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Letter to the President

Dear Mr. President:

Throughout the two terms of your Administration, the National Institute of Building Sciences has reported on the activities of our councils, committees and projects to improve the built environment in the United States. The Institute's work is forged in a theme that advances high performance and advocates increased resilience—not only for our buildings, but for the nation's communities as a whole.

During the past year, the Institute has endeavored to further this discussion and to promote a broader understanding of how increased resilience can benefit our communities in the event of a natural or man-caused disaster. With climate change triggering a growing number of disasters around the world, it is imperative that more resilience measures be taken to improve our built environment, thereby lessening the potential loss of life and property and reducing the recovery time it takes for communities to get back to their normal routines. That is why Building Innovation 2015: The National Institute of Building Sciences Third Annual Conference & Expo focused on Creating High-Performing Resilient Communities, and the theme of Building Innovation 2016 will be Achieving a Resilient Future. Through these events, we strive to expand the resilience conversation and get people engaged in addressing this immensely important topic.

At the same time, the findings of our councils and committees—which are highlighted in this report and categorized within four areas: Industry Leadership & Advocacy; Security & Disaster Preparedness; Facility Performance & Sustainability; and Information Resources & Technology—form the foundation upon which we base our discussion of improving building performance. The work of our councils and committees encompasses the full breadth of building sciences. As you will see in the pages that follow, our work is impressive and covers an expansive number of building-related topics. The Coordinating Council, which is made up of the chairs and vice chairs of each of the various standing councils and committees, provides the means for these program areas to work in unison and allows for information dissemination and better collaboration across all sectors of the building community.

In addition to the work of our councils and committees within specific areas of expertise, the Institute also works across disciplines to help advance the realization of an industry that can deliver high-performance buildings and communities.

As part of our ongoing work to advance building performance and outcomes, the Institute led a multi-year industry effort to develop an outcome-based compliance path for energy use and to get that provision included in the nation's building safety codes. By nature, building energy codes focus on the design of buildings and not their measured performance. The outcome-based compliance path sets targets for energy consumption and determines compliance through the building's actual achievement during operation. This new language, written by the Institute, went through the International Code Council's code development process and was published in the 2015 International Green Construction Code. A similar provision is currently in the process of being considered for the 2018 International Energy Conservation Code. The concepts of outcome- and performance-based policies and contracts were further advanced by a 2014 workshop conducted with the New Buildings Institute. The report from that workshop was released in 2015.

Based on growing concerns regarding the availability of a skilled workforce in the building industry and the long-standing desire to improve workforce productivity, in September 2015 the Institute conducted a Representative Hearing on Productivity and the Workforce. A total of 16 representatives from across the industry provided testimony. The Institute is in the process of compiling the recommendations into a report. A related infographic featuring the broad recommendations will be released at Building Innovation 2016.

Working with the Royal Institution of Chartered Surveyors (RICS), the Institute also undertook an initiative in 2015 to examine the potential opportunities and challenges surrounding the use of public-private partnerships (P3s) to advance building life-cycle performance and address potential financing opportunities. A summary from the first roundtable on the topic will be released at Building Innovation 2016 and a follow-up discussion is schedule for the RICS Conference in April 2016.
Codes, the work force and P3s are just some of the topics that appear in the *Moving Forward Report* at the end of this Annual Report. Developed by our Consultative Council each year, the *Moving Forward Report* includes findings and recommendations about those topics that are of most pressing concern to the building industry. The 2015 report addresses: Resilience and a Changing Climate; Aligning Government and Business to Deliver a Cost-Effective High-Performance Built Environment; and Building the Workforce. The report includes specific recommendations for each of these areas to achieve the goals established by policymakers, the public and the industry itself.  

You may notice that this year's report is shorter than past years. In the age of sound bites and Twitter feeds, we decided to shorten the length of our 40 program overviews. (A 40 page book may not sound small, but it is a 23% reduction from last year.) As always, if you would like additional information, please don't hesitate to go to our website at www.nibs.org, or contact us directly here at the Institute.  

We thank you, Mr. President, for your attention, and present this report covering the Institute's 2015 activities for your consideration. We look forward to 2016 as a year of continued success.

Sincerely,

James "Tim" Ryan, CBO  
Chairman, Board of Directors

Henry L. Green, Hon. AIA

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**About the Institute**

On August 22, 1974, recently sworn-in President Gerald Ford signed the Housing and Community Development Act (Public Law 93-383) into law, thereby setting into motion the founding of a new organization, the National Institute of Building Sciences.

The Congress finds “that the lack of an authoritative national source to make findings and to advise both the public and private sectors of the economy with respect to the use of building science and technology in achieving nationally acceptable standards and other technical provisions for use in Federal, State and local housing and building regulations is an obstacle to efforts by and imposes severe burdens upon all those who procure, design, construct, use, operate, maintain, and retire physical facilities, and frequently results in the failure to take full advantage of new and useful developments in technology which could improve our living environment.”

More than forty years later, the Institute continues to bring the public and private sectors together to address building-related concerns, addressing everything from building resilient, high-performing buildings to improving processes and reducing costs through the use of building information modeling and off-site construction. Serving as an authoritative source of advice with respect to the use of building sciences and technology, the Institute continues to provide the opportunity for free and open discussion of issues and problems where there was once conflict and misunderstanding. It brings together regulatory agencies, legislators and representatives of the private sector for open working sessions that seek a consensus solution to problems of mutual concern.

Headquartered in Washington, D.C., the Institute's professional staff provides technical, managerial and administrative support for the Institute's programs.
The Institute Board of Directors

The National Institute of Building Sciences Board of Directors is comprised of 21 members. Six members are appointed by the President of the United States, with the advice and consent of the Senate, to represent the public interest. The remaining 15 members are elected and can represent either public interest or industry voices. The Board representation includes architects, builders, building owners, building standards developers, consumers, contractors, educators, fire safety professionals, local agency officials, product manufacturers, professional engineers, state agency officials and others. However, the majority of board members are required to come from the public interest category.

In 2015, the Board’s Executive Team included James T. “Tim” Ryan, CBO, code administrator for the City of Overland Park, Kansas, as chair; Stephen T. Ayers, FAIA, the architect of the U.S. Capitol, as vice chair; Joy Marshall Ortiz, AIA, executive vice president of The Marshall Group, as secretary; and Wally E. Bailey, director of development services for the City of Fort Smith, Arkansas, as treasurer.

In addition, two new members were elected to the Board in 2015. Carl Hedde is senior vice president at Munich Reinsurance America, Inc. Thomas Izbicki, PE, FSFPE, is operations manager in the Dallas office of Rolf Jensen & Associates, Inc. In addition, Treasurer Bailey and Board Members Cheryl R. English, FIES, LC, Acuity Brands, Conyers, GA; Timothy H. Haahs, PE, AIA, Timothy Haahs & Associates, Blue Bell, PA; Richard B. Hayter, PhD, PE, FASHRAE, (Ret.) Kansas State University, Manhattan, KS; Carl Hedde, Munich Reinsurance America, Inc., Princeton, NJ; Thomas Izbicki, PE, FSFPE, Rolf Jensen & Associates, Inc., Plano, TX; Eric Lamb, DPR Construction, Redwood, CA; Brian C. Larson, PE, Stantec Consulting Services, Inc., Endicott, NY; Susan A. Maxman, FAIA, Green Cove Springs, FL; Thomas L. Mitchell, Jr., USAF, CFM, CFMJ, IFMA Fellow, FM3IS Associates, LLC, Universal City, TX; Dwight “Sonny” M. Richardson, Jr., Richardson Home Builders, Tuscaloosa, AL; Jerry Shaheen, LEED AP BD+C, Gilbane Building Company, Philadelphia, PA; Charles W. Steger, PhD, FAIA, Virginia Tech, Blacksburg, VA; James Timberlake, FAIA, Kieran Timberlake, Philadelphia, PA; Mary B. Verner, MES, JD, Washington State Department of Natural Resources, Olympia, WA; Steven R. Winkel, FAIA, PE, The Preview Group, Inc., Berkeley, CA.

Honored, upon completing their Board service in 2015, were John P. Kelly, retired executive vice president of Ryan Companies US, Inc., who served as secretary from 2012 to 2014, and Carl F. Baldassarra, PE, FSFPE, principal at Wiss, Janney, Elstner Associates, Inc.

2015 Board of Directors
Chair: James “Tim” Ryan, CBO, City of Overland Park, KS
Vice-Chair: Stephen T. Ayers, FAIA, LEED AP, Architect of the Capitol, Washington, DC
Secretary: Joy Marshall Ortiz, AIA, NCARB, The Marshall Group, Ltd., Architects, Reston, VA
Treasurer: Wally E. Bailey, CBO, City of Fort Smith, AR
Cindy L. Davis, Virginia Department of Housing and Community Development, Richmond, VA
Joseph B. Donovan, Beacon Capital Partners, Arlington, VA
Cheryl R. English, FIES, LC, Acuity Brands, Conyers, GA
Timothy H. Haahs, PE, AIA, Timothy Haahs & Associates, Blue Bell, PA
Richard B. Hayter, PhD, PE, FASHRAE, (Ret.) Kansas State University, Manhattan, KS
Carl Hedde, Munich Reinsurance America, Inc., Princeton, NJ
Thomas Izbicki, PE, FSFPE, Rolf Jensen & Associates, Inc., Plano, TX
Eric Lamb, DPR Construction, Redwood, CA
Brian C. Larson, PE, Stantec Consulting Services, Inc., Endicott, NY
Susan A. Maxman, FAIA, Green Cove Springs, FL
Thomas L. Mitchell, Jr., USAF, CFM, CFMJ, IFMA Fellow, FM3IS Associates, LLC, Universal City, TX
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Mary B. Verner, MES, JD, Washington State Department of Natural Resources, Olympia, WA
Steven R. Winkel, FAIA, PE, The Preview Group, Inc., Berkeley, CA
Membership

The National Institute of Building Sciences’ mission to serve the building industry is accomplished through the collaboration of more than 1,500 members who volunteer their time and expertise to the Institute's boards, councils and committees. Members represent both the industry and the public interest sectors of the building community and utilize their unique perspectives to develop and implement technical and procedural improvements to the building process. Institute members are design professionals, contractors, manufacturers, insurance representatives, software developers, educators and researchers and represent government agencies, academia and others. They support the Institute’s ability to be an authoritative source on innovative solutions for the built environment. This Annual Report demonstrates their commitment and many accomplishments. The Institute is grateful for their support and contributions.

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IntelliBuild
International Association of Plumbing and Mechanical Officials
International Code Council, Inc.
International Masonry Institute
Invicara Pte Ltd.
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Modular Building Institute
NASA
National Association of Home Builders
National Building Museum
National Fenestration Rating Council
National Institute of Standards and Technology
National Ready Mixed Concrete Association
Naval Facilities Engineering Command (NAVFAC)
National Council of Structural Engineers Association (NCSEA)
National Environmental Balancing Bureau (NEBB)
Newforma, Inc.
North American Insulation Manufacturers Association
NRB (USA) Inc.
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Viewpoint Construction Software
Virginia Department of Housing and Community Development
Walbridge
Wisconsin Department of Administration
Every year, the National Institute of Building Sciences recognizes individuals and organizations that have provided outstanding service to the Institute, the building community and the nation. The 2015 nominees include the Institute’s Low Vision Design Committee (LVDC); the International Code Council; David S. Collins, FAIA, NCARB; and Emory Rodgers.

The Institute Honor Award goes to an individual or organization that has made an exceptional contribution to the nation and the building community. The 2015 Honor Award recognizes the Institute’s Low Vision Design Committee (LVDC) for the Committee’s generous willingness to contribute its specialized expertise and an abiding desire to improve wayfinding in the built environment for individuals experiencing low vision. The LVDC was founded in late 2011 by a small group of architects, medical professionals, engineers, interior designers, lighting designers, federal agency representatives and community activists. Committee members, several of whom have low vision themselves, dedicated their time to amalgamating the knowledge of their separate vocations into tools that can be used cross-profession to create supportive environments for an ever-growing population with low vision. The Committee developed the Design Guidelines for the Visual Environment and is now working toward a national standard. This extraordinary group effort has been supported by the Jim H. McClung Lighting Research Foundation and the Hulda B. and Maurice L. Rothschild Foundation.

The Institute Member Award goes to a member of the Institute or affiliate council who has made a substantial contribution in support of the mission, goals and objectives of the Institute. The 2015 Member Award recognizes the International Code Council (ICC) for its collaborative work to promote code administration and application for a safe built environment; the development of informative information on the workforce; promoting activities and programs to assist in the development of the next generation of future code administrators; and supporting the activities of the Institute through the promotion, participation and engagement in Institute councils, programs and activities. Since its creation, Institute Sustaining Organization member ICC has been engaged in the activities of the Institute and, over the past few years, has increased its efforts and participation within the Institute.

The Institute President’s Award is given to an individual or organization in recognition of extraordinary efforts to assist in advancing the mission of the Institute. President Henry L. Green, Hon. AIA presented the 2015 President’s Award to David S. Collins, FAIA, NCARB, in recognition of his collegial assistance, continued encouragement and advice, and his professional commitment to improving codes and standards and forging a better understanding of the influence codes have in design and construction of our nation’s built environment.

Over the years, Green and Collins have shared a number of adventures in the development of codes and standards that have improved the built environment. For more than three decades, they have worked together on codes; ways to improve outreach to architects, code officials and the building community to provide a better understanding of the influence codes have in design and construction; and, most recently at the Institute, building enclosures.

The Mortimer M. Marshall Lifetime Achievement Award, the Institute’s highest honor, goes to someone who has demonstrated a lifetime of dedication to the mission and goals of the Institute. Established in 2011 and named after the organization’s first member, this award is bestowed upon those who exhibit the passion upon which the Institute is founded. The 2015 Mortimer M. Marshall Lifetime Achievement Award goes to Emory Rodgers in recognition of his distinc service as a member of the National Institute of Building Sciences Board of Directors, the Building Officials and Code Administrators (BOCA) International Board of Directors, the Council of American Building Officials (CABO) Board of Directors and the U.S. Architectural and Transportation Barriers Compliance Board (ATBCB) Advisory Commission; Second Vice President of CABO; and President of BOCA International.

Prior to his retirement, Rodgers held positions as the Chief Building Official of Arlington, Virginia, and as Deputy Director, Building and Fire Regulation Division at the Virginia Department of Housing and Community Development. He served as a mentor to numerous building officials throughout the country. In his service to the Institute Board of Directors, he brought the voice of code administration to the forefront of the discussions, providing valued insight to the many issues before the Board as it relates to the application of construction requirements and community planning. Additionally, his work has informed and guided the Institute on how to achieve greater impact on improving the built environment through a collaborative approach to the application of codes and standards.

Earlier in 2015, the Institute issued a call to industry for nominations to identify potential award recipients. An Awards Committee reviewed the submissions and selected winners from the nominees, based on how their work meets the mission, objectives and goals of the Institute.

The Awards Committee will solicit nominations for 2016 awards in late spring of 2016, with nominations due in July.

The Institute will celebrate its 2015 award winners at an Annual Reception and Awards Banquet, to be held January 14, 2016, during Building Innovation 2016: The National Institute of Building Sciences Annual Conference and Expo.

### Award Recipients

**Institute Honor Award:**
Low Vision Design Committee (LVDC)

**Institute Member Award:**
International Code Council

**Institute President’s Award:**
David S. Collins, FAIA, NCARB

**Lifetime Achievement Award:**
Emory Rodgers
Coordinating Council

The challenge of any organization with as many active councils and committees as the National Institute of Building Sciences is making sure the different groups are aware of what each other is doing. That is the specific purpose of the Coordinating Council. This council is the venue where the chairs and vice chairs of the Institute’s councils and committees meet to share information and coordinate efforts.

Such a convergence of the Institute's volunteer leaders serves an important function. The Coordinating Council provides the perfect environment for the chairs and vice chairs to build on program initiatives, share information and find possibilities to expand activities, whether collaborating on research, sharing expert resources or providing input on reports. Coordinating Council meetings provide an opportunity to highlight new projects, discuss upcoming events and brainstorm on opportunities for collaboration and teamwork.

The Coordinating Council also provides the Board of Directors with an update on how Institute programs are responding to the strategic direction set by the Board.

In 2015, the Council continued to serve as a forum for discussion and collaboration.

Looking Ahead

In 2016, the Coordinating Council will continue to convene throughout the year to share updates on program activities and discuss opportunities for collaboration among program areas.

Learn More

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Consultative Council

The Consultative Council engages leading building industry organizations from across private, trade, professional and labor organizations; private and public standards, code and testing bodies; public regulatory agencies; and consumer groups to develop findings and recommendations on important issues impacting the industry. Those recommendations are then included in the Institute’s Annual Report each year to the President and the U.S. Congress. In January 2015, the Consultative Council released its report, 2014 Moving Forward: Findings and Recommendations from the Consultative Council, during Building Innovation 2015: The National Institute of Building Sciences Annual Conference & Expo. The Council presented the findings in a June briefing to Congress during High-Performance Building Week and several member organizations included the report in their publications. The Council also put out a call to request input from the industry and began working to develop the 2015 report. The completed 2015 report is included at the end of this Annual Report.

Looking Ahead

The 2015 Moving Forward Report will be released at Building Innovation 2016. In 2016, the report will be the subject of a Congressional briefing hosted by the High Performance Building Congressional Caucus Coalition in June. In the spring of 2016, the Council also will solicit input from the industry and begin work on the 2016 report.

Learn More

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Website: www.nibs.org/CC

Council Leadership

Chair: Jessyca Henderson, American Institute of Architects
Vice-Chair: Pete DeMarco, International Association of Plumbing and Mechanical Officials
Secretary: Bob Horner, Illuminating Engineering Society
Low Vision Design Committee

A volunteer multidisciplinary group that serves to address the needs of all occupants of the built environment, including those with low vision, the Low Vision Design Committee (LVDC) continued working to develop guidelines that would accommodate persons with low vision in the built environment in 2015. In May 2015, the committee hit a major milestone when, after two public reviews, it published “Design Guidelines for the Visual Environment” on its website. The LVDC also rounded out its ongoing outreach efforts with presentations at the American Institute of Architects (AIA) National Convention in Atlanta in May, and the California Council for the Blind in Long Beach, California, in October.

Looking Ahead

In 2016, the LVDC is looking to pursue conversion of its guideline into a national standard. The group also has been tapped to offer presentations at the American Foundation for the Blind Leadership Conference in Washington, D.C., in March; the Environments for Aging Expo & Conference in Austin in April; and the AIA National Convention in Philadelphia in May.

Learn More

Staff Contact: Stephanie Stubbbs, Assoc. AIA, PMF, Program Director, sstubbs@nibs.org
Website: www.nibs.org/LVDC

Committee Leadership

Chair (April-December): Edward L. Soenke, AIA, The Design Partnership
Chair (January-March): James E. Woods, PhD, PE, Indoor Environmental Consultant
Vice Chair: Stuart Knoop, FAIA, OKKS Studios
Institute Board Liaison: Cheryl R. English, FIES, LC, Acuity Brands

Commercial Workforce Credentialing Council

In 2015, the National Institute of Building Sciences, through its Commercial Workforce Credentialing Council (CWCC), released the job task analysis for the U.S. Department of Energy (DOE) Better Buildings Workforce Guidelines (BBWG) jobs and worked with the DOE to put in place its recognition program. The Institute also worked with the American National Standards Institute (ANSI) to have the four BBWG jobs reviewed and preapproved for accreditation, which paves the way for certification bodies to get accredited. During the year, the Institute and DOE welcomed the first accredited BBWG job, Certified Energy Manager, submitted by the Associated Energy Engineers. The Institute also conducted outreach and support to generate interest in use of BBWG jobs in the public and private sector, working with community colleges and other education providers to support curriculum development to provide training for each of the BBWG jobs.

Looking Ahead

The Institute, through its CWCC, will continue to support the BBWG program for DOE by doing outreach to employers, owners, operators, regulators and educators in the public and private sector, and working with credentialing bodies. CWCC is developing a certificate program to accompany the BBWG certification program, with the first goal of developing a building operations certificate. The CWCC looks forward to seeing more certifications and certificates accredited and thereby earning BBWG recognition from DOE.

Learn More

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Council Leadership

Board of Direction
Frank DiGiovanni, U.S. Department of Defense
Jonathan Flaherty, Tishman Speyer
Brian Gilligan, U.S. General Services Administration
Don Gilligan, National Association of Energy Service Companies (NAESCO)
Jerry Kettler, Facility Performance Associates
John Lee, NYC Mayor’s Office
Kim Lennihan, NYSERDA
Doug Lewin, The South-central Partnership for Energy Efficiency as a Resource
Irvin Poke, Director of the Bureau of Construction Codes, State of Michigan
Paul Rode, SVP of Engineering, Related Companies
Carolyn Sarno, NEEP
Lisa Shulock, EEB Hub
Priya Swamy, U.S. Department of Energy
Lauren Zullo, NRDC

Board of Advisors
James Barry, Building Services 32BJ Training Fund
Ray Bert, AABC Commissioning Group (ACG)
Michael Bobkier, CUNY
Peter Crabtree, NSF BEST Center/Laney College
Eliot Crowe, PECI, Technical Program Manager
Russell Duke, IUOE Stationary Engineer Training Department
Roger Ebbage, Lane Community College - Energy Management Program
Deane M. Evans, New Jersey Institute of Technology (NJIT) Center for Building Knowledge - Energy Commissioning Agents/Auditors (ECAA)
Liz Fischer, Building Commissioning Association
Olga Gazman, Northwest Energy Efficiency Council
Jeff Horn, BOMI
Brandon Jones, Southface
Michele Jones, National Insulation Association
Tony Keane, IFMA
Bill Kent, Association of Energy Engineers
Matt Nelson, ASHRAE / Eco Commissions
Jim Page, NEMI / TABB
Christopher Surak, ASTM International
Dave Walls, ICC
Drake Wauters, American Institute of Architects
Steve Wiggins, National Environmental Balancing Bureau
National Council of Governments on Building Codes and Standards

Following last year’s adoption of a new National Council of Governments on Building Codes and Standards (NCGBCS) charter that allows Board positions to be held by both private- and government-sector representatives, the Institute’s Board of Directors appointed a new NCGBCS Board of Direction in 2015. The Council met in September under its new Board and identified five important topics before the codes and standards community that will be the basis for future Council activities. They include: existing buildings; adoption cycles; supporting code officials and departments through effective training, messaging and identification of benefits; early code official involvement in the design and construction process; and privatization of inspection and other services.

Looking Ahead
In 2016, the NCGBCS will establish working groups to examine the five topical areas of importance to codes and standards stakeholders. The working groups will identify the most valuable tools for addressing these challenges.

Learn More
Staff Contact: Ryan M. Colker, J.D., Presidential Advisor, rcolker@nibs.org
Website: www.nibs.org/NCGBCS

Off-Site Construction Council

In 2015, the Off-Site Construction Council (OSCC) issued two reports of findings from surveys conducted in late 2014. The first survey looked at how industry professionals were using off-site construction techniques and technology; the benefits they anticipated and realized; and the tools they needed to expand use. The second survey, which went to architecture and construction management university programs, focused on how and when off-site construction is being taught. Later in 2015, the Council conducted a third survey to find out what software tools the industry is utilizing in off-site construction. On September 23-24, the National Institute of Building Sciences (NIBS), through OSCC, co-hosted the inaugural Off-Site Construction Expo in Washington, D.C., along with the Modular Building Institute (MBI) and the Associated General Contractors of America (AGC). That same week, NIBS hosted a Representative Hearing on Productivity and the Workforce, which the OSCC was instrumental in developing.

The OSCC continued progress on its Off-Site Construction Implementation Guide, providing the first resource document, Off-Site and Modular Construction Explained. The Council also added a case study on an off-site construction project—Lexington High School Modular Addition—to the WBDG Whole Building Design Guide® webportal.

Looking Ahead
The OSCC will continue to develop resources for the Off-Site Construction Implementation Guide; will host a series of webinars in 2016 with accompanying resources; and work to expand the WBDG to include resource pages and case studies relevant to off-site construction. NIBS, through the OSCC, will again co-host the Off-Site Construction Expo with MBI and AGC in September 2016.

Learn More
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Council Leadership
Interim Chair/Institute Board Liaison: Cindy Davis, Virginia Department of Housing & Community Development
Jonathan Flannery, American Society for Healthcare Engineering
Bill Koefel, Koefel Associates
Henry Kosarzycki, State of Wisconsin, Department of Health Services
Nancy McNabb, National Institute of Standards and Technology
Emory Rodgers, Chesterfield, Virginia
John Terry, New Jersey Department of Community Affairs

Chair: Ryan Smith, University of Utah
Vice Chair: Susan Klawans, Gilbane Building Company
Secretary: Tom Hardiman, Modular Building Institute
Institute Board Liaison: Thomas Izbicki, PE, FSFPE, Rolf Jensen & Associates, Inc.
Martin Anderson, American Institute of Steel Construction
Ian Peter Atkins, Gensler
John Erb, DeLuxe Building Systems
Brad Guy, Catholic University of America
George Lea, U.S. Army Corps of Engineers
Dan Nyce, Oldcastle
Allan Post, Perkins+Will
RJ Reed, Whiting Turner
Laurie Robert, NRB
Greg Rohr, PVOTek
Stacy Scopano, Autodesk

Photo: Lehman College courtesy of NRB Off-Site Construction
Team up with the Total Learning Research Institute (TLRI) and the National Aeronautics and Space Administration (NASA), the National Institute of Building Sciences (NIBS) established a science, technology, engineering and mathematics (STEM) education program aimed at attracting students to building science-related careers known as the Mars City Facility Operations (Ops) Challenge. In January 2015, the Mars City building information model (BIM) development team, including representatives from KieranTimberlake, Gilbane Building Company and Alderson Engineering, received the Institute’s Member Award. Throughout the year, the Mars City project team continued developing the simulation scenario by engaging professional facility managers from the Minneapolis chapter of the International Facility Management Association (IFMA). The team also completed editing a collection of interviews of building industry professionals to be featured on an online Building Science Career Center. In addition, NIBS organized a Building Sciences Pavilion within the USA Science and Engineering Festival, to be held in April 2016.

Looking Ahead

In 2016, the STEM Program will launch the Building Science Career Center on the WBDG Whole Building Design Guide®, featuring career information and interviews from a dozen different disciplines; host a booth at the USA Science and Engineering Festival; and continue working on the Mars City simulation and testing.

Learn More

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STEM Leadership

Lead Organizations:
National Institute of Building Sciences
Total Learning Research Institute
National Aeronautics and Space Administration

Technical Support:
Alderson Engineering
Autodesk
Gilbane Building Company
International Facility Management Association
Jacobs Engineering
KieranTimberlake
Onuma Inc.
TMA Systems
Tipps Architecture

Platinum Plus Contributors
IFMA Foundation

Silver Contributors
Daniel Steenstra, Alexandria, VA
Joseph Romano, Langan Engineering

Contributor
Bill Brodt, Silver Spring, MD
Council on Finance, Insurance and Real Estate

In January 2015, the Council on Finance, Insurance and Real Estate (CFIRE) released its first report, Financing Small Commercial Building Energy Performance Upgrades: Challenges and Opportunities, during Building Innovation 2015: The National Institute of Building Sciences Annual Conference and Expo. The Council followed up the release with presentations to a variety of audiences, including a Congressional briefing supported by the High Performance Building Congressional Caucus Coalition. During the year, CFIRE also partnered with the Multihazard Mitigation Council (MMC), which resulted in the release of a report, Developing Pre-Disaster Resilience Based on Public and Private Sector Incentivization, in October 2015, followed by a webinar to discuss the topic in detail. In addition, CFIRE looked at how various public equity financing tools, specifically Real Estate Investment Trusts (REITs), Master Limited Partnerships (MLPs) and Yieldcos, can be used to support expansion in energy-efficiency and renewable-energy projects. The resulting report will be released in January at Building Innovation 2016.

Looking Ahead

In 2016, CFIRE will release a new report, Financing Energy-Efficiency and Renewable-Energy Projects, and promote the recommendations through outreach to Congress and the broader financing community. CFIRE and MMC will work to engage stakeholders and formulate strategies for implementing incentivization programs and practices. CFIRE also will support the Institute’s study on the benefits of public and private-sector investment in mitigation as a follow up to the 2005 MMC report, Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities.

Academy for Healthcare Infrastructure

A collaborative research program that brings leading healthcare professionals together to address industry challenges at a national level, the Academy for Healthcare Infrastructure (AHI) is focused on improving the processes to create and maintain the complex built environment required to support America’s healthcare mission. In 2015, five AHI Interdisciplinary Research Teams developed white papers. Each team was chaired by four executives from America’s leading healthcare systems who represent current “best thinking” on each of their topics; related subject matter experts; and an academician who facilitated the writing. The topics included: Owner Organization for Successful Project Outcomes; Developing a Flexible Healthcare Infrastructure; Project Acceleration/Speed to Market Strategies; Defining the Next Generation’s Focus; and Reducing Capital Costs. The teams will present their findings at the 2016 AHI Forum, to be held during Building Innovation 2016: The National Institute of Building Sciences Annual Conference and Expo.

Looking Ahead

In 2016, the Academy will assemble five interdisciplinary teams of leaders in the healthcare facilities industry to address the next set of critical topics. Once completed, the teams will present their findings at the 2017 AHI Forum.

Learn More

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Council Leadership

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Secretary: Lindene Patton, CoreLogic
Institute Board Liaison: Carl Hedde, Munich Reinsurance America, Inc.
Debra Ballen, Insurance Institute for Business and Home Safety
James Finlay, Finlay Consulting Group
Kevin Fry, Building Owners and Managers Association International
Erin Rae Hoffer, Autodesk
Jim LaRoe, LAROE Consulting Services
Michael Zimmer, Ohio University

AHI Research Governors

Frank Aucremanne, Cleveland Clinic Foundation
John A. Becker, U.S. Department of Defense Military Health System
Clayton Boenecke, U.S. Department of Defense Military Healthcare System
Michael H. Covert, CHI St. Luke’s Health System
Peter R. Dawson, AIA, Texas Children’s Hospital
Kip C. Edwards, Banner Health
Mark P. Ehret, AIA, INOVA Health System
Brian Holmes, Texas Health Resources
Walter B. Jones, Jr., MetroHealth
Tom Kinman, Children’s Medical Center
John Koulmetis, AIA, EDAC, Kaiser Foundation Health Plan, Inc.
Joanne Krause, Medical Facilities, U.S. Navy
Jeffrey W. Land, Dignity Health
JoAnn Magnatta, Main Line Health System
Robert F. McCoole, Ascension Health
Dennis Milsten, CCM, U.S. Department of Veterans Affairs
Robert Mitsch, Sutter Health
Gregory Mehler, BJ’s Healthcare
Spencer Moore, MD Anderson Cancer Center
Scott Nelson, Advocate Health Care
Donald H. Orndoff, AIA, Kaiser Foundation Health Plan, Inc.
Judy Quasney, National Institutes of Health
Skip Smith, Catholic Health Initiatives
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SECURITY & DISASTER PREPAREDNESS
Building Seismic Safety Council

In 2015, the Building Seismic Safety Council (BSSC) completed the last ballot of the development cycle for the National Earthquake Hazards Reduction Program (NEHRP) Recommended Provisions for New Buildings and Other Structures; prepared the 2015 Provisions (FEMA P-1050) for publication as a two-volume book and DVD; and developed the NEHRP Recommended Seismic Provisions: Design Examples (FEMA P-1051) to illustrate and apply the changes. Except for Chapter 24, the Provisions were adopted with few modifications into the American Society of Civil Engineers (ASCE) Structural Engineering Institute (SEI) ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures, which is referenced in the model building codes developed by the International Code Council (ICC). To ensure the model codes conform to the Provisions, the BSSC Code Resource Support Committee (CRSC) developed six proposals for submission to the ICC to be voted on at Committee Action Hearings in April 2016. BSSC’s Project 17 Planning Committee prepared a report that defined four major issues for a multi-year FEMA/U.S. Geological Survey (USGS) effort to coordinate USGS hazard modeling with engineering design values and maps, and with ASCE/SEI 7 and the building codes. BSSC hosted its first Annual Colloquium and held webinars on Colloquium topics and Project 17 Planning. The BSSC Provisions Update Committee (PUC) began preparing issues and research recommendations for the next cycle to develop the 2020 Provisions.

Looking Ahead

In 2016, BSSC will develop the 2015 NEHRP Provisions: Training and Educational Materials and host the second BSSC Colloquium, and the CRSC will attend the ICC Hearings in April to defend the six submitted proposals. For the 2020 NEHRP Recommended Seismic Provisions development cycle, PUC will evaluate the current ASCE/SEI 7 standard; review research and development activities; and identify a list for the issue teams to develop change proposals and the Project 17 Committee will develop design map-related change proposals.

Scientific Resolution Panel

The Federal Emergency Management Agency (FEMA) renewed its five-year Scientific Resolution Panel (SRP) contract with the National Institute of Building Sciences in 2015. Following the convening of two SRPs in 2014, the Institute submitted reports for FEMA Region I and Region X in 2015. The Institute also added coastal storm and hydraulic engineering experts to the SRP cadre of experts. During the year, the Institute received an Independent Panel request from FEMA to support the agency in resolving the technical data submitted by a Region II community.

Looking Ahead

In 2016, the Institute will convene the Independent Panel and, within 90 days of the panel’s first meeting, submit a final report identifying proposed sensitivity testing or impact analysis testing that FEMA may need to undertake. Throughout the year, the Institute will continue to convene SRPs on an as-needed basis.

Integrated Rapid Visual Screening

The National Institute of Building Sciences, which has served as the project manager of the Integrated Rapid Visual Screening (IRVS) tool for the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T) since 2011, continued to provide the IRVS Interagency Security Committee (ISC) version to federal agencies and provide support upon request in 2015. During the year, the Institute continued working with DHS S&T to develop a long-term plan to make all versions of IRVS, including the IRVS for Buildings, Mass Transit Stations and Tunnels; the IRVS ISC; and the IRVS for Schools, available to government and private-sector users.

Looking Ahead

In 2016, the Institute will continue to work with DHS on the long-term plan for IRVS and, when it is in place, form user groups to help the Institute provide support and continue ongoing development.
Multihazard Mitigation Council

The Multihazard Mitigation Council (MMC), which promotes collaboration to achieve resilience objectives, worked with the Council on Finance, Insurance and Real Estate (CFIRE) in 2015 to publish a white paper, Developing Pre-Disaster Resilience Based on Public and Private Incentivization. The white paper offers a new approach to capturing incentives for pre- and post-hazard investment and concluded that the most cost-effective way to achieve resilience is through a holistic set of public, private and hybrid programs based on mortgages and loans; insurance; finance; tax incentives and credits; grants; regulations; and enhanced building codes. Building on a previous proposal to the Federal Emergency Management Agency (FEMA), the MMC prepared a comprehensive proposal in 2015 to study the cost-effectiveness of private-sector mitigation to be considered for funding by a public-private-sector consortium under the White House Council for Environmental Quality. During the year, the MMC unveiled the Mitigation Clearinghouse, an online resource, available at mitigationclearinghouse.nibs.org, consisting of new research, existing publications and other materials related to mitigation best practices. The MMC also supported a study to determine whether the public understands the current life-safety objective of the building code’s seismic design requirements, which was submitted for publication in Earthquake Spectra. As part of its ongoing series, the MMC staged four mitigation-themed webinars in 2015, and, along with the Building Seismic Safety Council, coordinated the October issue of the Journal of the National Institute of Building Sciences (JNIBS), with the theme, “After Disaster Strikes: Planning for Community Resilience.” The MMC helped coordinate the Security & Disaster Preparedness Symposium: Means and Methods for Creating Resilient Communities and conducted the Special Session — Ten Years after "Mitigation Saves": An Examination of the Value of Private-Sector Investment in Mitigation, both held during Building Innovation 2015: The National Institute of Building Sciences Conference and Expo in January, and prepared for two symposia featuring resilience incentives for homeowners, businesses, utilities and communities, to be held at Building Innovation 2016.

Looking Ahead

In January, MMC will co-host the Security & Disaster Preparedness Symposium at Building Innovation 2016. During the year, the MMC will prepare an addendum to the incentivization white paper and a non-technical version to promote resilience incentivization to stakeholders; seek funding to formulate an incentivization model that can be implemented nationwide to support resilience; conduct several resilience webinars; contribute articles to JNIBS; and expand the Mitigation Clearinghouse.

Learn More

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DHS National Critical Infrastructure Security and Resilience Research and Development Plan

Following the release of Presidential Policy Directive 21 (PPD-21)—Critical Infrastructure Security and Resilience in 2013, the U.S. Department of Homeland Security was tasked with developing plans to strengthen the security and resilience of critical infrastructure against both physical and cyber threats. DHS established an Integrated Task Force and formed the Research and Development Working Group to implement specific requirements contained in PPD-21 focused on research and development in support of physical infrastructure and its underlying cyber systems. The National Institute of Building Sciences provided DHS with technical and subject matter expertise, including support for broad stakeholder engagement; a national review, including a comment period on the draft plan, adjudication and coordination contributions from team members; and drafting and final editing of the plan. The National Critical Infrastructure Security and Resilience Research and Development Plan was delivered to the Executive Office of the President in February 2015 and publicly released in November 2015.
A Business Process for Critical Infrastructure Security and Resilience (BP-CISR)

In 2013, President Obama issued Presidential Policy Directive 21, which focuses on critical infrastructure security and resilience (CISR). The Directive and subsequent National Infrastructure Protection Plan, NIPP 2013: Partnering for Critical Infrastructure Security and Resilience, emphasize the individual and collective responsibilities of critical infrastructure owners; state and local governments; and regional public-private partnerships to advance CISR.

Sponsored by the U.S. Department of Homeland Security (DHS) Office of Infrastructure Protection (IP), the National Institute of Building Sciences began working on a Critical Infrastructure Security and Resilience Risk Management Process (CISR-RMP) in 2014, building on an approach tested in a number of U.S. infrastructures and metropolitan areas. In 2015, the Institute synthesized design criteria from various sources to model a CISR-RMP that operates on three levels: the “enterprise” level of individual infrastructures and local agencies, each conducting its own risk analysis, valuing and choosing alternatives and evaluating results from its own perspective; a regional public-private partnership that conducts a derivative risk analysis, valuation and evaluation from the regional public’s perspective; and an aggregation of these analyses and decisions to state and national totals for overall policy and program analysis and reporting. The Institute also began working on a unique “bottom-up, inside-out” implementation approach that integrates the model risk/resilience process with on-going business processes (e.g., asset management and capital planning/budgeting) at the enterprise level so that risk/resilience improvements are made in the context of routine processes.

Looking Ahead

In 2016, the Institute will research several missing “building blocks” in the process. The first is the need for an enforceable data-sharing protocol for use by infrastructures to analyze their vulnerability to dependencies to understand the potential for cascading failures. (This highly sensitive information, though not routinely shared, is essential for interdependencies analysis.) The second is an improved understanding of how risk/resilience analysis can be integrated into existing, routine business processes. The project team will conduct case studies to examine these issues in actual organizations, then update and refine the model CISR-RMP, with a field-scale developmental pilot test also planned.

SAFETY Act for Commercial Facilities

Under contract with the U.S. Department of Homeland Security (DHS) Science & Technology (S&T) Office of Safety Act Implementation (OSAI), the National Institute of Building Sciences developed a plan to use DHS Best Practices for Anti-Terrorism Security (BPATS) to help commercial facilities meet the requirements of the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (the SAFETY Act). The Institute, working closely with OSAI, developed a process for conducting assessments of facilities for coverage under the SAFETY Act; conducted five pilot tests of that process; and developed a tool to use in conducting the assessments. The Institute also is developing a training program for assessors and building owners to conduct facility assessments when applying for SAFETY Act coverage.

Looking Ahead

In 2016, the Institute will deliver the final version of the BPATS assessment tool, provide training on the assessment process and use of the tool and assist DHS to make it available for use by commercial facilities seeking SAFETY Act coverage.

Learn More

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Learn More

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FACILITY PERFORMANCE & SUSTAINABILITY
Building Enclosure Technology & Environment Council

The Building Enclosure Technology and Environment Council (BETEC), which works to optimize energy efficiency in the design, construction, operation and modification of new and existing buildings through the coordination of research, development and verification programs, updated its charter in 2015. During the year, the Building Enclosure Councils, a joint venture between The American Institute of Architects and the National Institute of Building Sciences (NIBS) to bring information about building enclosure technology to local architects, engineers, contractors, manufacturers and other members of the building industry, grew to more than 3,000 participants in 31 cities across the country. NIBS, BETEC and BEC-Kansas City hosted the fourth BEST Conference Building Enclosure Science and Technology™ (BEST4), held April 13-15, 2015, in Kansas City. More than 300 participants attended 22 technical sessions to hear 65 papers and presentations. For the first time in BEST Conference history, the papers are available on the Building Research Information Knowledgebase (BRIK) website, www.brikbase.org, making them easily accessible and searchable. In addition, BETEC, as part of its agreement with ASTM, completed development of a five-day curriculum on building commissioning, based on ASTM E2947 Standard for Building Enclosure Commissioning. The pilot for the course, developed by former BETEC chair Wagdy Anis, FAIA, will be offered in 2016.

Looking Ahead

With its new charter in place, BETEC looks forward to planning committee-driven activities during 2016. As mentioned, 2016 also will see the launch of the pilot program for the five-day training program on building enclosure commissioning. Preparations for BEST5, slated for April 2018 in Philadelphia, will kick into gear. Additionally, BETEC members will be preparing presentations and papers for their part in the December, 2016 Building XIII.

U.S. Department of Defense – Defense Health Agency

In 2015, the National Institute of Building Sciences successfully completed a four-year contract with the U.S. Department of Defense (DOD) Defense Health Agency (DHA) that included 33 task orders around facility life-cycle management. The Institute effectively provided program management and technical support to the DHA Facilities Division. The year was highlighted by tasks detailing an innovative study on flexible healthcare design and generating a commissioning guide for DHA facility managers. The Institute continued to provide DHA with space and equipment planning system (SEPS) training and construction planning committee (CPC) support. During 2015, the Institute also began work on a newly awarded three-year contract with DHA, in which the Institute was awarded seven task orders to provide technical services around data warehousing, dashboarding and server consolidation of DHA’s facility data.

Looking Ahead

The Institute will complete the seven task orders contracted by June 2016 and begin work on services related to developing facility cost models for real properties.

Learn More

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Council Leadership

Chair (June – December): Theresa Weston, PhD, Technical Fellow, Dupont Building Innovations
Chair (January – June): Judd A. Peterson, AIA, Director of Building Science, Judd Allen Group
Secretary: Whitney Okon, AIA, Applied Building Sciences
Institute Board Liaison: Joy Marshall Ortiz, AIA, NCARB, The Marshall Group, Ltd., Architects
Sustainable Buildings Industry Council

The Sustainable Buildings Industry Council (SBIC) works to unite and inspire the building industry toward higher performance. During Building Innovation 2015: The National Institute of Building Sciences Annual Conference and Expo in January, SBIC hosted a luncheon to recognize the winners of the 2014 Beyond Green™ High Performance Building and Community Awards. The top prize in the High-Performance Buildings Category went to the Bullitt Center in Seattle, Washington. In the High-Performance Buildings Category, a Merit Award went to the Karuna House and the Project Team of Holst Architecture, Hammer & Hand, Imagine Energy, Earth Advantage and Intepl. In the Innovations for High-Performance Buildings & Communities Category, a Merit Award went to the New Jersey Institute of Technology (NJIT) Center for Building Knowledge for its Smart Supermarkets Program. Also in the Innovations for High-Performance Buildings & Communities Category, a Merit Award went to Skidmore, Owings & Merrill LLP (SOM) for its Timber Tower research. Case studies for all of the award winners are available on the WBDG. SBIC issued the Call for Entries for the 2015 Awards in June and closed the call in October. During the year, the Council also continued to market the Beyond Green™: Guidelines for High Performance Homes, now in its sixth edition.

Looking Ahead
In 2016, SBIC will host the Beyond Green™ High-Performance Building Awards Luncheon in January, with a call for nominations in the summer. During the year, the Council will undertake a strategic planning effort to support dialogue, education and sharing of best practices around emerging issues for the achievement of high-performance buildings.

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Gary Bailey, Innovative Design
Mike Bell, National Association of Home Builders
Doug Brown, BASF Corporation
Chip Clark, Brick Industry Association
Dean Frank, Precast/Prestressed Concrete Institute
Kurt Riesenburg, Spray Polyurethane Foam Alliance
Paul Stewart, Gilbane Building Company
Mark Thimons, American Iron & Steel Institute
Brian Wolf, Cannon Design, Inc.

National Mechanical Insulation Committee

The National Mechanical Insulation Committee (NMIC) for Building and Industrial Applications continued its work to update the internet-based Mechanical Insulation Design Guide (MIDG) in 2015. Chaired by the National Insulation Association (NIA) and NIA’s Foundation for Education, Training and Industry Advancement, which funds many of its activities, the NMIC also worked with industry groups, through the National Institute of Building Sciences Consultative Council, to look for funding of a study that examines the impact of thermal insulation on potable hot water and other similar distribution systems. Authorization of the study is pending approval by the U.S. Senate.

Looking Ahead
In 2016, the NMIC will continue to update and potentially expand the MIDG; work with the Consultative Council; examine the best approach by which to increase usage of the MIDG and e-learning courses; and disseminate information about the other mechanical insulation resources available.

Learn More
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High Performance Building Council

Established as a result of the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007, the High Performance Building Council (HPBC) serves to advance recommendations for high-performance building metrics and verifications methods. In 2015, the HPBC continued to work on the National Performance-Based Design Guide (NPBDG), transitioning from a release, review and comment process to publicizing and encouraging use of the web-based guide through a number of key National Institute of Building Sciences partners. During the year, the HPBC also participated in the Institute’s project to help the U.S. Department of Energy (DOE) develop a draft definition for Zero Energy Buildings (ZEB) with input from industry stakeholders.

Looking Ahead

In 2016, the HPBC will continue to work with Institute partners to promote the use and updating of the National Performance-Based Design Guide.

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GSA Facilities Standards for the Public Buildings Service

For the past several years, the National Institute of Building Sciences has brought together federal agency representatives, subject matter experts and architecture/engineering (A/E) user groups to recreate design standards for the Public Buildings Service (PBS) of the General Services Administration (GSA) into a performance-based, living document. The 2014 edition of the Facilities Standards for the Public Buildings Service (P100) establishes federal design standards and criteria for new buildings, major and minor alterations, and work in historic structures that affects almost 10,000 GSA-owned or -leased facilities today. Institute staff worked with GSA reps to create the first annual informational update to the P100, which was released in May 2015. The update includes links allowing GSA employees only to access referenced standards through existing web-based standards subscription. The Institute also worked with GSA to develop an extensive new “Workplace Productivity” section, which includes tiers of performance levels and the criteria to meet performance levels; helped develop performance levels for protecting birds and other pollinators; submitted a report comparing energy requirements of the P100 to requirements in other green building programs; and created an electronic matrix version of the document.

Looking Ahead

In 2016, Institute staff will work with GSA representatives to create technical updates of the P100 and launch the electronic matrix version of the document on the GSA website. Likely additional enhancements will come in the form of ties to cost estimating measures.

Learn More
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VA Facility Management Programs

Looking Ahead

In 2016, the Institute will continue contracts with CFM for standards and criteria development, planning and other studies to support improved facility life-cycle management. These projects include a VA *Healing Environments Design Guide* (HEDG); *Physical Security and Resiliency Design Manual* (PSRDM); *Physical Security Design Manual for Mission Critical Facilities*; *Physical Security Design Manual for Life-Safety Protected Facilities*; a VHA staffing study for VA Medical Center engineering staff; a historic preservation reuse initiative; SEPS2BIM; and a report to Congress on DHA best practices.

Learn More

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The National Institute of Building Sciences continued to work with the U.S. Department of Veterans Affairs (VA) to improve acquisition, development and life-cycle management of its real property portfolio in 2015. Among its projects for the VA Office of Construction and Facility Management (CFM), the Institute worked with Veterans Health Administration (VHA) chief engineers and clinical staff to assure enterprise-wide program support. During the year, the Institute hosted a meeting for VA and the Design Build Institute of America (DBIA) to educate VA on improved processes for their design/build criteria development and held an educational workshop on public-private partnerships (P3) for VA leadership. The Institute began the next cycle of revisions on *The VA BIM Guide v2* and the next edition of the *VA A/E Submission Requirements for VA Medical Center Major New Facilities, Additions & Renovations Program Guide PG 18-15 Volume B*. The Institute managed the training sessions for the healthcare facility space and equipment planning system (SEPS), jointly owned and maintained by VA and the Department of Defense (DOD)/Defense Health Agency (DHA), as well as template and criteria management for SEPS and space criteria standards for healthcare facilities information. In addition, the Institute supported a forum for the U.S. Army Corps of Engineers (USACE) on early contractor involvement (ECI) as a method for improving federal contracting practices. While VA was not directly involved in this forum, as USACE is congressionally mandated to take over VA construction projects exceeding $100 million, this construction procurement process will have a direct effect on VA health care facility planning, design and construction. Out of this forum came an initiative with the American General Contractors (AGC) to form a committee to recommend revisions or modifications to the Federal Acquisition Regulation (FAR) and Defense Federal Acquisition Regulation (DFAR) to advance the use of ECI to improve facility life-cycle management. Plans for a future forum to include VA are in discussion.

This circa-1750 grist mill at Perry Point, Maryland, is being converted into an educational facility for VA staff use.
Commissioning Industry Leaders Council

In 2015, the Commissioning Industry Leaders Council (CxILC) worked with the WBDG Whole Building Design Guide® Commissioning Subcommittee and Operations & Maintenance Subcommittee to update pages on building commissioning. The Council also worked with the Commercial Workforce Credentialing Council (CWCC) to help the U.S. Department of Energy develop the Better Building Workforce Guidelines (BBWG) job task analysis for commissioning providers, and assist in defining the job title of “Building Commissioning Professional.”

Looking Ahead

In 2016, the Council will continue to examine opportunities to provide building owners, code officials, designers and other stakeholders with information on the role of commissioning in helping achieve desired levels of performance. The Council will also continue to work with the CWCC to assure that certification programs in commissioning represent the best practices within the industry.

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Stephanie Reiniche, ASHRAE
Dominic Sims, International Code Council
Billy Smith, American Society of Plumbing Engineers
Ken Sulka, Associated Air Balance Council
Mark Terzigni, Sheet Metal and Air-conditioning Contractors National Association
Melissa Wackerle, American Institute of Architects
Stephanie Wiggins, Newcomb & Boyd
Sara Yerkes, International Code Council

Zero Energy Buildings

The National Institute of Building Sciences completed the final zero energy building definition report for the U.S. Department of Energy (DOE) in 2015 and DOE released it to the public. The report is being used by the government and private sector as a foundation element to support the ongoing growth of zero energy buildings. The report is available at http://energy.gov/eere/buildings/downloads/common-definition-zero-energy-buildings.

Learn More
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The Building Research Information Knowledgebase (BRIK) continued to bring peer-reviewed building-related research to practitioners and support identification of long-term industry research needs in 2015. This joint project of the National Institute of Building Sciences (NIBS) and The American Institute of Architects (AIA) increased its internal research base to 2,000 entries during the year. Part of that effort was comprised of a “database within a database” for the U.S. Department of Defense (DoD)—Defense Health Agency, offering research reflecting a specified mandate for topics pertinent to the agency, and the addition of the papers and presentations from the 2015 BEST Conference. The addition of the EBSCO search services, a leading provider of research databases, also brought AIA and NIBS member subscribers access to some tens of thousands of abstracts with three EBSCO databases: Arts and Architecture, the Avery Index to Architectural Periodicals and EBSCO’s Sustainability Reference Center.

Looking Ahead to 2016

2016 will see a new, streamlined structure proposed to the Research Council, along with a new charter designed to emphasize teams to accomplish set goals. AIA and NIBS staff will look to increase partnerships and collaboration; conduct demonstrations and sign-ups at both organizations’ conferences; propose a limited ad campaign on the BRIK site; and again mentor an intern to help build the DHA library.

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WBDG Whole Building Design Guide®

In 2015, the WBDG Whole Building Design Guide® drew its largest number of visitors yet: 6.75 million people looking for building-related information that is difficult or impossible to find elsewhere visited the site and downloaded a total of 48 million documents. During the year, the various committees responsible for maintaining the site updated eight sections and five resource pages, and also added four new pages and six case studies. WBDG now offers more than 70 online WBDG and Federal Energy Management Program (FEMP) courses, adding five new FEMP courses during the year. Institute staff members worked to promote the use of the WBDG through presentations to multiple audiences, a regular “What’s on WBDG” contribution to the Institute’s monthly newsletter and a compiled glossary of WBDG links and articles published in the Journal of the National Institute of Building Sciences (JNIBS). In addition, staff began the behind-the-scenes work to transition the website to a new format, which will allow for improved functionality; quicker and more focused searches; and the ability for visitors to create a custom library of WBDG pages and documents.

Looking Ahead

Staff expects to complete the effort to revamp the entire WBDG website by midyear 2016. Content updates for a number of continuing education courses and case studies also are planned to go live during the year. Outreach and promotion of WBDG will continue via live presentations at meetings and conferences, Twitter, LinkedIn and other social media, blogs and podcasts.

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GSA Central Facility Data Architecture and Taxonomy

In 2015, the National Institute of Building Sciences worked with the U.S. General Services Administration (GSA) Public Buildings Service (PBS) Office of Public Buildings Information Technology Services (PB-ITS) to evaluate use cases for GSA processes for facility management, emergency management and building performance and energy management to determine requirements for data from building information models (BIMs), using open standards to support GSA systems and procedures. The Institute delivered a draft report for GSA during the year, which analyzed the requirements from the use cases and how those could be supported using the buildingSMART International (bSI) Industry Foundation Class (IFC) schema. An accompanying IFC-based model view definition (MVD) was also developed to identify exchange requirements between BIM applications and GSA systems.

Looking Ahead

The Institute will complete the report and MVD in 2016; work with GSA to continue development of the requirements; and then move to support deployment of the exchange specifications with GSA, its design consultants and software and system providers.

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buildingSMART alliance®

The buildingSMART alliance®, (Alliance), which serves to make the nation's fragmented real property industry more efficient, made some major changes to its structure in 2015. The Alliance updated its charter; transitioned into a new leadership model; completed and published its 2015 Strategic Plan; improved, with the generous support of its sponsors, its financial stability; and established a new organizational structure of subcommittees and task groups. The Alliance then formed subcommittees for Thought Leadership, Information Standards, Proven Practices, Education, Communications, Industry Liaison and Membership functions; defined subcommittee guidelines, roles and responsibilities; and appointed four subcommittee chairs. In addition to funding and executing the publication of its building information modeling (BIM) standard, the National BIM Standard—United States® (NBIMS-US™) Version 3 (V3), the Alliance also developed the NBIMS-US™ V3 Reassessment Report. Planning for educational webinars in support of the computer-aided design (CAD) standard, the United States National CAD Standard® (NCS) Version 6, which the National Institute of Building Sciences and its partners released in 2014, continued throughout the year.

Looking Ahead
The Alliance will finalize development and roll out the first NCS educational webinar in the spring; develop subcommittee operational plans; and work to ratify the National BIM Guideline for Owners as a consensus document.

National BIM Standard-United States®

In July 2015, the National Institute of Building Sciences buildingSMART alliance® released the most recent edition of the nation's consensus-based standard governing building information modeling (BIM), the National BIM Standard—United States® (NBIMS-US™) Version 3 (V3). Building professionals from across the nation and around the world had the opportunity to offer their ideas to improve the NBIMS-US™. The Project Committee received 40 submissions, 27 of which were approved for further subcommittee review and acation. The subcommittees then forwarded their recommendations, along with the submissions, to the full Project Committee membership of 143 industry peers. More than 91% of the NBIMS-US™ Project Committee members voted on the V3 ballots, with more than two thirds of the non-abstaining members voting to approve the 27 items on the ballot. Following the vote, the Planning Committee officially ratified the results. The standard then underwent proofing and final preparations before being ready for online publication. In its first six months, the NBIMS-US™ V3 was downloaded by 9,452 people from more than 105 countries. Leading visits to the site: US, China, UK with over 4,355 combined downloads of the standard.

Looking Ahead
In 2016, the buildingSMART alliance® will develop education programs and events to support adoption and implementation of the standard.

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NBIMS-US V3 Planning Committee
Chair: Chris Moor, American Institute of Steel Construction
Vice Chair: Jeffrey W. Ouellette, Nemetschek Vectorworks, Inc.
Secretary: Connor Christian, Kiewit Corporation
Paul Audidle, NBBJ
Peter Cholakis, 4Clicks Solutions
Johnny Fortune, Bullock Tice Associates
Lamar Henderson
Susan Keenliside, buildingSMART Canada
William T. Napier, Wisconsin Department of Administration, Division of State Facilities
John Sullivan, Autodesk, Inc.
Ray Topping, Fiatech
United States National CAD Standard®

Following the release of the most recent version of the nation’s computer-aided design (CAD) standard, the United States National CAD Standard® (NCS) Version 6, in September 2014, the NCS Marketing Team, kicked off a marketing campaign. The team, consisting of the NCS contributing organizations, The American Institute of Architects, Construction Specifications Institute and National Institute of Building Sciences, promoted sales of the new edition through advertisements in the three member associations’ in-house publications, as well as industry periodicals. During 2015, the NCS Steering Committee also began discussions to develop a webinar series to promote NCS content and implementation.

Looking Ahead

In 2016, the NCS Steering Committee will hold its first webinar and create other education programs and events to support adoption and implementation of the new version of the standard.

Learn More

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National BIM Guide for Owners

The National Institute of Building Sciences (NIBS) kicked off development of a new guide in 2015 to help building owners and their design teams utilize building information modeling (BIM) during the building design, construction and operations process and to better support owners’ performance requirements. The National BIM Guide for Owners is being developed under the auspices of NIBS, The American Institute of Architects (AIA), Building Owners and Managers Association International (BOMA), International Facility Management Association (IFMA) and ASHRAE. During the year, NIBS established a development committee consisting of experts from various stakeholder groups; researched and reviewed existing guidelines; and began developing language for the draft guide.

Looking Ahead

In 2016, the development committee will convene for a face-to-face meeting during Building Innovation 2016 in January to review the first draft of the guide.

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Steering Committee

Chair: Ed Lowe, Burgess & Niple, Inc.
Vice Chair: Michael Fate, Tetra Tech
Secretary: Greg Jordan, Dewberry
Jennifer DiBona, That CAD Girl
Steve Spangler, U.S. Army Corps of Engineers
Jason Sturniolo, RRMM Architects

Committee Leadership

Chair: Dan Chancey, Commercial Advisors Asset Services
Ernie Conrad, PE, Conrad Engineers
Carrie Dossick, PhD, PE, University of Washington
Craig Dubler, PhD, Penn State University
Dennis Knight, PE, Whole Building Systems LLC
Johnny Fortune, Bullock Tice Associates
John Messner, PhD, Penn State University
Dennis Patnode, HDR Architecture
Earle Kennett, Consultant
In 2015, the Facilities Maintenance and Operations Committee (FMOC) worked with OmniClass, (which develops a national standard that describes products used in construction) to incorporate the Construction Operations Building information exchange (COBie) and Specifiers Properties information exchange (SPie) into its OmniClass Products Table 23. FMOC and OmniClass also held discussions with public and private organizations to expand the table to include sustainable products and standards. FMOC arranged several sessions for the March 2015 National Facility Management and Technology (NFMT) Conference, held in Baltimore, Maryland. At its March meeting, FMOC members identified “Critical Facilities Equipment Identification and Maintenance” as a topic to develop into a WBDG Whole Building Design Guide® Resource Page. The page went live in December. FMOC also updated five sections in the WBDG Facilities O&M section and the “Optimize Operational and Maintenance Practices” page in the Sustainable Design Objective. In September, FMOC distributed a survey to all members to learn more about their priorities and how the Committee can better support them.

Looking Ahead

In response to the 2015 member survey, the FMOC is planning to form several new subcommittees to address operations and maintenance topics of interest to FMOC members and will be increasing participation with facility management-related organizations. In addition, FMOC is coordinating several sessions for NFMT 2016.

Information Exchanges

For the first time, the newest edition of the nation’s consensus-based standard governing building information modeling (BIM), the National BIM Standard—United States® (NBIMS-US™) Version 3 (V3), which the Institute’s buildingSMART alliance® released in July 2015, included the following information exchange standards: the Life Cycle information exchange (LCie), Plumbing information exchange (Wsie), HVAC information exchange (HVACie), Electrical information exchange (SPARKie) and Building Programming information exchange (BPie). In addition, the NBIMS-US™ V3 incorporated the latest version of the Construction Operations Building information exchange (COBie), COBie Version 2.4. In November 2015, the COBie Task Group (CTG), formerly known as the Computerized Maintenance Management Systems/Computer Aided Facilities Management (CMMS/CAFM) Topical Committee, which previously operated as a subcommittee of the Institute’s Facility Maintenance and Operations Committee (FMOC), was reorganized as a task group of the buildingSMART alliance®. The impetus for the new reorganization and realignment within the two Institute program areas is to broaden the scope and membership of the CTG to include a diverse group of industry stakeholders with an interest in COBie.

Looking Ahead

In 2016, the CTG will review and vet proposed amendments to COBie 3.0; promote and support wider adoption of COBie; and expand implementation through presentation of the standard at public events around the country.

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Institute Board Liaison: Thomas L. Mitchell, Jr., USAF, CFM, CFMJ, IFMA Fellow, FM3IS Associates, LLC
Peter Cholakis, 4Clicks Solutions
Bill East, PhD, PE, FASCE, Prairie Sky Consulting
Glenn Hunt, Peripheral Systems, Inc.
Casey Martin, AIA, AICP, Jacobs Engineering Group Inc.,
Darrell Rounds, FMA, CEM, General Motors Company

COBie Task Group Leadership
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Vice Chair: Brian Haines, FM:Systems
Secretary: TJ Meehan, CADD Microsystems
ISS Liaison: Robert Anderson, Vectorworks, Inc.
Past Chair: Kerry Joels, TMA Systems
William Brodt, National Aeronautics and Space Administration
Angeriglica Carasquillo-Manguel, U.S. Army Corps of Engineers
Marty Chobot, Inwicara Pte. Ltd.
Thomas Dalbert, Onuma, Inc.
Bill East, PhD, PE, FASCE, Prairie Sky Consulting
Danielle Gran, Kristine Fallon Associates, Inc.
Ortez Gude, Corvado
Yong Ku Kim, Onuma, Inc.
Robert Mencarini, Building Informatics
Chuck Mies, Autodesk, Inc.
Frank Moore, Autodesk, Inc.
Nicholas Nisbet, buildingSMART UK & I
Kimon Onuma, Onuma, Inc.
Brad Peterson, ARCHIBUS, Inc.
Ross Powell, TMA Systems
Don Shirley, Bentley Systems, Inc.
Andy Smith, Bentley Systems, Inc.
Igor Starkov, EcoDomus
Nick Stefanidakis Sr., ARCHIBUS, Inc.
John Sullivan, Autodesk, Inc.
Brandon Tobias, U.S. Army Corps of Engineers
Grace Wang, Jacobs
James Watson
Jim Whittaker, Facility Engineering Associated, PC
Michael Willette, ARCHIBUS, Inc.
Doug Wood, IBM
FHWA Advancement of Bridge Information Modeling Standards

The National Institute of Building Sciences continued its work on the Federal Highway Administration (FHWA) Advancement of Bridge Information Modeling (BrIM) Standards Project in 2015, conducting an analysis to evaluate the bridge life-cycle process; evaluating potential bridge modeling schema; and completing analyses of two common types of bridges: a 4-span steel girder and 5-span reinforced concrete box beam, to test the application of the candidate schema. Based on those analyses, the Institute developed an accompanying exchange specification using the Industry Foundation Class (IFC) schema to develop a model view definition (MVD) for the Design to Construction Contract Exchange then conducted workshops to get input on preliminary results and obtain feedback from bridge experts. The Institute prepared a draft final report and MVD for FHWA and industry review. The report identifies a pathway for BrIM standardization based on, and making use of, the work that has been done for buildings by the Institute’s buildingSMART alliance®, as well as buildingSMART International and its members.

Looking Ahead

The Institute will complete the report and MVD for FHWA’s use and distribution, and work with FHWA, the American Association of State of Highway Transportation Officials (AASHTO), state departments of transportation and technology companies to implement the recommendations in the report and MVD to advance a common and standardized methodology for defining BrIM data.

Learn More

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ProjNetSM

ProjNetSM is a secure, integrated, internet-based suite of construction design and communication tools that allow all authorized project business partners to participate in document exchange and examination, inquiry, comment, record storage and issue resolution. In 2015, the National Institute of Building Sciences provided ProjNetSM sales support and oversaw Riverside Research’s hardware, software, networking, information assurance, programming and support activities. The team worked with the U.S. Army Corps of Engineers (USACE) Construction Engineering Research Laboratory (CERL) to complete a Certification and Accreditation (C&A), separate from the existing C&A in place for the U.S. Department of State (DoS). The Army granted ProjNet.com a one-year Authority to Operate (ATO) for the USACE-CERL site. The maintenance and development team maintained the site and addressed user requirements while providing support to the DoS Overseas Building Operations (OBO) and Office of Real Property Management, USACE, the Naval Facilities Engineering Command (NAVFAC), National Aeronautics and Space Administration (NASA) and several other organizations and agencies at the federal, state and local government levels. Programming staff prepared and presented a modernizing proposal and project plan in late 2014, which was approved for implementation by the owner of the system, USACE-CERL, in March 2015.

Looking Ahead:

Modernization of the ProjNetSM site will continue through 2016 while maintaining and supporting the current platform. Information assurance staff will also work with both DoS and the U.S. Army to extend the existing ATOs that both expire in 2016.

Learn More

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National Clearinghouse for Educational Facilities

Architects, engineers, planners, builders, state and local officials, administrators and teachers all look to the National Clearinghouse for Educational Facilities (NCEF) website, at www.ncef.org, as an important resource for information on planning, design, funding, building and maintenance of schools, from pre-K through university. Throughout 2015, NCEF functioned solely as an archival site due to lack of funding. Despite its archival status, NCEF still remains a primary resource of information on constructing and maintaining educational facilities. In recent years, a heightened interest in school safety and security has been a major driver for NCEF use. NCEF’s continued popularity convinced the Institute to consider advertising as a revenue stream to allow redesigning the website and reviving NCEF to be an up-to-date resource on all facets of educational facility design.

Looking Ahead

In 2016, the NCEF website will be kept open for all users as its content is migrated into Drupal, a new and powerful content management system. The addition of advertising to the site pages will provide income to maintain the newly formatted site and support fresh content being posted regularly.

buildingSMART International Product Room and buildingSMART Data Dictionary Management

The National Institute of Building Sciences continued to provide leadership of the buildingSMART International (bSI) Product Room and support the buildingSMART Data Dictionary (bsSDD) operation in 2015. The Product Room saw growth in participation in response to national programs in various countries developing common object libraries to support building information modeling (BIM) programs around the world. bSI is pursuing strategies to integrate the bSDD with all of the bSI open standards, including the Industry Foundation Classes (IFC), Information Delivery Manual (IDM) and Model View Definition (MVD), to better meet user requirements for model and non-model data management.

Looking Ahead

The Institute will support the bSI Product Room and the bSDD programs in 2016 as they continue to develop and grow.

GSA Unit Cost Study Update

The National Institute of Building Sciences worked to update and expand the 2010 U.S. General Services Administration (GSA) Public Building Service (PBS) unit costs studies for federal office buildings, court houses, laboratories, land ports of entry, hardened offices and repair alterations and modernizations. To achieve the 2015 update, the Institute researched changes to the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) criteria, Energy Independence and Security Act of 2007 (EISA) mandates and the GSA PBS 2015 edition of the Facilities Standards for the Public Buildings Service (P100) document. These references were used to refine cost models associated with the GSA PBS building types, which are used by GSA portfolio managers for budgeting of new construction or renovations.

Looking Ahead

The project will conclude in 2016 with the addition of the cost models of U.S. Department of Veterans Affairs building types. The GSA Office of the Chief Information Officer (OCIA) will construct a web-based application to facilitate use of the unit cost models.

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Hundres of building professionals descended on the nation’s capital to attend Building Innovation 2015: The National Institute of Building Sciences Third Annual Conference & Expo. During the Conference, held January 6-9, 2015, at the Washington Marriott Wardman Park in Washington, D.C., the diverse audience collaborated on Creating High-Performing Resilient Communities. The four-day event presented five symposia, one special session and three keynotes, delivering over 50 presentations and the chance to earn up to 32 continuing education credits. Eighteen committee and council meetings and multiple networking events gave attendees ample opportunities to catch up on projects and share ideas. Two award ceremonies highlighted industry advances and leadership while 22 exhibitors showed off the latest industry advancements on the exhibit floor.

The Conference kicked off Tuesday with annual meetings for Institute councils and committees including the Council on Finance, Insurance and Real Estate where the council issued a new report, Financing Small Commercial Building Energy Performance Upgrades: Challenges and Opportunities. The first keynote speaker, James T. "Tim" Ryan, Chairman of the Institute’s Board of Directors and Code Administrator for the City of Overland Park, Kansas, addressed the Tuesday luncheon. Ryan, who has witnessed a number of natural hazard events during his three decades working for a jurisdiction, reinforced the importance of the conference theme. As the Institute wrapped up its 40th Anniversary celebration, Ryan also talked about setting priorities for the Institute’s future and the value of tapping into the enormous wealth of knowledge at the Institute’s disposal.

Wednesday began with an opening plenary keynote by Bryan Koon, Director of the Florida Division of Emergency Management and President of the National Emergency Management Association (NEMA). Koon talked about creating high-performing resilient communities and provided Florida’s perspective on disaster management and the steps that state has taken to improve mitigation for its jurisdictions. The Security & Disaster Preparedness Symposium: Means and Methods for Creating Resilient Communities, focused on ways to improve resilience and prepare for disasters. Speakers addressed a range of topics, from facilities hazards and risk assessment, through codes and governance, to social considerations and economics, and community resilience. During its Annual Meeting, the Consultative Council released its 2014 Moving Forward Report. The Information Resources and Technologies Symposium: Improving Facilities with the Power of Information looked at the opportunities that exist for the owner of an information-rich facility. It started with the end in mind, optimizing facility operations, then looked at resilient facilities and information’s role when disaster strikes; construction as an information goldmine; Vision 2021: The Challenge; getting started on the right foot and taking the first critical steps; and then a wrap-up session. Innovations from the leading companies and organizations exhibiting during the Conference were highlighted by a Walking Lunch where attendees networked while seeing the latest innovations and activities from the exhibitors. The evening ended with the Exhibitors Reception, which offered attendees more time to interact with colleagues and exhibitors.

On Thursday, the Industry Leadership & Advocacy Symposium: Leading the Way to High-Performing Communities focused on how the various segments of the building industry can come together to realize buildings in high-performing communities. At the Facility Performance & Sustainability Symposium: Setting the Foundation for Resilient Communities, presenters established the connection between performance, sustainability and resilience, and demonstrated how to set performance-based design objectives and analyze results to support decision-making. During the Beyond Green™ Awards, the Sustainable Buildings Industry Council recognized the winners of the 2014 Beyond Green™ High-Performance Building and Community Awards. The Institute also held a CEO Summit during the day. That evening, the Institute hosted its Annual Reception and Awards Dinner, featuring a retirement celebration honoring Senior Vice President and Chief Operating Office Earle Kennett.

On Friday, the Plenary Symposium: Creating High-Performing Resilient Communities began with a lightning round of innovative presentations by Institute program directors, followed by a CEO Panel that discussed how the industry organizations are working to achieve industry and community goals. At the FEDCon® Luncheon, Norman Dong, Commissioner, Public Buildings Service (PBS) at the U.S. General Services Administration (GSA), discussed GSA’s workplace initiatives, focusing on performance and the results from projects under the American Recovery and Reinvestment Act (ARRA).

In the afternoon, the Multihazard Mitigation Council (MMC) held a Special Session: Ten Years after “Mitigation Saves” – An Examination of the Value of Private-Sector Investment in Mitigation. Presenters discussed a vision for developing Version 2 of the 2005 MMC study, which will look at private-sector investments in mitigation and evaluate their effectiveness.

The final activity of the week was a meeting of the Institute’s Board of Directors.
Moving Forward:
Findings and Recommendations from the Consultative Council

Introduction

The U.S. building industry is a dynamic industry. The challenges it faces have significant implications for the nation’s economy and citizens. Each year, the National Institute of Building Sciences, through its Consultative Council, brings together key stakeholders from across the building industry to examine the challenges and opportunities before both the industry and the nation. The Consultative Council compiles the most critical issues, along with strategies to address them, into a report to help the industry and the nation's policymakers better deliver the high-performance buildings and communities that meet societal, governmental, owner and occupant goals.

For the 2015 Moving Forward Report, the three primary topics were: Resilience and a Changing Climate; Aligning Government and Business to Deliver a Cost-Effective, High-Performance Built Environment; and The Building Workforce.

I. Resilience and a Changing Climate

Communities are trying to become more resilient to disruptions from hazards, such as severe weather, floods, hurricanes, earthquakes, man-caused threats. To successfully mitigate these changing risks, public- and private-sector stakeholders need to understand the evolving effects of climate change and its potential impacts on their existing and new building stock; infrastructure; and social needs and systems. Communities need codes, standards, guidance and tools that will help them recognize their risks and prevent disruptive hazards from becoming disasters.

A. An Industry Statement on Resilience

To truly accomplish resilience at the community level requires the engagement, cooperation and coordination of numerous disciplines and stakeholders. In 2014, recognizing this need for collaboration and coordination, the building industry came together to issue a joint statement on resilience, committing to work to significantly improve the resilience of the nation’s buildings, infrastructure, public spaces and communities. The statement focuses on specific aspects where the industry has the greatest opportunity to make a difference. Based on these priorities, the Consultative Council offers the following recommendations, several of which are discussed in greater depth in this report:

1. Research materials, design techniques, construction procedures and other methods to improve the standard of practice.
   - Federal agencies that address climate-related issues (potentially under the auspices of the U.S. Global Change Research Program) and climate researchers should engage with members of the design, construction and operations disciplines to assess the performance of buildings during catastrophic events and support the development of tools and information that incorporate the anticipated climate changes into codes, standards, guidance and industry practice.¹

2. Educate our profession through continuous learning. Through coordinated and continuous learning, design, construction and operations professionals can provide their clients with proven best practices and utilize the latest systems and materials to create more resilient communities.
   - As recognized in the March 19, 2015, Executive Order—Planning for Federal Sustainability in the Next Decade, the design, construction and operations communities must increase their capability to understand and incorporate climate-resilient principles into their work. The industry should develop, with the technical and financial support of federal partners, educational coursework to build such capabilities.²
   - Government leaders should work with facility owners; planning, design, construction and operations representatives; and resilience and disaster-preparedness professionals to establish common metrics and performance standards that can drive implementation of effective resilience strategies.

3. Advocate at all levels of government for effective land use policies, modern building codes and smarter investment in the construction and maintenance of our nation’s buildings and infrastructure.
   - Federal agencies should actively engage in the codes and standards development process, alongside industry stakeholders, to assure federal priorities are considered and federally supported research findings are incorporated. Such engagement should support the existing private-sector-led development process and the importance of life-cycle costs and benefits in determining the overall code content.
   - Federal agencies with an interest in building codes should work collaboratively to support the adoption of the latest codes at the state and local level through the provision of incentives, technical assistance and training of state and local leaders and code officials.
   - The design, construction and management disciplines should work with owners and project developers (including within government) to develop and implement innovative approaches to procurement and delivery of a high-performance built environment, including public-private partnerships (design-build-finance-operate-maintain procurement), performance-based contracting and integrated project delivery. Where necessary, regulatory and policy barriers must be reviewed and changed to capture the benefits of such approaches.
   - Beyond-code programs play an important role in providing consistency to owners, manufacturers and members of the design, construction and operations disciplines on the achievement of higher-performing facilities. Federal agencies (both as facility owners and subject matter experts) should participate in the development of such programs and use them.

¹ The U.S. Government Accountability Office is in the process of conducting a study on current efforts relating to climate change and future opportunities. The National Institute of Building Sciences also has begun to undertake work in this area in response to a recommendation included in the 2014 Moving Forward Report.
B. Addressing Drought and Water Use Concerns

The nation must address the need to respond to increasing droughts (in particular, the utilization of finite water resources) and continue on a path towards increased levels of water efficiency in buildings. The Federal Government should take the leadership role in supporting plumbing research, including the development of pipe-sizing methodologies, policies to support utilization of alternative water sources and incentives to reduce energy and water use in order to help ensure adequate water supplies, especially in regions of water scarcity, while addressing and mitigating the unintended consequences of water efficiency.

The nation needs the Federal Government to take the leadership role in the following areas in order to help ensure adequate water supplies, especially in regions of water scarcity, while addressing and mitigating the unintended consequences of water efficiency:

- Support plumbing research – Congress and the Administration should direct and fund the National Institute of Standards and Technology (NIST) to reopen its plumbing research facility. NIST leadership is needed to work with industry to develop new, statistically based models for calculating water-supply pipe sizing in buildings. Reducing pipe size increases the scouring action of the water within the pipes, which helps to reduce biofilm growth, where pathogens like legionella grow and multiply. This effort would carry the added benefit of decreasing construction costs and wait times for hot-water delivery, thus saving both water and energy usage throughout the life of the building.

- Develop a new statistical model for pipe sizing – The U.S. Environmental Protection Agency (EPA) should support the research and development of less-invasive water sub-metering technologies. The information obtained from sub-metering will result in a better understanding of complex water-use patterns associated with various building types.

4. Respond alongside professional emergency managers when disasters do occur. Industry experts routinely work in partnership with government officials to survey damage, coordinate recovery efforts and help communities rebuild better and stronger than before.

- Members of the design, construction and operations community have extensive building-related knowledge, which is valuable in responding to a hazard event. Such expertise should be utilized to the greatest extent practical without the fear of liability for licensed professionals. State and local governments should support passage of laws that open the door for professionals to participate constructively in response and recovery.

- Code officials are valuable resources to their communities, serving alongside police, fire and emergency medical services (EMS) in both mitigation and pre-event planning, as well as recovery after a disaster event. They play a valuable role in post-disaster assessments of structures and are a key asset in the rebuilding process. State and local government leaders should be prepared to take advantage of the capabilities of code officials and confirm that disaster management agencies are including code departments in their planning and recovery processes. The Federal Emergency Management Agency (FEMA) also should develop coordinated training for code officials at the federal level—as is done for fire officials at the National Fire Academy.

5. Plan for the future, proactively envisioning and pursuing a more sustainable built environment.

- Members of the building industry, with the engagement of stakeholders—including lifelines—at the federal, state and local level, should work to develop guidance and tools that support increased resilience. Particular attention should be given to interdependencies across lifelines and infrastructure.

C. Code Development, Adoption and Enforcement Support

Building and related safety codes and standards are an essential part of public safety in the United States. The key to making facilities safe and able to resist natural disasters is the adoption of building codes based on science and technical knowledge, combined with proper design and construction practices and strong code compliance mechanisms. Properly enforced building codes also allow communities to quickly rebound from devastation caused by those disasters. Codes enhance economic development and ensure consistency among jurisdictions; yet adopting jurisdictions can make amendments that best fit their climatic, geographic and other local needs.

To support the development, adoption and enforcement of building codes, the Consultative Council makes the following recommendation:

- The U.S. Department of Homeland Security (DHS)/FEMA, Department of Housing and Urban Development (HUD) and DOE, working with industry partners, including insurance companies, should develop a collaborative program to support adoption, administration and enforcement of the most currently available building codes. Such a program should provide scientific and economic data associated with the effectiveness of building codes and their impacts on communities; education and training for code professionals; technical assistance; and evaluation tools for code department effectiveness.
D. Resilience and Green-Building Rating Systems

While codes provide an important means for setting baseline requirements at a community level, green-building rating systems provide a valuable resource for designers, contractors and owners going beyond minimum levels. Nationally recognized green-building rating systems contribute to the awareness of environmental issues that may impact resilience. Owners and teams using rating systems have the opportunity to mitigate effects on buildings, humans and the environment as they consider pursuit of criteria related to using an integrated design process, selection of site, evaluation of building materials and use of sound construction practices. While code development activities are responding swiftly to address new environmental threats, rating systems are also evolving to support increased awareness.

The inclusion of criteria that encourages the use of integrated design processes to reward teams for setting performance goals and maintaining focus on those performance goals throughout the design and construction process helps drive achievement of high-performance goals. The criteria also encourage incorporation of community representatives where issues such as resilience and regional climate threats can and should be brought into the planning process.

The green-building rating systems encourage a focus on evaluation of building materials for life-cycle assessment issues, which may result in teams selecting materials with lower carbon emissions, among other objectives. In addition to reducing environmental impacts, rating systems can help teams think through life-cycle cost and building service life or durability issues that may be impacted by regional climate threats. As these national rating systems evolve, their stakeholders should strive to encourage owners and teams to use integrated design processes that involve broad community input; select sites with full consideration of regional climatic threats and resource capacity; evaluate building material durability and service life issues; conduct moisture control analyses to decrease water intrusion potential; and evaluate other opportunities through the use of rating systems to safeguard occupants and the long-term value of property during times of high-impact events.

II. Aligning Government and Business to Deliver a Cost-Effective, High-Performance Built Environment

Building owners and government agencies both aim to realize specific goals in the design, construction and operations of the built environment. Many of these goals are focused on similar ends—particularly around safety and security, and sustainability. Working collaboratively toward these goals will assure implementation of the most cost-effective strategies. Such strategies can lead to increased industry productivity—a long-standing challenge for the industry.

A. Streamlining Regulatory Processes for Buildings and Infrastructure

High-performance, sustainable and resilient buildings and infrastructure require the consideration and integration of numerous systems and practices—which are regulated by different government entities. Regulatory efficiency and compliance with modern construction codes and standards and other government regulations requires implementation of a system that supports streamlined approaches to compliance. Having regulatory agencies of federal, state and local governments work collaboratively, with the support of advanced information technology resources, can assure regulatory requirements are met and projects needed for economic, environmental and social benefits, such as resilience to disasters, can go forward in a timely and cost-effective manner.

Recommendation:

- The White House, through the Office of Management and Budget (OMB) and with the engagement of DOE, EPA, HUD, DHS, the Access Board and U.S. Economic Development Administration (EDA), and working with industry stakeholders, should identify opportunities to align regulatory implementation and compliance requirements to support achievement of desired outcomes in the most cost-effective and efficient manner. The state and local levels should also conduct such a process and, ultimately, across all three levels of government.

B. Utilizing Standards to Support Interoperability and Lower Transactional Barriers

Standards have a direct relationship with the global macro economy. Consistency in measurement standards at an international level helps to improve economic efficiency and provide the ability to accurately understand, interpret and benchmark property assets. In conjunction with emerging technologies, it also allows better data collection and predictive use of data. In May 2013, the International Property Measurement Standards (IPMS) Coalition formed to develop and implement global standards for the measurement of real property. In November 2014, the Coalition published IPMS for office buildings. The Coalition is expected to publish standards for other asset classes—residential, industrial, retail, and mixed use—in the next two years. A separate coalition has been formed, the International Construction Measurement Standards (ICMS) Coalition, to address global standards for construction.

One central theme in construction and facility and asset management is decision-making. International standards and building information modeling (BIM), separately and jointly, improve decision-making. Standards also allow classifications to be developed for the productive use of technology. In the built environment, BIM and ‘big data’ promise much, but they have to overcome industry global challenges and fragmentation. Various studies have shown that improving project performance is only possible by improving decision-making at each stage of the project life-cycle. In turn, decision-making can only be improved by providing the right information, in the right form, at the right time.

Recommendations:

- The Administration should establish an inter-agency committee to engage with the International Property Measurement Standards (IPMS) Coalition and the International Construction Management Standards (ICMS) Coalition in the consultive process and work towards the timely implementation of IPMS and ICMS across the public buildings stock—this includes use in BIM associated with renovations or new construction.

C. Innovative Solutions to Pressing Finance and Performance Needs

Numerous building industry and consumer groups have identified the current state of the nation’s infrastructure as a challenge to ongoing realization of economic goals. Several potential solutions have emerged, including a greater focus on life-cycle performance and total cost of ownership and utilization of innovative financing mechanisms.
1. Small Commercial Building Energy Retrofit Finance

As identified in a report by the Institute’s Council on Finance, Insurance and Real Estate, small commercial buildings offer a significant, yet untapped opportunity to improve energy performance. The retrofit market for small commercial buildings is conservatively estimated to be $35.6 billion, assuming a 30% improvement in performance for buildings constructed before 1980. A market this size would create an estimated 424,000 job-years of full-time employment and reduce greenhouse gas emissions by 87 million metric tons a year. Small building retrofits would also improve the resilience of the nation’s built environment and would take pressure off the aging electric grid.

Despite this considerable opportunity, numerous market barriers are preventing meaningful financing and investment in retrofits for the small commercial building market. Small commercial buildings are less likely to be well-leased, well-located and occupied by strong-credit tenants. As a result, these buildings typically fall outside the investment parameters of institutional lenders and investors, making it more difficult to supply capital for energy retrofits.

Recommendations

- Federal agencies should expand and deploy programs to facilitate state and local energy retrofit financing efforts.
  - Expand existing research, program development and technical assistance programs, including EnergyStar, and DOE’s Commercial Building Energy Consumption Survey (CBECS) and Energy Efficiency and Renewable Energy (EERE) initiatives, which provide cost-effective approaches to market expansion.
  - The Federal Government is well-positioned to support research and deployment of control software and hardware for building performance tracking, reporting and analysis. Activities in this arena will enhance the measurement and verification of building energy performance and energy retrofit outcomes.
  - Federal credit enhancements and guarantees, such as those offered under the Small Business Administration (SBA) 7(a) and 504/Certified Development Company (CDC) programs, are a potent and well-tested way to attract substantial additional private financing to the small commercial building retrofit market. Developing a program that combines SBA’s small business financing expertise and DOE’s energy-efficiency technical support would be ideal.
  - Federal policymaking should encourage public-private energy retrofit approaches. To date, public-private ventures have been the most successful model for delivering energy retrofit financing to the small commercial building sector and have demonstrated the most potential to scale. Such initiatives should:
    - Leverage public credit enhancements, superior collection methods and sanctions to improve loan security and leverage significant private capital flows.
    - Use standardized administrative processes, legal documents and contractor training.
    - Bundle utility, federal, state and local tax incentives.
    - Aggregate small projects into larger energy-retrofit contracts.
    - Provide turnkey services to the property owner.
    - Promote cost-effective and readily deployed and replicated energy-conservation measures.
    - Public policies and programs should be designed to anticipate the future aggregation of energy-retrofit loans into bonds and to provide the basis for appropriate loan documentation. Secondary markets, when appropriately controlled for risk, help to maximize financing opportunities and reduce financing costs.

2. Utilizing Innovative Procurement, Contracting and Financing Mechanisms

Building owners and policymakers are becoming increasingly interested in the performance of buildings. Whether driven by sustainability, resilience concerns or the desire to protect the investments of taxpayer dollars, government agencies are under increasing pressure to achieve performance-based requirements. These pressures are coming at a point when the budgets for new facilities, major capital improvements and long-term maintenance are shrinking. At the same time, there is greater public recognition of the need to incorporate a full life-cycle approach, increase sustainability, strengthen resilience and improve building performance. These challenges and requirements are spurring governments to look for new models to meet their long-term building performance goals.

Public-private partnerships (P3s) offer governments the opportunity to overcome challenges related to project financing while driving achievement of performance requirements. P3s have emerged as a potential procurement and finance model to engage the private sector in helping stretch public-sector dollars, meet agency needs, introduce innovation and meet long-term performance goals cost-effectively. Across federal, state and local government, the policies for use of such a procurement and financing mechanism vary. More than 30 states have enabling legislation that addresses P3s at the state level, in a variety of models. Yet, a path forward for Federal Government utilization of P3s is currently unclear.

Recommendations:

- Increase the focus on measured, actual performance through new and emerging contracting tools, codes, policies and practices. This will require the sharing of best practices, sample contracts and case studies, along with efforts to address industry concerns around liability for non-performance. Tax incentives and utility programs should incorporate requirements based on actual, measured reductions in energy use.
- Examine public-sector procurement models for opportunities to expand models that support life-cycle budgeting to optimize cost-effective performance. This includes examining Federal Acquisition Regulation (FAR) and Defense Federal Acquisition Regulation (DFAR) requirements and Office of Management and Budget (OMB) and Congressional Budget Office (CBO) scoring methodologies. Expand utilization of performance-based contract requirements and P3/design-build-operate-maintain contracts.
- Incorporate system-level requirements and operations-focused criteria into baseline codes and other policies to assure long-term performance and focus on diligent design, construction

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6 Case Study: Governor George Deukmejian Courthouse (Long Beach Court Building). See http://www.wbdg.org/references/cs_longbeach.php.
and operations in support of community goals and protection of subsequent owners of projects constructed for short-term investors.

- The building industry—with involvement of representatives from the legal, finance and insurance sectors—should conduct a dialogue on how to evolve the current state of fees, timelines and risk in furtherance of a systems-based approach to realize actual, measured performance results.

- Establish a federal level body to help coordinate and provide guidance for both federal and state-level P3 efforts. This should include an educational component for policymakers and procurement officials.

### D. Implementing Whole-Building and Performance-Focused Strategies

To date, strategies to reduce the impact of buildings on society or the environment largely have focused on design-based interventions or component-by-component strategies. While such strategies have resulted in some level of improvement in the built environment, it is becoming increasingly obvious that today’s goals require a new approach—one focused at the systems or whole-building level and the actual, measured achievement of performance goals. Setting realistic performance goals requires supporting data. A number of efforts are already underway, including the emergence of benchmarking and disclosure requirements at the state and local level.

#### Recommendations:

- The U.S. Congress should consider a comprehensive approach to provide energy-efficiency incentives for buildings, including tax credits, deductions and depreciation schedules in developing tax reform measures. Tax incentives should be performance-based and linked to measurable energy savings; incentives might also be targeted to encourage retrofits that deliver substantial efficiency gains.

- Policymakers should leverage national CBECS data and the growing quantity of voluntary and mandatory benchmarking and disclosure programs to create more meaningful building performance databases. Better collection and dissemination of energy consumption and benchmarking data will support the design of more meaningful energy models and help owners, tenants, buyers, sellers, appraisers and banks to evaluate the performance of specific buildings and the interventions with the greatest return on investment.

- The building industry should develop and implement guidance, standards and other tools that focus on the systems and whole-building level, while including performance criteria. The General Services Administration (GSA) P-100 Facilities Standards for the Public Buildings Service,7 and the private-sector National Performance Based Design Guide8 are examples of such tools.

#### 1. A Holistic Incentivization Strategy for Resilience Investments

Resilience has come to occupy a place in public policy and programs across the United States. Yet, even in the face of growing losses and the deleterious effects of natural disasters, the nation’s capacity and appetite is waning for continued federal and state funding for pre- and post-disaster mitigation as part of efforts to promote resilience. A new approach is necessary—one focused on capturing the potential incentives provided by both the public and private sectors for pre- and post-hazard investment. The most cost-effective manner to achieve resilience is through a holistic and integrated set of public, private and hybrid programs based on capturing opportunities available through mortgages and loans; insurance; finance; tax incentives and credits; grants; regulations; and enhanced building codes and their application. This focus on inducing corrective action is called “incentivization.”9

This approach calls for input, consensus, leadership and action from a broad spectrum of stakeholders that represent the entire U.S. incentivizing community and the regulatory and economic processes that need to be developed and coordinated to make incentivization part of the nation’s economic fabric. Such discussions need to occur at high enough levels in the public and private sectors to ensure enactment. Participants should include those who offer incentives, such as: insurance and finance-related companies, lenders and foundations, as well as forward-thinking communities and federal and state government agencies. It also needs to include homeowners, businesses, utilities and communities as decision-makers. The private sector will not undertake investment to support achieving resilience just because it is sensible, but because is economically prudent. Therefore, stakeholder offerers need a level of confidence that using incentives to implement mitigation strategies to achieve resilience will justify investments, underwriting and loan and grant programs. Decision-makers want the certainty that they can offset the cost of implementing mitigation strategies. In this win-win scenario, all stakeholders should experience the expanded benefits and co-benefits of resilience, including reduced losses and operational continuity. Once incentives start becoming the standard practice for leading private-sector stakeholders, the rest of the private sector should begin to follow.

Incentivizing property owners, lenders and securitizers to increase the use of mitigation standards should involve:

- The development and adoption of appraisal and bond underwriting standards that recognize the valuation benefits of building resilience, all other factors being equal. [Enhanced appraised values allow a borrower to leverage more mortgage financing for a given loan-to-value ratio. Conversely, for a specific loan amount, a more-resilient building will be better collateralized (that is, have a lower loan-to-value ratio) than a less-resilient comparable property. Similarly, bonds tied to more-resilient properties would carry higher ratings, thus minimizing interest expense to the issuer.]

- The establishment of federal, state or local tax incentives for building owners participating in mitigation programs and grant programs to support participation in approved mitigation initiatives.

- Establish education and training programs for realtors and brokers to support expanded disclosure of building performance features, which could drive the marketplace to seek these resilience strategies.

Additional incentives strategies would be especially useful for residential properties:

- The expansion of federal home renovation programs to include mitigation improvements.

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7 GSA P100 Facilities Standards for the Public Buildings Service. See http://gsap100.wbdg.org/
8 National Performance Based Design Guide. See http://npbdg.wbdg.org/
• Interest rate reductions for residential mortgages, provided, through Fannie Mae and Freddie Mac, on properties built to approved mitigation standards. This approach was recently introduced by Fannie Mae for mortgages on green-certified residential properties.

Buildings owned by small businesses are likely to face special challenges implementing mitigation strategies for resilience. There is currently a significant market gap in supplying renovation financing for such properties. Closing the gap should include:

• Locally administered resiliency programs that would provide turnkey renovation services to participating property owners. Local property-assessed clean energy (PACE) programs are already providing such services for green building renovations.

• Federal SBA loans guaranteed by the federal government and made by private lenders or community development financial institutions, to finance building resiliency upgrades. SBA loans are already a key source of building acquisition and renovation financing for small businesses, although such loans lack specific resiliency requirements.

• Contractor-based financing, whereby a general contractor would develop turnkey resilience programs for small buildings.

• Public-private solutions, combining PACE and SBA approaches with private capital and delivery of resilience-based renovation programs at the local level.

Financial institutions are increasingly becoming involved in resilience discussions. Incentives for mitigation in resiliency programs could also be addressed through the capital markets:

• Corporate debt ratings, in appropriate cases, could recognize mitigation strategies. This approach would focus on companies whose assets are significantly concentrated in facilities or equipment in a single region or urban area prone to natural disasters, where such an event would have a profound effect on property loss and business discontinuity. Such companies would experience improved bond ratings, all other factors remaining equal, by adopting comprehensive mitigation strategies that achieve resilience. Similarly, municipal bonds linked to the construction of resilient facilities in regions prone to natural disasters could realize enhanced bond ratings, other factors being equal.

• Resilience-based real estate investment trusts (REITs), private equity funds and bond issuances could represent potential market innovations. In such cases, resiliency approaches could be combined with other environmentally-friendly approaches. Such investment strategies would address growing investor appetites for green investments, while resiliency strategies would reduce investment risk and improve portfolio operating performance.

E. Cybersecurity of Buildings and Critical Infrastructure

Building control systems with embedded communications technology, as well as those enabled via an Internet Protocol (IP) address, provide critical services that allow a facility to meet the functional and operational needs of users and occupants. Unfortunately, they also can be easy targets for hackers and people with malicious intent. Facility/building control systems, such as building automation systems, energy management systems, physical security access control systems and fire alarm systems, are now considered potential hacking points into an organization.\(^{10}\)

**Recommendation:**
• Building industry members, particularly facility managers, manufacturers and system technicians, should investigate and deploy existing federal and private-sector tools to assure the cybersecurity of building control systems. This includes training to recognize and address vulnerabilities.

III. The Building Workforce

Concerns are growing about the availability of a workforce that can design, construct, operate and regulate the high-performance facilities being demanded by building owners and policymakers. These concerns focus both on the availability of skilled workers for the current and near-term, as well as into the future.

The reasons for skilled labor shortages are multi-faceted. In general, the overall workforce is aging. In addition, the recent recession and down-turn in construction resulted in many construction workers leaving the industry for other sectors of the economy. Finally, quality training programs, particularly for hourly craft professionals, are lacking. School systems have dismantled public vocational and technical education programs, participation in union apprenticeship training is declining and high school programs have put an increased focus on college preparatory programs.

At the same time the industry is experiencing short-term labor challenges, it also is expecting to face a long-term need for new entrants into the field. According to the U.S. Bureau of Labor Statistics, the construction sector is projected to grow twice as fast as the average for all industries in the coming years, creating 1.6 million jobs between now and 2022.

**Recommendations:**
• States and localities, with support from federal agencies and private sector representatives, should expand the availability of career and technical education programs, both at the high school and post-secondary education levels. State and local governments should enact legislation to permit the development of charter schools and construction career academies and give public school leaders the opportunity to establish construction career academies.

• All members of the building industry should serve as champions for the industry, by serving as mentors and advocating within the educational community and to parents, teachers, guidance counselors, students, business leaders and other decision makers to support technical/vocational curriculum that meet the needs of today’s workplace.

IV. Conclusion

The findings and recommendations included in this condensed version of the 2015 Moving Forward Report represent the building industry’s latest thinking on the tools, technologies, resources and policies needed to achieve the goals established by policymakers, the public and the industry itself. These goals can be achieved by engaging and collaborating with all industry stakeholders. To view the full report, visit www.nibs.org/CC.
### Statements of Financial Position

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## Statements of Activities

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<td><strong>1,272,032</strong></td>
<td><strong>1,110,595</strong></td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>13,951,523</strong></td>
<td><strong>17,247,721</strong></td>
</tr>
<tr>
<td><strong>Change in Net Assets</strong></td>
<td>$(106,262)</td>
<td>$(432,710)</td>
</tr>
</tbody>
</table>

The accompanying notes of the Institute’s audited financial statements are an integral part of these financial statements. For a complete copy, write to: National Institute of Building Sciences, 1090 Vermont Avenue, NW, Suite 700, Washington, DC 20005-4950
The Institute Staff

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Executive Assistant to the President

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