resilient design and construction. Presidential Executive Order 13514¹⁰ recently mandated the Federal leadership role for green sustainable Federal buildings. Similarly, a Presidential Executive Order promoting the use of resilient design for Federal facilities would accelerate the adoption of resiliency objectives by those design and construction firms doing business with the Federal Government.

⁸ *The Robert T. Stafford Disaster Relief and Emergency Assistance Act*, signed into law November 23, 1988, constitutes the statutory authority for most Federal disaster response activities especially as they pertain to FEMA and FEMA programs.

⁹ *The Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act)*.

¹⁰ EO 13514, "Federal Leadership in Environmental, Energy, and Economic Performance", signed on October 5, 2009.

A new resiliency qualification requirement in legislation for emergency funds provided under the Stafford Act would serve to educate local communities about resilient design objectives by requiring that they be addressed in community mandatory disaster mitigation and response plans.

Federal Agency Leadership and Cooperation Current cooperation on resilience initiatives is uneven and characterized by mission-oriented silos among different Federal agencies or within the agencies themselves. Instead, they need to work together to effectively develop a coordinated and integrated approach to resiliency.

Recommendation:

3. As part of Executive Order or Presidential Directive, DHS should take the lead with other Federal agencies in coordinating public/private collaborations, interagency cooperation, subject matter experts and academe to develop resilient designs, validated criteria, metrics, analysis tools, codes, and performance standards.

DHS has a major role in identifying research needed, developing tools and criteria, and assisting local jurisdictions in adopting new codes by providing appropriate resources and training. Guidance and support from DHS will accelerate the level of acceptance by state and local governments, communities and planning groups. DHS can lead the way in defining, promoting, and facilitating communications between the public and private sectors, bringing the perspective of each to bear in an integrative manner, and continuing to develop state-of-the-art tools and software for building professionals. Additionally, DHS can collaborate with national accreditation boards (practice and education boards) to influence state laws related to training and certification requirements. The “One DHS” approach—unifying the various agencies and directorates of the department—will send a message to owners, communities and others that the Federal Government will act in a unified and consistent manner on policies related to resilient design.

DHS must transparently define resilience criteria for all hazards performance. This will necessitate expanding the expertise of its staff and the forging of a collaborative development effort with designers, engineers, owners, operators, building code developers, and state and local government officials. Based on detailed and validated criteria, these entities and other stakeholders can then develop the quantitative measures to assess resiliency and performance, support creation of financial incentives, or provide justification for increased valuations. This type of guidance also will be required to introduce resiliency objectives into community-level disaster mitigation and response plans as required by the Stafford Act.

Public/Private Partnerships

Existing governmental and private sector groups are working to advance a comprehensive, integrated all hazards and high performance approach to enhance the security and resilience of buildings and infrastructure. To be more effective and avoid duplication of effort, the Federal Government and the private sector, including non-profit organizations, professional societies, and trade associations, should enhance partnerships to collaborate in defining the metrics, benchmarks, tools, and criteria needed to advance resiliency objectives and support codes and standards development for the built environment. Businesses and local and regional public/private partnerships also are key resources to assure community involvement, and leverage to better disseminate information on resiliency and put it into practice.

Recommendations:

4. Public/Private partnerships should immediately engage in the creation of the metrics, criteria, design and economic tools, and analysis techniques necessary to develop a validated business case for integrated resilient design and provide the basis for Safety Act liability protection. These partnerships should continue to involve government, university, industry international experts as well as mayors of selected cities, and representatives from the National Governors Association to foster resilience for the building industry. They should leverage work previously undertaken or currently being performed (this is especially true for local or regional partnerships).
5. A Presidential Advisory Committee should be established on resiliency to take advantage of representatives from existing private sector organizations, including the Business Roundtable, the U.S. Chamber of Commerce, Business Executives for National Security, the Security Consensus Operational Readiness Evaluation (SCORE) network, The Infrastructure Security Partnership (TISP), and other appropriate individuals and organizations.
6. The ongoing Sector Partnership Structure (Sector Coordinating Councils and Government Coordinating Councils), administered by DHS should engage the commercial building sector, especially insurance, banking, finance, and the codes and standards organizations, to ensure that decision-making in all sectors breaks down the “stovepipes” that bar uniform approaches and common consideration of resiliency.

Codes and Standards

Traditionally, building codes have regulated life safety issues. New building codes and standards should extend beyond life-safety aspects to include resilient design concepts in a performance-based approach as well as continuity of operations¹¹. They should rely on common and widely adopted methods of measurement, provide a flexible framework to address different facility types, and address types of structures (from residential to large commercial and industrial structures), and recognize the differing levels of performance that are required. Uniform adoption of resiliency objectives by jurisdictions requires including resiliency requirements in the current model building codes, educating regulators and their constituents, and incentivizing the application, inspection, and regulation of resiliency approaches. This process begins with the development of criteria, codes, and standards that address resiliency objectives and the supporting tools and validation for their use.

Given that state and local governments have jurisdiction over building codes, the role of the Federal Government is limited in mandating changes. Opportunities do exist, however, to effect changes in zoning, local planning, and urban planning requirements by providing guidance to communities and jurisdictions on how and where to design and locate buildings and infrastructure to encourage best practices for life safety, security, resiliency, and other objectives.

Recommendations:

7. Relevant codes and standards organizations such as the International Code Council (ICC), the National Fire Protection Association (NFPA), and ASTM International (formerly known as the American Society for Testing and Materials) and others should participate in an effort to support development of an integrated suite of standards, codes, and guidelines that support resiliency for buildings and infrastructure with clear guidance on design criteria and concepts.
8. The Interagency Committee on Standards Policy (ICSP) and the American National Standards Institute's Homeland Security Standards Panel (ANSI-HSSP) should coordinate the development of resiliency standards across various standards development organizations for facilities. These two organizations bring together a broad range of Federal agencies and standards development organizations necessary to ensure efficient alignment of goals and standard development responsibilities. Other groups such as the Federal Facilities Council (of the National Academies' National Research Council), and the Federal Real Property Council can provide effective venues for collaboration.

¹¹ The International Organization for Standardization (ISO) may provide guidance on relevant criteria.

Research and Development

Research and development plays a crucial role in developing tools and techniques for improving resiliency. Universities, Federal agencies, national laboratories and centers of excellence should be engaged in the advancement of resiliency efforts.

Recommendations:

9. The Infrastructure Subcommittee of the National Science and Technology Council (NSTC) should coordinate future R&D activities across Federal agencies. The NSTC should define a research and development agenda, address gaps in existing technologies, and create the body of knowledge required to effectively integrate protection and resiliency from all hazards for buildings and infrastructure. Specifically, efforts should be undertaken to integrate resilience in the risk assessment process, including defining the desired end state. The effects of aging on the resiliency of infrastructure should be investigated to identify existing vulnerabilities. Research conducted over the last 30 years by the earthquake community is highly regarded research and should be examined.
10. The DHS Science and Technology Directorate in partnership with the U.S. Chamber of Commerce, insurance groups, and engineering societies should support R&D on the economic benefits of resilience, including the effectiveness of expenditures and return on investment.
11. DHS should establish a Center of Excellence for Resilient Design and Operations closely tied with public and private sector partners to bring focused attention to filling data needs, synthesizing existing data, focusing on tools, and conducting studies.

Design Practice and Performance Outcomes

The nation's built environment is a central element of the nation's economic and physical security and requires the ability to continue operations after a disaster. Essential to the built environment is implementation of superior operational and functional performance that cost-effectively integrates security, resiliency, sustainability, and occupant productivity, health, and safety factors. Practices that improve the performance of the nation's built environment can be improved considerably. The use of integrated design teams that include building owners, designers, engineers, procurement and budget staff, and contractors is paramount and essential to implement resilient design.

Certification programs for facilities involve third-party independent assessments to provide the owner, buyer, occupants, and community with a measure of facility performance or quality of design. These programs, with appropriate training and if properly conducted, would allow valuations of building designs to be more market-driven for attributes such as sustainability or resilience to allow faster recovery after a disruption or disaster. The most commonly recognized certification program for buildings, Leadership in Energy & Environmental Design (LEED) managed by the U.S. Green Building Council, has worldwide recognition and can act as a model for educating the building community on the benefits of resilient building design.

Recommendations:

12. An interagency memorandum of understanding (MOU) should be implemented among all Federal agencies involved in urban planning, design, construction and operations related to buildings and infrastructure.¹² The MOU should establish an Interagency Resilience Working Group to identify and share tools and best practices, and coordinate the implementation of resilient design activities for Federal buildings.
13. DHS should support state and local planning and regulatory entities to advance the application and enforcement of resilient design for buildings and infrastructure in communities.
14. Professional societies and trade organizations such as the American Society of Civil Engineers (ASCE) and the American Institute of Architects (AIA) should work to integrate resilience into design, construction and operations of buildings and infrastructure, develop resiliency assessment tools and define professional certifications for those performing physical security assessments, business impact analyses, and cyber-related resiliency functions.¹³
15. Urban and community planning and zoning organizations should develop strategies to build in resilience to all hazards for maintaining the functionality of infrastructure.
16. Certification programs should be prepared for educating professionals and implemented to assess resiliency as part of building performance. Certification programs should provide incentives to the design community to promote and sustain resiliency.

¹² Agencies that would likely participate include: DHS, DOE, VA, HHS, GSA, HUD, NIST, Army Corps, OMB, EPA, DOT, DOD and others. Such an interagency working group could be created through the National Science and Technology Council or by Presidential Executive Order.

¹³ These certifications may include liability protection granted under the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act).

Education and Outreach

There is a need to train architects, engineers and others in the building industry in resilience design and operation, both at the collegiate and professional levels. For example, the American Institute of Architects (AIA) and the American Society of Civil Engineers (ASCE) have been developing state chapter level programs for training design professionals that are a simple and inexpensive way to make the nation and its infrastructure more resilient.

Effective outreach and communications with the myriad players in the building industry is a critical component for introducing resilient design. The high-performance green building movement is one example of a successful approach that engages stakeholders around a key issue. This effort has transformed the building products market, business community, and asset owners in the design and construction of high performance buildings.

Recommendations:

17. Educational and training curricula should be prepared for professionals and technical staff (including architects, engineers and others in the building industry) on resilient design concepts, best practices, and criteria.
18. Outreach and dissemination activities should be developed and implemented to make those in the building and infrastructure industries aware of resilience¹⁴. Public and private sector organizations should share existing work and best practices developed broadly among private sector and governmental partners.

¹⁴ One successful outreach effort could involve awards to incentivize and recognize achievements in high performance and resilient design. The Malcolm Baldrige Awards, sponsored by the National Institute of Standards and Technology to improve the competitiveness and performance of U.S. organizations, could serve as a model.

Appendix One: Attendees

Invited Participants

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Deputy Assistant Secretary
Office of Infrastructure Protection
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Directorate
Department of Homeland Security

Michael Chipley
President
The PMC Group LLC

Christopher Doyle
Director
Infrastructure Protection & Disaster
Management Division
Science and Technology Directorate
Department of Homeland Security

Jane Engvall, AIA
Chief Architect
Headquarters Consolidation, DHS CAO
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Stephen E. Flynn
President
Center for National Policy
CISAC Consulting Professor

Charlotte Franklin
Deputy Coordinator
Resiliency, Preparedness, Partnerships
Arlington Office of Emergency Management

Henry Green, Hon. AIA
President
National Institute of Building Sciences

David Heyman
Assistant Secretary
Office of Policy
Department of Homeland Security

Stacey K. Hirata
Chief, Installation Support Community
HQ-USACE

Brian Kamoie, JD, MPH
Senior Director for Preparedness Policy
National Security Staff
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David Kaufman
Director
Office of Policy and Program Analysis
Federal Emergency Management Agency
Department of Homeland Security

Sandra Knight
Deputy Federal Insurance and Mitigation
Administrator
Federal Emergency Management Agency
Department of Homeland Security

Richard Marshall
Director, Global Cyber Security
Management National Cyber Security
Division
National Protectorate and Programs
Directorate
Department of Homeland Security

Charles Matta
Director
Strategic Programs & Professional
Resources
Public Buildings Service
General Services Administration

Get Moy
Vice President
Program Management
AECOM

Lloyd Siegel
Director
Strategic Management
Office of Construction & Facilities
Management
Department of Veterans Affairs

S. Shyam Sunder
Director
Engineering Laboratory
National Institute of Standards and
Technologies

Paul Welch, Hon. AIA
Acting Executive Vice President/CEO
The American Institute of Architects

Appendix Two: Agenda



U.S. Department of Homeland Security

Designing for a Resilient America: **A Stakeholder Summit on High Performance Resilient Buildings and Related Infrastructure**

The American Institute of Architects
Board Room, Second Level
1735 New York Avenue, NW
Washington, DC

November 30-December 1, 2010

November 30

8:00 am **Registration and Coffee**
Second Floor Foyer

8:30 **Summit Welcome**

- *Henry Green, Hon. AIA, National Institute of Building Sciences*
- *Paul Welch, Jr., Hon. AIA, The American Institute of Architects*
- *Christopher Doyle, Director, Infrastructure Protection & Disaster Management Division, Science and Technology Directorate, Department of Homeland Security*

- 8:50 **Welcome on Behalf of the Department of Homeland Security**
- *David Heyman, Assistant Secretary, Office of Policy, Department of Homeland Security*
- 9:20 **Creating a Culture of Resilience**
- *Brian Kamoie, JD, MPH, Senior Director for Preparedness Policy, National Security Staff, The White House*
- 10:00 **Break**
- 10:20 **Overview of Resilience Programs within DHS**
 Department of Homeland Security, *Moderated by: David Kaufman Director, Office of Policy and Program Analysis, FEMA*
- *National Protectorate and Programs Directorate, Sue Armstrong, Deputy Assistant Secretary, Office of Infrastructure Protection; Rich Marshall, Director, Global Cyber Security Management, National Cyber Security Division*
 - *Science and Technology Directorate, Christopher Doyle, Director, Infrastructure Protection & Disaster Management Division*
 - *Federal Emergency Management Agency, Sandra Knight, Deputy Federal Insurance and Mitigation Administrator*
- 11:20 **Overview of Resilience Programs at Federal Agencies**
- *General Services Administration, Charles Matta, Director, Strategic Programs & Professional Resources, Public Buildings Service*
 - *National Institute of Standards and Technologies, S. Shyam Sunder, Director, Engineering Laboratory*
- 11:50 **Rebuilding a Resilient America**
- *Stephen E. Flynn, President of the Center for National Policy and CISAC Consulting Professor*
- 12:30 pm **Lunch**
- 1:20 **Principles of High Performance Integrated Design**
- *Get Moy, Vice President, AECOM and Chairman, High-Performance Building Council, NIBS*

- 1:50 **Overview of Resilience Programs at Federal Agencies (Cont.)**
- *Department of Veterans Affairs, Lloyd Siegel, Director, Strategic Management, Office of Construction & Facilities Management*
 - *Army Corps of Engineers, Stacey Hirata, Chief, Installation Support & Public Works Sector, Critical Infrastructure Assurance*
- 2:50 **Break**
- 3:15 **Introduction to Working Group Objectives and Procedures**
- 3:30 **Working Group Session I: Understanding the Issues**
 Working groups develop commentary on issues of resilience for buildings and related infrastructure
- *Attributes of resilience for buildings and infrastructure*
 - *Integration and interdependencies of resilience with security, energy, environmental and other building requirements*
 - *Identification of design and construction practice issues*
 - *Identification of institutional and organizational interactions (government, industry and academe)*
 - *Identification of interdependencies and issues at the intersection between natural and human-caused hazards and sustainability for buildings and related infrastructure*
 - *Identification of issues at the intersection between physical and cyber security*
- 5:30 **Recess**
- 7:00 **Optional Dinner (on own) at PJ Clarke’s Restaurant, 1600 K Street, NW, Washington**

December 1

- 8:30 am **Welcome**

- 8:40 **Case Study—An Integrated Approach to Resiliency in Arlington County**
- *Michael Chipley, President, The PMC Group LLC*
 - *Charlotte Franklin, Deputy Coordinator, Resiliency, Preparedness, Partnerships, Arlington Office of Emergency Management*
- 9:10 **Working Groups Report Out from Session I**
- 9:50 **Break**
- 10:10 **Working Group Session II: Developing Strategies for Integrating Resilience into Buildings and Related Infrastructure**
- Working groups develop commentary on how to incorporate resilience into buildings, related infrastructure, and other aspects identified by the first working group sessions.
- *Codes and standards, public and private incentives, Federal criteria and guidelines, other regulatory means*
 - *Validation and certification programs and metrics to evaluate*
 - *Improving design and construction practice to achieve high performing buildings and infrastructure*
 - *Federal interagency cooperation to foster resilience for buildings and infrastructure such as an interagency memorandum of understanding*
 - *Encouraging partnerships among all levels of government, industry and academe*
 - *Interdependencies including resilience for cyber communication within the physical environment*
- 12:00 noon **Lunch**
- Case Study--New DHS Headquarters at St. Elizabeth's**
- *Jane Engvall, AIA, Chief Architect, Headquarters Consolidation, DHS CAO Headquarters Management & Development and Gill Thompson, Chief, HQ Physical Security Division, DHS*
- 1:00 pm **Working Groups Report Out from Session II**

1:40

Working Group Session III: Moving the Agenda Forward

Working groups discuss and develop recommendations for moving forward. Groups focus on developing 3-5 recommendations that could be sent forward for implementation. Subjects may include:

- *Improving Federal interagency cooperation*
- *Developing and implementing an interagency MOU*
- *Developing and implementing verification and certification initiative*
- *Developing a strong business case portfolio*
- *Developing public and private incentives*
- *Augmenting outreach and dissemination programs*
- *Making institutional and policy changes to enhance resilience*

3:00

Working Groups Report Out

3:40

Summit Summary

4:00

Adjourn