Innovative Solutions for the Built Environment

ANNUAL REPORT
to the President
of the United States
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABOUT NIBS</td>
</tr>
<tr>
<td>4  Letter to the President of the United States</td>
</tr>
<tr>
<td>8  About the Institute</td>
</tr>
<tr>
<td>8  Board of Directors</td>
</tr>
<tr>
<td>9  Membership</td>
</tr>
<tr>
<td>INDUSTRY LEADERSHIP &amp; ADVOCACY</td>
</tr>
<tr>
<td>11 Coordinating Council</td>
</tr>
<tr>
<td>12 Consultative Council</td>
</tr>
<tr>
<td>12 Low Vision Design Committee</td>
</tr>
<tr>
<td>13 Off-Site Construction Council</td>
</tr>
<tr>
<td>14 National Council on Building Codes and Standards</td>
</tr>
<tr>
<td>15 Commercial Workforce Credentialing Council</td>
</tr>
<tr>
<td>16 Science, Technology, Engineering and Mathematics Education Program</td>
</tr>
<tr>
<td>17 Council on Finance, Insurance and Real Estate</td>
</tr>
<tr>
<td>SECURITY &amp; DISASTER PREPAREDNESS</td>
</tr>
<tr>
<td>19 Building Seismic Safety Council</td>
</tr>
<tr>
<td>20 Scientific Resolution Panel</td>
</tr>
<tr>
<td>20 SAFETY Act for Commercial Facilities</td>
</tr>
<tr>
<td>21 Multihazard Mitigation Council</td>
</tr>
<tr>
<td>22 Natural Hazard Mitigation Saves</td>
</tr>
<tr>
<td>FACILITY PERFORMANCE &amp; SUSTAINABILITY</td>
</tr>
<tr>
<td>25 Building Enclosure Technology and Environment Council</td>
</tr>
<tr>
<td>26 U.S. Department of Defense – Defense Health Agency</td>
</tr>
<tr>
<td>26 VA Facility Management Programs</td>
</tr>
<tr>
<td>27 National Mechanical Insulation Program</td>
</tr>
<tr>
<td>INFORMATION RESOURCES &amp; TECHNOLOGIES</td>
</tr>
<tr>
<td>29 Building Research Information Knowledgebase</td>
</tr>
<tr>
<td>30 WBDG Whole Building Design Guide®</td>
</tr>
<tr>
<td>31 GSA Central Facility Data Architecture and Taxonomy</td>
</tr>
<tr>
<td>31 buildingSMART alliance®</td>
</tr>
<tr>
<td>32 National BIM Standard-United States®</td>
</tr>
<tr>
<td>32 Information Exchange</td>
</tr>
<tr>
<td>33 Facility Maintenance and Operations Committee</td>
</tr>
<tr>
<td>34 ProjNet™</td>
</tr>
<tr>
<td>35 FHWA Building Information Modeling for Bridges</td>
</tr>
<tr>
<td>36 buildingSMART International Product Room</td>
</tr>
<tr>
<td>37 U.S. Department of State Overseas Building Operations BIM Program Development</td>
</tr>
<tr>
<td>MOVING THE INDUSTRY FORWARD</td>
</tr>
<tr>
<td>39 Annual Conference</td>
</tr>
<tr>
<td>42 2018 NIBS Annual Awards</td>
</tr>
<tr>
<td>44 Moving Forward: Findings and Recommendations from the Consultative Council</td>
</tr>
<tr>
<td>54 2018 Financial Statements</td>
</tr>
<tr>
<td>56 NIBS Staff</td>
</tr>
</tbody>
</table>
Dear Mr. President:

The National Institute of Building Sciences is pleased to provide you with this Annual Report that highlights the work the Institute has conducted over the past year to help improve the safety, performance, and resilience of the nation’s buildings and communities.

In 2018, the Institute continued its mission to provide an open forum for discussion among the various facets of the building sectors.

Focusing on the areas outlined in the enabling legislation, the Institute continues to establish performance criteria, standards and other technical provisions to maintain life, safety, health and public welfare. We develop such materials to be suitable for adoption by the jurisdictions and agencies that regulate buildings, including test methods and other evaluative techniques relating to building systems, subsystems, components, products and materials with due regard for addressing consumer problems. Our councils, committees and work groups engage with private organizations, institutions, agencies and federal, state, local and other governmental entities, giving particular attention to the development of methods that encourage representation from all sectors of the economy and ensure national interests are protected and promoted for the best results.

Throughout the year, the Institute initiated several new projects designed to shape the future of the organization and set in place a plan to achieve even greater success for the building community and in the built environment.

As you read this report, you will see how our councils and committees continued to identify, plan and execute activities that reach our goals and move our mission forward. We continued to align our councils and committees to tackle issues across multiple lines of discussion to improve the effectiveness of the work we do and to gain broader acceptance in the building community. By bringing all the parties together, we can better address the challenges of multiple facets of the building industry in a more cohesive manner.

Our councils, committees and work groups focus on solving some of the nation’s most significant building-related problems. We are grateful to the Institute members and the organizations they represent for their contributions to the many activities of the Institute and, particularly, the projects highlighted in this report.

In 2018, the Institute continued its progress on a multi-year study to update and expand Natural Hazard Mitigation Saves study developed by the Multihazard Mitigation Council (MMC) in 2005 for the Federal Emergency Management Agency (FEMA). In October, the project team issued the report, Natural Hazard Mitigation Saves: Utilities and Transportation
Infrastructure, which looks at the benefit-costs results of Economic Development Administration mitigation grants and specific mitigation strategies for infrastructure. The team also finalized the Natural Hazard Mitigation Saves: 2018 Interim Report, which was released in January 2019 and outlines the benefits jurisdictions would gain from moving from low-level codes to adopting 2018 model building codes. The findings in these reports provide local, state and federal entities with the data they need to better implement a more robust system of protection for their communities. Such information also helps to raise the understanding of homeowners, businesses and industry so they can select cost-effective measures to protect their property and assets.

Throughout the year, the Council on Finance, Insurance and Real Estate (CFIRE) continued its collaboration with the MMC to develop a framework for a resilience mortgage and incentives for hazard mitigation. CFIRE participated in a number of projects, including providing input to FEMA on the Federal Flood Risk Management Standard. CFIRE worked with the American Institute of Architects (AIA) New York Chapter to present Funding to the Future: Resilience Planning Across Public and Private Sectors in June, and with the Urban Green Council to present Weathering the Storm: The Intersection of Finance and Resilience in October.

The National Council on Building Codes and Standards (NCBCS) continued its coordination with industry organizations on potential changes and updated proposals for the 2021 International Existing Building Code (IEBC). NCBCS also continued its development activities on a web tool for cities on life-cycle energy policies and worked with the Alliance to Save Energy on a new WBDG Whole Building Design Guide® resource page on building systems efficiency.

The Building Enclosure Technology and Environment Council (BETEC) sponsored and the Building Enclosure Council (BEC) BEC-Philadelphia (one of 34 BEC chapters across the nation) hosted the fifth triennial BEST Building Enclosure Science and Technology (BEST5) Conference in Philadelphia in April. Some 300 participants attended the event, where BETEC launched the first three modules that professionals can take to earn a joint ASTM/NIBS certificate in building enclosure commissioning (BECx).

The Building Seismic Safety Council (BSSC), under the sponsorship of the Federal Emergency Management Agency (FEMA), continued its work for the National Earthquake Hazards Reduction Program (NEHRP) to develop the NEHRP 2020 Recommended Provisions for New Buildings and Other Structures and update the U.S. Geological Survey’s seismic design value maps.

The Facility Maintenance and Operations Committee (FMOC) initiated six task work groups, including groups on transitioning from construction to operation, artificial intelligence in
LETTER TO THE PRESIDENT

building; designing for maintainability; total cost ownership; facility management standards; and prioritizing capital reinvestment for a property portfolio. During the year, the FMOC developed and published two resource papers, Design for Maintainability: The Importance of Operations and Maintenance Considerations during the Design Phase of Construction and Transitioning a New Facility from Construction to Operations and Asset Management.

The Off-Site Construction Council (OSCC) continued to develop additional implementation resources on the utilization of off-site construction technologies, working to update several existing resource documents, including Getting the Most Out of Off-Site Construction: Steps for Success; Using Precast Concrete as an Off-Site Construction Strategy; and The Rise of Modular Construction: Emerging Commercial and Legal Considerations. The OSCC also finalized the results of education and industry surveys, and undertook an initiative with AIA to provide information and support to architects who use off-site construction methods.

Among its many projects to support the federal agencies, the Institute worked with the U.S. Department of Homeland Security (DHS) Science & Technology (S&T) Office of Safety Act Implementation (OSAI) on the Best Practices for Anti-Terrorism Security (BPATS) assessment tool for commercial facilities, accompanying user manuals and online training to help assessors and building owners conduct facility assessments using the BPATS. Commercial facility owners can utilize these best practice resources to assess exposure of their buildings to a terrorist attack.

As established in the enabling legislation, the Consultative Council includes a broad base of agencies and organizations knowledgeable in the field of building technology, with representatives from private, trade, professional and labor organizations; private and public standards, code and testing bodies; public regulatory agencies; and consumer groups. This council continues to provide guidance and recommendations in areas of importance to the nation and our built environment. In 2018, the council addressed the important role that existing buildings play in achieving a high-performance building stock. The resulting report, 2018 Report Moving Forward: Findings and Recommendation offers a look at various ways to improve the performance of the nation’s existing building stock. The Council outlines efforts undertaken to date and the challenges that still remain. The report, found at the end of this Annual Report, will initiate a broader discussion that can shape the future use of our nation’s existing buildings.

As demonstrated in the wide range of deliverables the Institute accomplished over the past year, our strategy, working across councils and with greater engagement of the building community, has proven to be effective and productive. Engaging a broad segment of the building industry, including designers, constructors, material producers, suppliers and
academia, the Institute remains a leading force to address the most demanding issues facing our built environment.

We would also like to take this time to thank the former President of the Institute, Henry Green, for his efforts leading the organization over the past 10 years. He retired in December, so the work you see in this report is due to his dedication to the organization. As we move forward, our role in bringing the building community together continues to be imperative to improve efficiencies, avoid duplicative efforts and make our nation more productive and ready for the next challenge. The Institute stands ready in the year ahead to lead the way.

Thank you for this opportunity to share our work with you.

Sincerely,

Joseph B. Donovan
Chairman, Board of Directors

Lakisha A. Woods, CAE
President and CEO
About NIBS

The U.S. Congress established the National Institute of Building Sciences in 1974 to bring the public and private sectors together to address building science and technology-related issues to improve the safety and performance of buildings. Today, the Institute continues to provide the opportunity for free and open discussion of issues and problems where there was once conflict and misunderstanding. It continues to assemble federal, state and local government agencies and representatives of the private sector for open working sessions that seek a consensus solution to problems of mutual concern. The Institute also works with federal agencies on projects related to the built environment to help achieve national goals. Headquartered in Washington, D.C., the Institute’s professional staff provides technical, managerial and administrative support for the Institute’s programs.

NIBS 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 U.S. Senate, to represent the public interest. The remaining 15 members are elected and can represent either public interest or industry voices. Board representation includes architects, builders, building owners, building standards developers, consumers, contractors, educators, fire safety professionals, insurance representatives, 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.

2018 BOARD OF DIRECTORS

Chair: Joseph B. Donovan, Beacon Capital Partners, Arlington, VA
Vice Chair: Carl Hedde, Munich Reinsurance America, Inc., Princeton, NJ
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James “Tim” Ryan, CBO, City of Overland Park, KS
James Timberlake, FAIA, KieranTimberlake, Philadelphia, PA
Mary B. Verner, MES, JD, Washington State Department of Natural Resources, Olympia, WA
## Member Organizations

### MEMBERSHIP
Without the commitment of its membership, the National Institute of Building Sciences simply could not accomplish its mission to improve the built environment by advancing building science and technology. Representing all disciplines of the building community, Institute members lend their expert knowledge and first-hand experiences toward the development of sound solutions to better the industry. They generously contribute time and energy to serve on the boards, councils, committees and projects to support the Institute’s work. Members represent the construction industry, government agencies, design professionals, software developers, manufacturers, insurers, educators, researchers and others. With their support and active participation, the Institute successfully serves as the industry’s leader and advocate for the construction and maintenance of safe and sustainable buildings and communities.

### SILVER SPONSOR ORGANIZATION
U.S. Department of Veterans Affairs

### ALLIANCE SPONSOR ORGANIZATION
FM Global
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NBBJ
U.S. Army Corps of Engineers
U.S. General Services Administration

### CONTRIBUTING SPONSOR ORGANIZATION
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### SUSTAINING ORGANIZATION
AABC Commissioning Group (ACG)
Aconex
AEC Science and Technology, LLC
American Concrete Institute
American Iron & Steel Institute
American Society of Professional Estimators
American Wood Council
APA – The Engineered Wood Association
ArchiDATA Architect of the Capitol ASHRAE
Building Owners & Managers Association, Intl.
Building Systems Design
Burns & McDonnell
Charles Pankow Foundation
Chartered Association of Building Engineers
Component Assembly Systems
Concrete Masonry Association of California and Nevada
EIFS Industry Members Association
FM:Systems
General Motors Company
Ice Edge Business Solutions
Insurance Institute for Business & Home Safety
International Association of Plumbing and Mechanical Officials
International Code Council, Inc.
Invicara Pte Ltd.
Jaros, Baum & Bolles
Keter Construction & Development, Inc.
Legrand
McCarthy Building Companies, Inc.
Modular Building Institute
NASA
National Association of Home Builders
National Building Museum
National Ready Mixed Concrete Association
Naval Facilities Engineering Command (NAVFAC)
National Council of Structural Engineers Association (NCSEA)
National Environmental Balancing Bureau (NEBB)
Newforma, Inc.
Onuma, Inc.
Precast/Prestressed Concrete Institute
Portland Cement Association
Professional Retail Store Maintenance Association (PRSM)
Professional Roof Consultants, Inc.
Romanyk Consulting Corp.
SEAOC
Site 1001, Inc.
Structural Engineering Institute
Underwriters Laboratories
Vectorworks
Virginia Department of Housing and Community Development
The Williams Companies, Inc.
Wisconsin Department of Administration
INDUSTRY LEADERSHIP & ADVOCACY
The Coordinating Council meets several times a year to share updates on projects and discuss activities of the standing councils and committees. The meetings, held in tandem with the National Institute of Building Sciences Board of Directors meetings, give the members, consisting of the leaders of each of the Institute’s standing councils and committees, and members of the Board of Directors an opportunity to communicate about their activities and share ideas for potential collaboration across Institute projects and council activities. The Institute’s councils and committees consist of professionals from a wide range of fields.

The Coordinating Council provides an assembly point for these experts from different industries and backgrounds—who may not interact in their daily careers—to meet and discuss mutual concerns, keep apprised of each group’s efforts and provide input on Institute projects. In 2018, the Coordinating Council served as the meeting ground for the Multihazard Mitigation Council and the Council on Finance, Insurance and Real Estate to discuss disaster mitigation. The assembly of the group also triggered a discussion about winding down the Sustainable Buildings Industry and High Performance Building councils, since other Institute programs and building industry organizations had taken up their missions.

LOOKING AHEAD
In 2019, the Coordinating Council will meet throughout the year to discuss program activities and collaborate on mutual areas of interest.
Consultative Council

Throughout the year, the Consultative Council developed the 2018 Moving Forward Report, which featured findings and recommendations to the President and U.S. Congress that focus on the building industry of the future. The report, which will be released during the council’s Annual Meeting at Building Innovation 2019, is included at the end of this Annual Report. In 2018, the Consultative Council also conducted outreach activities associated with the 2017 report, including a Congressional briefing during High-Performance Building Week, and generated related fact sheets on 2017 directives to advance the building workforce and address water-related issues.

LOOKING AHEAD
Following the release of the report at Building Innovation 2019, the council will continue its outreach through Congressional briefings and other outlets. The Council also will begin developing the 2019 Moving Forward Report, with an intended release during Building Innovation 2020.

Low Vision Design Committee

The Low Vision Design Committee (LVDC) extended its outreach efforts throughout 2018, speaking nationally to the Environments for Aging Expo & Conference in Savannah in April. The LVDC works to fulfill its mission to “address the needs of all occupants of the built environment, including those with low vision, through improvements in designs and operational procedures for new and existing facilities to enhance the function, safety and quality of life” by identifying relevant knowledge—and research gaps—and sharing that knowledge through the creation and refinement of design guidelines and building standards, including its seminal Design Guidelines for the Visual Environment.

LOOKING AHEAD
In 2019, the LVDC hopes to offer a presentation to the Environments for Aging Expo & Conference in Salt Lake City in April. The group also will continue to pursue financial alternatives to convert its guideline into a national standard.

LEARN MORE
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LEADERSHIP
Chair: Vicki Worden, GBI
Vice-Chair: Wanda Edwards, RCI
Off-Site Construction Council

Throughout 2018, the Off-Site Construction Council (OSCC) continued to develop additional implementation resources on the utilization of off-site construction technologies. The Council converted a number of presentations from its 2016 webinar series into resource documents, including Getting the Most Out of Off-Site Construction: Steps for Success; Using Precast Concrete as an Off-Site Construction Strategy; and The Rise of Modular Construction: Emerging Commercial and Legal Considerations. The OSCC undertook an initiative with AIA to provide information and support to architects who use off-site construction methods. The Council also initiated activities with the Construction Specifications Institute (CSI) to develop joint guidance on effectively specifying and using off-site construction components. Later in the year, the OSCC released the results of its 2017 education and industry surveys, which compare the 2014 and 2017 results from both educators and building professionals. The results provide an update on industry use and academic teaching of off-site construction.

LOOKING AHEAD

In 2019, the OSCC will continue dialogue with AIA and CSI; work with other organizations to create consensus documents to support users of off-site construction technologies; and develop additional guidance documents.

LEARN MORE

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LEADERSHIP

Chair: Tom Hardiman, Modular Building Institute
Vice-Chair: Laurie Robert, NRB
Secretary: Dean Frank, Dean Frank Associates
Institute Board Liaison: Paul Bertram, PRB Connect
INDUSTRY LEADERSHIP & ADVOCACY

National Council on Building Codes and Standards

In 2018, the National Council on Building Codes and Standards (NCBCS) continued coordinating with industry organizations on potential changes and updated proposals for the 2021 International Existing Building Code (IEBC). The Council brainstormed on a white paper addressing the roles that codes and code officials play during disasters, and discussed additional topics for new white papers. The NCBCS continued activities relating to the development of a web tool for cities on life-cycle energy policies and worked with the Alliance to Save Energy on a new WBDG Whole Building Design Guide® resource page on building systems efficiency. NCBCS members also provided input on the new Natural Hazard Mitigation Saves multi-year study and related 2018 Interim Report.

LOOKING AHEAD

In 2019, the NCBCS will work with the Off-Site Construction Council (OSCC) on potential development of new codes relating to off-site construction inspection. Members will continue progress on white papers. Given that the 2018 Interim Report has a significant focus on building codes as a means to achieving mitigation, the Council also will look to leverage that work in communicating the value of building codes.

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LEADERSHIP

Chair: Henry Kosarzycki, State of Wisconsin, Department of Health Services
Vice-Chair: Bill Koffel, Koffel Associates
Secretary: Jonathan Flannery, American Society for Healthcare Engineering
Institute Board Liaison: Cindy Davis, Virginia Department of Housing & Community Development
Stephen Jones, Millburn Township, New Jersey
Scott McDonald, Department of Development Services, City of Denton, TX
Emory Rodgers, Virginia Building Officials Association
Commercial Workforce Credentialing Council

In 2018, the National Institute of Building Sciences, through its Commercial Workforce Credentialing Council (CWCC), continued to support the U.S. Department of Energy (DOE) Better Buildings Workforce Guidelines (BBWG). During the year, the Institute and DOE welcomed more accredited BBWG jobs: Certified Commissioning Processing Professional (CxPP) from National Environmental Balancing Bureau and Certified Energy Management Professional from the Energy Management Association. To advance the education of the energy efficiency workforce, the CWCC worked with a cohort of community colleges to help them design curriculum that would be eligible for DOE recognition following the Certificate Program Guidelines developed previously. In addition, the CWCC completed accreditation requirements for a Blast Protection Professional (BPP) Job Task Analysis (JTA) under a grant from the U.S. Department of Defense (DOD) Combating Counter-Terrorism Technical Support Office (CTTSO).

LOOKING AHEAD
The CWCC will continue to support the DOE BBWG program in 2019, working on outreach with the public and private sectors, coordinating with credentialing bodies on BBWG certifications and certificates and supporting educational programs. The CWCC also will continue to support BPP credentialing materials and work with a credentialing body to offer a BPP certification.

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LEADERSHIP
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Don Gilligan, National Association of Energy Service Companies (NAESCO)
Jerry Kettler, Facility Performance Associates
John Lee, New York City Mayor’s Office
Kim Lenihan, New York State Energy Research and Development Authority
Kelly Hebert, The South-Central Partnership for Energy Efficiency as a Resource
Elizabeth Obregon, U.S. Department of Homeland Security
Paul Rode, RxR Construction Services
Carolyn Samo Goldthwaite, Northeast Energy Efficiency Partnership (NEEP)
Priya Swamy, Holly Carr, U.S. Department of Energy
Science, Technology, Engineering and Mathematics Education Program

The cornerstone project of the NIBS Science, Technology, Engineering and Mathematics (STEM) Education Program, the Mars City Facility Operations (Ops) Challenge, continued to elevate in 2018. During the year, the STEM Program hosted a booth at the 2018 USA Science and Engineering Festival, where staff and volunteers presented a virtual reality walkthrough of the Mars City base.

LOOKING AHEAD

The staff will continue working with other members of the Building Sciences Pavilion to develop common messaging and promotion of the online Building Sciences Career Center available on the WBDG Whole Building Design Guide® website. Additionally, the project team will continue developing the Mars City Facility Ops Challenge, adding functionality and integration across the program’s various components.

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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
Council on Finance, Insurance and Real Estate

Throughout 2018, the Council on Finance, Insurance and Real Estate (CFIRE) worked extensively, in collaboration with the Multihazard Mitigation Council (MMC), to develop a framework for a resilience mortgage and incentives for hazard mitigation. CFIRE members participated on an oversight committee for the Natural Hazard Mitigation Saves multi-year study. The Council participated in a number of projects, including providing input on the Federal Flood Risk Management Standard. CFIRE members also gave two presentations during the year: in June, CFIRE worked with the American Institute of Architects (AIA) New York Chapter to present Funding to the Future: Resilience Planning Across Public and Private Sectors, and in October, with the Urban Green Council to present Weathering the Storm: The Intersection of Finance and Resilience.

LOOKING AHEAD

In 2019, CFIRE will continue work with the MMC to develop a framework for a resilience mortgage. Additional focus areas include the valuation of renewable energy systems and the incorporation of resilience and energy efficiency measures into the insurance and financial underwriting process.

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LEADERSHIP

Institute Board Liaison: Brian Garbecki, PE, LEED AP, Gilbane Building Company, Boston, MA
Building Seismic Safety Council

In 2018, the Building Seismic Safety Council (BSSC), under the sponsorship of the Federal Emergency Management Agency (FEMA), continued to develop the 2020 Recommended Provisions for New Buildings and Other Structures for the National Earthquake Hazards Reduction Program (NEHRP). The Provisions Update Committee (PUC) hosted three meetings and oversaw the work of nine issue teams. The PUC conducted 23 ballots on 19 technical proposals. Eight of the 19 proposals passed the PUC and were approved by the BSSC Board of Direction for Member Organization (MO) ballot. In addition, BSSC’s Project 17 Committee (P17C), under the sponsorship of FEMA and coordinated with the U.S. Geological Survey (USGS), held two meetings and oversaw the efforts of five work groups to develop guidelines for the next generation of seismic design value maps. Project 17 balloted three proposals, two of which passed the P17 and were forwarded to PUC and one failed. The P17 work officially wrapped up in 2018 and a P17 final report was prepared to summarize the findings and recommendations. In addition, the ASCE/SEI 7-16 adoption report was complete and published on the BSSC website; and the PUC 2018 Interim Report documenting the important technical proposals during the fiscal year 2018 was competed and will be published on the BSSC site. Seven online on-demand courses based on the 2015 NEHRP Provisions, reflecting the latest changes in ASCE/SEI 7-16, were developed and to date, 44 persons have taken the training courses. PUC members and BSSC staff delivered presentations at the Structural Congress and 11th National Conference on Earthquake Engineering.

LOOKING AHEAD

In 2019, the PUC will meet three times during the fiscal year, and each of the issue teams is expected to meet several times. A new Mapping Issue Team will be formed to develop proposals based on the P17 recommendations. PUC ballots must be substantially complete by August 2019 to meet ASCE’s schedule for developing the next edition of ASCE/SEI 7-22. The BSSC also will continue to conduct outreach efforts.

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COUNCIL LEADERSHIP

Chair/Retired: James R. Cagley, P.E., S.E., Cagley & Associates

Vice Chair/Acting Chair: Charles J. Carter, PhD., P.E., S.E., American Institute of Steel Construction

Secretary: Jennifer Goupil, P.E., Structural Engineering Institute, American Society of Civil Engineers

At-Large: Bahram Zarinafsar, AIA, Zarinafsar & Associates, Inc.

At-Large: Anne M. Ellis, PE, FACI, FASCE, Anne Ellis, LLC
Scientific Resolution Panel

In 2018, the National Institute of Building Sciences continued its Scientific Resolution Panel (SRP) work with FEMA. During the year the Institute was asked to convene two SRPs — a joint Coastal Appeal for the Cities of San Bruno and South San Francisco, San Mateo County, California in FEMA Region IX and a Riverine Appeal for the Township of Wayne, in Passaic County, New Jersey located in FEMA Region II. The San Bruno and South San Francisco Panel delivered its decision and report to the FEMA Administrator and the communities in April 2018. The Township of Wayne Panel held a kick-off meeting in mid-October and delivered its final determination, within the SRP’s statutory 90-day review and evaluation period, in late February of 2019.

LOOKING AHEAD

In 2019, the Institute will continue to convene SRPs on an as-needed basis to address community appeals and/or FEMA concerns and update the SRP website with an intended release during Building Innovation 2020.

SAFETY Act for Commercial Facilities

In 2018, the National Institute of Building Sciences working for the U.S. Department of Homeland Security (DHS) Science & Technology (S&T) Office of Safety Act Implementation (OSAI) completed and released the Best Practices for Anti-Terrorism Security (BPATS) assessment tool for commercial facilities, accompanying user manuals, and online training to help assessors and building owners conduct facility assessments. Commercial facility owners can utilize the best practices to assess exposure of their buildings to a terrorist attack. The results can be used as part of an application for coverage under the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (SAFETY Act) as described on the DHS website.

LOOKING AHEAD

In 2019, the Institute will host the BPATS Tool, provide training in its use and support the application process for commercial facility owners and assessors.
Multihazard Mitigation Council

In 2018, the Multihazard Mitigation Council (MMC) and the Council on Finance, Insurance and Real Estate (CFIRE) further developed a concept paper on resilience mortgages, reaching out to include stakeholder viewpoints from risk analysis experts, insurance providers and communities. During the year, several mortgage organizations reviewed the paper for concept feasibility. The MMC also met with Rural Studio of Auburn University to explore conducting a pilot study of the resilience mortgage concept to use for affordable housing in Hale County, Alabama and surrounding counties. The resilience mortgage is an outgrowth of the white paper, Developing Pre-Disaster Resilience Based on Public and Private Incentivization, published in October 2015, and its 2016 addendum. The Federal Emergency Management Agency (FEMA) has since adopted incentivization as an objective in its 2018-2022 Strategic Plan. In addition, an Institute team consisting of members from the MMC continued progress on the expanded mitigation benefit-cost study (see the Mitigation Saves section), preparing a 2018 Interim Report for release at Building Innovation 2019.

LOOKING AHEAD

In 2019, the MMC with CFIRE will continue to work with representatives from the housing, mortgage and insurance community to establish the resilience mortgages concept, and develop a proposal with Rural Studio for a resilience mortgage that combines energy features to create an affordable sustainability mortgage. As described in the Mitigation Saves section, the MMC will complete an additional edition of the mitigation benefit-cost study.
Natural Hazard Mitigation Saves

In 2018, the Institute released the Mitigation Saves 2017 Interim Report at the Building Innovation 2018 Conference & Expo in January. The 2017 Interim Report, developed under the sponsorship of FEMA, demonstrates that investing in hazard mitigation measures to exceed select requirements of the 2015 International Codes (I-Codes), the model building codes developed by the International Code Council (ICC), can save the nation $4 for every $1 spent. Also, the impacts of 23 years of federal mitigation program grants by FEMA, the Economic Development Administration (EDA) and the Department of Housing and Urban Development (HUD) result in a national benefit of $6 for every $1 invested. Like its 2005 predecessor, the 2017 Interim Report has been quoted in numerous publications and presented at multiple venues throughout the year.

Later in 2018, the Institute released an update to the 2017 Interim Report at the 2018 International Code Council convention in October. The update includes a study, sponsored by the Economic Development Administration (EDA), on the benefit-costs results on mitigation grants and specific mitigation strategies for infrastructure; and a second study, sponsored by the International Code Council (ICC), the Insurance Institute for Business & Home Safety (IBHS) and the American Institute of Architects (AIA), on the benefits of jurisdictions going from using low level codes to adopting the 2018 model building codes. The Multihazard Mitigation Council (MMC) project team additionally initiated efforts on benefit-costs of mitigation retrofits for the Department Housing and Urban Development (HUD).

LOOKING AHEAD

In spring 2019, the Institute will publicly release the next edition of Natural Hazard Mitigation Saves that includes mitigation retrofit benefit-costs.

LEARN MORE

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Oversight Committee: Mitigation Saves 2017 Interim Report
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Gavin Smith, Coastal Resilience Center of Excellence
Tim Reinhold, Insurance Institute for Business & Home Safety
Peter Vickery, Applied Research Associates
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In 2018, Institute members participating on the Building Enclosure Technology and Environment Council (BETEC) worked together to increase the understanding of the roles individual building components and the environment play in optimizing energy use. By sharing knowledge of existing and new technologies and practices, BETEC integrates technical programs on building safety, durability, resilience and occupant comfort with the thermal performance of building envelopes. Continuing its joint venture with The American Institute of Architects, the Institute under the aegis of BETEC, oversaw 34 local chapters of the Building Enclosure Councils (BECs) which have amassed 4,000 members to date. BEC-Iowa, the newest chapter, launched in 2018. Together with the Institute, BETEC sponsored the fifth triennial BEST Building Enclosure Science and Technology Conference (BEST5). The three-day Conference, hosted by BEC-Philadelphia at the historic Loews Philadelphia Hotel in Philadelphia in April, presented more than 300 participants with knowledge from researchers and practitioners on the science and art of the building enclosure. Those attending had the opportunity to look back on the history of buildings to gain inspiration on ways to achieve innovative strategies for energy efficiency and resiliency in existing and future building enclosure. During BEST5, BETEC delivered the first three training modules of a workshop leading to a joint ASTM/NIBS certificate in building enclosure commissioning (BECx).

LOOKING AHEAD

In 2019, BETEC members plan to undertake a major volunteer effort to update sections of the Building Envelope Design Guide, part of the Institute’s WBDG Whole Building Design Guide® website. The P17C will conclude its work on the seismic maps.

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COUNCIL LEADERSHIP

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Chair: David Herron, AIA, Principal, herron + partners
Vice Chair: Steven Shanks, Chief Operating Officer, CTI Consultants Inc.
Past Chair: Theresa Weston, PhD, Technical Fellow, Dupont Building Innovation
AIA Building Performance Committee Liaison: Cheryl Smith, AIA
U.S. Department of Defense – Defense Health Agency

In 2018, the National Institute of Building Sciences assisted the U.S. Department of Defense (DOD) Defense Health Agency (DHA) with technical support to enhance the facility budget cost models of its real property portfolio. The Institute guided DHA on its Capital Improvement Decision Model (CIDM 5.0 – 6.0) process. In addition, the Institute team developed recommendations relating to project management; execution, including military construction (MILCON); sustainment; restoration; and modernization. The tasks led to strategic planning for future policy adoption.

LOOKING AHEAD

In 2019, the Institute will continue work on newly awarded task orders that facilitate DHA’s initiative to share data with other federal agencies and consider life-cycle management principles in sustaining and maintaining medical facilities. The Institute expects to begin a DHA Commissioning pilot program by the end of the year.

VA Facility Management Programs

In 2017, the Institute completed its contract with U.S. Department of Veterans Affairs Construction and Facilities Management (CFM) for a historic preservation reuse initiative, which included development of a building reuse assessment tool to evaluate historic buildings for adaptive reuse; investigation of best practices for the reuse of historically significant buildings for healthcare-related services; and prototype designs for VA historic building configurations for clinical, administrative and residential healthcare services. The Institute directed a project team of five subject matter expert firms to synergize their knowledge into a toolkit that will be used cross-platform internally and shared by VA’s central offices and local Veterans Integrated Service Networks. In June 2018, the Institute teamed up with VA CFM staff to present the Assessment Tool and its uses at the AIA national convention in New York City, to an audience of more than 200 architects.

LOOKING AHEAD

The Institute has completed its obligations to the VA under this contract.

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National Mechanical Insulation Program

In 2018, the National Mechanical Insulation Committee (NMIC) for Building and Industrial Applications updated information in the Mechanical Insulation Design Guide (MIDG) hosted on the WBDG Whole Building Design Guide® web portal and worked with the National Insulation Association (NIA) to support the use of mechanical insulation continuing education e-learning modules as a prerequisite to the NIA’s Thermal Insulation Inspector Course which is currently in the final stages of development. The Committee is chaired by the NIA’s Foundation for Education, Training and Industry Advancement.

LOOKING AHEAD

NMIC will continue to update the MIDG and support the NIA in its Thermal Insulation Inspector Course, which will serve as a thorough introduction to mechanical insulation and the inspection process for mechanical insulation systems in new construction, retrofit, and/or maintenance applications and prepare those individuals seeking professional mechanical insulation system inspection certification.

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LEADERSHIP

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Architectural Computer Services Inc. (ARCOM - Masterspec)
ASHRAE
Midwest Insulation Contractors Association (MICA)
National Insulation Association (NIA)
North American Insulation Manufacturers Association (NAIMA)
Oak Ridge National Laboratory (ORNL)
U. S. Army Corp of Engineers (USACE)
U.S. Department of Energy (DOE)
U.S. Department of Veterans Affairs (VA)
U.S. General Services Administration (GSA)
U.S. Naval Facilities Engineering Command (NAVFAC)
INFORMATION RESOURCES & TECHNOLOGIES
Building Research Information Knowledgebase

The Building Research Information Knowledgebase (BRIK), a joint project of the Institute and The American Institute of Architects (AIA), continued its ad campaign from 2017 to increase AIA members’ awareness and use of the online research portal through dedicated print and digital advertising. This effort extended a larger campaign designed to make AIA members aware of the value of research to their practices. In the same vein, NIBS staff took part in an AIA-sponsored Research Summit in Minneapolis in July. BRIK expanded its database to include all the presentations and papers from the triennial Building Enclosure Science and Technology (BEST5), as well as all the Beyond Green Award winners from the Whole Building Design Guide for the purpose of offering a wider variety of professionally reviewed building-related research. Additionally, NIBS and AIA jointly hosted booths at Building Innovations 2018 in Washington, DC, and at the AIA National Convention in New York to showcase BRIK and demonstrate its use.

LOOKING AHEAD

In 2019, BRIK members hope to present a program highlighting research in general and BRIK in particular at the 2019 AIA National Convention in Las Vegas. The BRIK Council also will work to create a new, streamlined format for case study presentations on BRIK to encourage AIA members to submit research projects. Institute and AIA staffs will once again join forces to promote BRIK at Building Innovations 2019 in Washington, D.C. and the AIA National Convention.
2018 marked the Whole Building Design Guide’s (WBDG) 21st year of operation, and 1.5 million visitors and 5 million page views during the course of the year. Subject matter expert committees updated the sections of the WBDG in 2018, including new articles on Design for Maintainability: The Importance of Operations and Maintenance Considerations During the Design Phase of Construction Projects. Six new resource pages and several new case studies, including Saint-Gobain/CertainTeed North American Headquarters, the 2018 Beyond Green Award recipient, also joined the mix. WBDG now offers more than 123 online WBDG and Federal Energy Management Program (FEMP) courses, including a new course on Building Resiliency. Institute staff members worked to promote the use of WBDG through presentations to multiple audiences, including National Facilities Management and Technology Conference (NFMT), AIA National Convention, and the U.S. Department of Commerce Special American Business Internship Training (SABIT) program. The WBDG provided references and further reading to back up the regular articles in the Institute’s monthly newsletter, Building Sciences and Journal of the National Institute of Building Sciences (JNIBS).

**LOOKING AHEAD**

In 2019, WBDG will continue to add new case studies and resource pages, as well as new FEMP online courses. In addition, the Buildings Enclosure Design Guide (BEDG) portion of the website will receive a major refresh. Staff will continue to promote WBDG via live presentations at meetings and conferences, including the NFMT in Baltimore, and the AIA National Conference in Las Vegas, as well as via Twitter, LinkedIn and other social media, blogs and podcasts.
GSA Central Facility Data Architecture and Taxonomy

In 2018, 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 fully complete a comprehensive Industry Foundation Class (IFC)-based model view definition (MVD) to identify exchange requirements for asset management, building performance and spatial program validation between building information modeling (BIM) applications and GSA systems to support planning, design, construction and operations of its facilities.

LOOKING AHEAD
In 2019, the Institute and GSA staff will work with GSA's design consultants and software and system providers to deploy the exchange specification to allow GSA to further integrate data from BIM with its internal systems to improve facility operations.

buildingSMART alliance®

In 2018, the buildingSMART alliance® (bSa), developer of the flagship national computer-aided design (CAD) and building information modeling (BIM) standards – the United States National CAD Standard® (NCS) and National BIM Standard—United States® (NBIMS-US™), prepared to begin development of the next editions of the standard. The bSa conducted an NBIMS Planning Workshop to organize a master plan for developing NBIMS-US™ Version 4. The NCS Subcommittee conducted a review and editing effort of the NCS to prepare for development of NCS Version 7.

LOOKING AHEAD
In 2019, the bSa will assemble a Planning Committee (PLC), which will meet two times during the fiscal year. Based on the results of the Planning Workshop, bSa anticipates forming up to 10 work groups to address NBIMS-US™ content, supporting tools and publication format. A PLC ballot of subcommittee and work group proposals is scheduled for later in the year. The NCS Subcommittee anticipates completing its review of the NCS by early 2019 and will conduct a Project Committee ballot on proposed changes. The Construction-to-Operation Building information exchange (COBie) Committee intends to reconvene during the year to finalize COBie 3.

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LEADERSHIP
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Vice Chair: Dennis Knight, PE, FASHRAE, CCS, CxA, LEED AP, Whole Building Systems, LLC
Secretary: Craig Dubler, PhD, Penn State University
Past Chair: Paul Audsley, Assoc. AIA, NBBJ
Member at Large: Johnny Fortune, LEED AP, Bullock Tice Associates
Institute Board Liaison: Lane J. Beougher, FAIA, Ohio Facilities Construction Commission
National BIM Standard-United States®

In 2018, 2,859 accounts were created to access the National BIM Standard-United States® (NBIMS-US™) Version 3. At its Annual Meeting in January, the buildingSMART alliance® Board of Direction outlined a vision and set goals for developing the next version of NBIMS-USTM. In February, the Alliance convened a workshop to begin planning the development of NBIMS-USTM version 4. At the workshop, the participants discussed the value NBIMS-USTM should have to the industry, and the types of content and delivery methods to be considered. In September, the Alliance conducted a second workshop that clarified a vision and goal for NBIMS-USTM version 4, which is to “Create a collection of Standards and Guidelines that support the implementation of Building Information Modeling in Design, Construction, and Operations of buildings and infrastructure in the US and beyond.” Workshop participants also identified key projects and priorities. The NBIMS Planning Committee approved the revised Rules of Governance prepared by the buildingSMART alliance® Board of Direction for conducting the NBIMS development effort.

LOOKING AHEAD
In 2019, a new Planning Committee (PLC) will be assembled and meet two times during the fiscal year. It is anticipated that up to 10 work groups will be formed to address NBIMS-US™ content, supporting tools and publication format. A PLC ballot of subcommittee and work group proposals is scheduled for later in the year.

Information Exchange

In 2018, the Construction-to-Operation Building information exchange (COBie) Task Group (CTG), the group within the buildingSMART alliance® that oversees development of the COBie standard, discussed future coordination with the development of the next version of the nation’s building information modeling (BIM) standard, the National BIM Standard-United States® (NBIMS-US™), of which COBie is part.

LOOKING AHEAD
In 2019, the CTG plans to submit the team-approved COBie revisions to the NBIMS-US™ when the next standard development cycle begins.

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LEADERSHIP
Project Committee
Chair: Carrie Dossick, University of Washington
Facility Maintenance and Operations Committee

The Facility Maintenance and Operations Committee (FMOC) initiated six task work groups in 2018, including groups on transitioning from construction to operation; artificial intelligence in building; designing for maintainability; total cost ownership; facility management standards; and prioritizing capital reinvestment for a property portfolio. The Committee sent a letter out to the FMOC and wider Institute memberships to invite people to join the task groups. The FMOC developed and published two resource papers, Design for Maintainability: The Importance of Operations and Maintenance Considerations During the Design Phase of Construction and Transitioning a New Facility from Construction to Operations and Asset Management, on the WBDG Whole Building Design Guide®, and hosted two related webinars on the topics.

LOOKING AHEAD

In early 2019, the FMOC hosted a kickoff meeting for the six new task groups. The Committee also plans to conduct a focus group meeting with industry leaders to brainstorm how facility managers can better contribute to the challenges and needs of the industry. The FMOC also plans to develop resource papers and training sessions through its task groups.

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LEADERSHIP

Chair: Casey Martin, AIA, AICP, Jacobs Engineering Group Inc.
Vice Chair: Rolf Alexis, General Motors Company
Immediate Past Chair: Darrell X. Rounds, FMA® C.E.M., General Motors Company
Institute Board Liaison: Brian Larson, PE, Stantec Consulting Services, Inc.
In 2018, the National Institute of Building Sciences continued to manage this secure, integrated, internet-based suite of design and construction tools, providing ProjNet™ sales support and overseeing hardware, software, networking, information assurance, programming and customer support activities. During the first quarter of FY18, the ProjNet™ team completed the United States Army Corps of Engineers (USACE) Federal Information Security Management Act (FISMA) security assessment and accreditation (A&A) of the ProjNet™ operating system and received a three-year Authority to Operate (ATO) from Department of Defense (DOD), Department of State (DOS) assessment and accreditation, which took place during the same time-period, also was approved.

The Design Review and Checking System, ProjNet-DrChecks™, the flagship application of the ProjNet™ suite celebrated its 20th anniversary. Over the past 20 years, DrChecks™ has become the de-facto public project design review and checking application. In FY18, over 30,972 public and private design and construction stakeholders worldwide used the accredited, secure online project design and review tool. The secure framework allows access to public projects by all stakeholders. By the close of FY18, 1 university, 3 commercial firms, 5 state agencies, and 12 federal agencies were using the licensed product. The site is widely used by different federal and state agencies, private firms, and education Institutions. The current customer usage distribution is 41% DOD agencies, 50% non-DOD agencies and 9% non-Federal.

LOOKING AHEAD
During the last three years, the ProjNet Team has been working to develop a new interface for the system. This interface provides a modern look and new capabilities to the system without changing its basic functionalities. It is expected that a Beta version of the updated interface will be presented to major ProjNet™ stakeholder during the system annual meeting ballot of subcommittee and work group proposals is scheduled for later in the year.
FHWA Building Information Modeling for Bridges

In 2018, the National Institute of Building Sciences continued working with the Federal Highway Administration (FHWA) and WSP, Inc. to complete the AASHTOWare-IFC integration and prepare IFC models for two bridge modeling demonstration projects for the Utah Department of Transportation. The Institute also began to provide advisory support on bridge model standardization to the AASHTO Subcommittee on Bridges and Structures (SCOBS) Technical Committee on Technology and Software (T-19) for a Building Information Modeling (BIM) for bridges pooled fund project to continue to develop and deploy BIM for design and construction of bridges.

LOOKING AHEAD
The project team will continue its FHWA work on BIM for Bridges in 2019 supporting bridge modeling demonstration projects for the Utah Department of Transportation and the AASHTO T-19 BIM for Bridges project aimed at advancing the use of open standards-based bridge models in the United States.

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buildingSMART International Product Room

National Institute of Building Sciences staff continued to lead the buildingSMART International (bSI) Product Room and supported operations of the buildingSMART Data Dictionary (bSDD) in 2018. Work continued on a complete integration with the bSI Industry Foundation Class (IFC) model and the bSDD to support connections between IFC and a wide range of building industry information. In coordination with related standards development efforts at the International Standards Organization (ISO) and the Common European Standards (CEN) level, a bSI standard to connect product data to building models was drafted for review and approval.

LOOKING AHEAD
The Institute will continue to support the bSI Product Room and the bSDD programs in 2019, as bSI continues to deploy procedures for harmonizing terminology used in models with applications and programs around the world.

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U.S. Department of State Overseas Building Operations BIM Program Development

In 2018, the National Institute of Building Sciences worked on implementation of the building information modeling (BIM) and management roadmap it developed for the U.S. Department of State Overseas Building Operations (OBO). Following the roadmap, the Institute’s project team began helping OBO create integrated workflows for OBO space planning systems. In addition to data management support, the team worked with OBO to revise OBO BIM standards; create space plan templates for BIM; identify and implement integrated digital design review procedures; and develop record modeling practices for existing and historic buildings.

LOOKING AHEAD

In 2019, the Institute will continue to support implementation of space planning, model authoring, design review, existing building record modeling and asset management BIM uses while also continuing development of the OBO BIM Roadmap to encompass related construction and operations phase uses.

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MOVING THE INDUSTRY FORWARD
Annual Conference

Building Innovation 2018 — The National Institute of Building Sciences Sixth Annual Conference & Expo brought together hundreds of building industry professionals to explore strategies to Sustain. Strengthen. Secure. Held January 8-11, 2018, at the Mandarin Oriental in Washington, D.C., the event included four enriching days of quality programming and activities; 55 presenters in 20 educational sessions offering 31 continuing education units; three keynote presentations; four networking events; one inspiring award ceremony; 20 exhibits; and the unveiling of the Mitigation Saves Interim Report. From the completed follow-up survey, Conference attendees gave Building Innovation 2018 an overall rating of 8.5 out of 10 points and provided positive feedback on the quality of programs and presenters.
MOVING THE INDUSTRY FORWARD

DAY ONE: MONDAY, JANUARY 8, 2018
Councils and Committees, Meet and Greet

The National Institute of Building Sciences kicked off the first day of Building Innovation 2018 with meetings of its Board of Directors and Consultative Council in the morning and meetings of most of the other Councils and Committees in the afternoon. The Board discussed normal business activities and voted on a number of issues. During its meeting, the Consultative Council released its 2017 report, Moving Forward: Findings and Recommendations from the Consultative Council, which goes to the President of the United States and the U.S. Congress. The groups that met in the afternoon included the buildingSMART alliance® (bSa); Commercial Workforce Credentialing Council (CWCC); BRIK Building Research Information Knowledgebase (BRIK) Research Council; Council on Finance, Insurance and Real Estate (CFIRE); Building Enclosure Technology and Environment Council (BETEC); Multihazard Mitigation Council (MMC); Commissioning Industry Leaders Council (CxILC); and WBDG Whole Building Design Guide Advisory Committee. Afterwards, attendees made their way to one of the two morning education sessions on managing life-cycle data and tools to evaluate resilience and sustainability, and then headed to the Exhibit Hall Walking Lunch where they had a chance to mingle with the 20 exhibitors and learn about the latest technologies and opportunities in the building industry.

The Off-Site Construction Council (OSCC) and Facility Maintenance and Operations Committee (FMOC) convened later in the day. After four afternoon sessions on resilient, sustainable building design; regulating existing buildings; timber construction; and improving building performance, everyone headed back to the Exhibit Hall for the Exhibitor Reception to network and discuss the day’s events.

DAY TWO: TUESDAY, JANUARY 9, 2018
Resilient Infrastructure, Education Sessions, Meetings and Exhibit

Raymond P. Daddazio, EngScD, PE, kicked off the first day of education sessions Tuesday morning at the Opening Keynote Breakfast sponsored by the American Society of Civil Engineers. The President of Thornton Tomasetti, Daddazio emphasized why resilience matters. He began his presentation talking about what makes an enduring, resilient organization and then talked about what it takes to be resilient. He cited the National Oceanic and Atmospheric Administration, which, earlier in the week, had released data showing 2017 to be the most costly U.S. disaster year on record. “We can’t afford to spend $300 billion every year,” said Daddazio. Prior to introducing Daddazio, Institute President Henry L. Green, Hon. AIA, announced the unveiling of the newly updated National Institute of Building Sciences website at www.nibs.org. Afterwards, the attendees made their way to one of the two morning education sessions on managing life-cycle data and tools to evaluate resilience and sustainability, and then headed to the Exhibit Hall Walking Lunch where they had a chance to mingle with the 20 exhibitors and learn about the latest technologies and opportunities in the building industry.

The Off-Site Construction Council (OSCC) and Facility Maintenance and Operations Committee (FMOC) convened later in the day. After four afternoon sessions on resilient, sustainable building design; regulating existing buildings; timber construction; and improving building performance, everyone headed back to the Exhibit Hall for the Exhibitor Reception to network and discuss the day’s events.

DAY THREE: WEDNESDAY, JANUARY 10, 2018
Meetings, Sessions, an Embassy and Awards

Day three of the Conference was a whirlwind of activity. Eight education sessions, held throughout the day, covered a range of topics, including a look at the future; facades; technology; air barriers and commissioning; facility management; zero-energy buildings; life-cycle coordination; and liability and risk. During the Plenary Keynote Luncheon sponsored by The American Institute of Architects, James Timberlake, FAIA, Partner at KieranTimberlake, talked about the new U.S. Embassy in London. “I know you’re not here for the beauty of the thing,” he joked. “You’re here for the dirt and the back stories.” Timberlake proceeded to share an inside look at the challenges of the project, which, at the peak of construction, had more than 1,000 workers onsite. In the afternoon, the CEO Summit convened and, during its annual meeting, the National Council on Building Codes and Standards (NCBCS) released a white paper on involving code officials early in the design process. That evening, the Institute
hosted its Annual Awards Reception, sponsored by BOMA International. At its Annual Awards Banquet, the Institute recognized new and retiring Board members and honored the 2017 award winners, and the 2017 Beyond Green™ Award winners presented their projects.

**DAY FOUR: THURSDAY, JANUARY 11, 2018**

**A 20-Year Retrospective, Updates to Mitigation Saves and Education Galore**

Day four of the Conference brought anniversaries and unveilings. During the FEDCon® Breakfast, Earle Kennett, former Senior Vice President (retired) at the Institute; Sherri McMillion, PE, CEM, Specifications and Standards Criteria Manager, Naval Facilities Engineering Command and Chair of the WBDG Advisory Council; and Bernard Deneke, PE, Director, Engineering Criteria and Programs, Naval Facility Engineering Command, presented the history, success and performance of the WBDG in celebration of its 20th Anniversary. “It was pretty cool to be involved with CD Rom in the very beginning,” said Kennett. “They’d just call and say, ‘This thing is amazing. How’d you get all of this to fit on this little disk.’” What started out with three federal agencies has grown to 12. The WBDG hosts over 6,000 documents. WBDG use has grown to an average of three million downloads by 500,000 users per month in 2017.

Six sessions covered a variety of topics, including 3-D printing; information technology; workforce performance; post-occupancy evaluation; sustainability and health; and designing for disasters. At the Mitigation Saves Presentation Lunch, the Institute unveiled the new Mitigation Saves Interim Report, with presentations by sponsors Roy E. Wright, Deputy Associate Administrator for Insurance and Mitigation at the Federal Emergency Management Agency, and Sara C. Yerkes, Senior Vice President, Governmental Relations at the International Code Council; lead author Keith Porter; and MMC Program Director Philip Schneider, AIA, and moderated by Institute Presidential Advisor Ryan M. Colker, J.D.
2018 NIBS Annual Awards

Each year, the National Institute of Building Sciences hosts an Awards Reception and Banquet to recognize outstanding service to the Institute, building community and nation. Institute board, staff and members honored the 2018 award winners at a ceremony on Wednesday, January 9, 2019, during Building Innovation 2019: The National Institute of Building Sciences Seventh Annual Conference and Expo, at the Mandarin Oriental in Washington, D.C.

THE 2018 INSTITUTE MEMBER AWARD

The Institute Member Award was awarded to a member of the Institute who made a substantial contribution to support the mission, goals and objectives of the Institute. Board Chairman Joseph Donovan and Institute President and CEO Lakisha A. Woods presented the 2018 Member Award to Cheryl A. Smith, AIA, LEED-AP, principal at Cope-Linder
Architects in Philadelphia. Smith received the award to recognize her tireless work and dedicated leadership in planning the fifth triennial BEST Conference Building Enclosure Science & Technology™ (BEST5), hosted in Philadelphia in 2018. The event brought together the building community to share invaluable research, best practices, case studies and the latest technologies with the best and brightest leaders in building enclosure design. It was Smith’s idea to showcase the work of local firms and homegrown projects at BEST5, which brought a rich new dimension to the conference series.

THE 2018 INSTITUTE HONOR AWARD
The Institute Honor Award is awarded to individuals who made an exceptional contribution to the nation and the building community. The 2018 Honor Award was presented to the Federal Emergency Management Agency, U.S. Economic Development Administration, U.S. Department of Housing and Urban Development, International Code Council, Insurance Institute for Business and Home Safety, National Fire Protection Association and American Institute of Architects in recognition of their support of the development of the Natural Hazard Mitigation Saves: 2017 Interim Report. The report highlighted the benefits of two mitigation strategies: federally funded mitigation grants and designing buildings to exceed the provisions of the model codes. This report and the subsequent 2018 Interim Report provide valuable data showing the positive impact of current mitigation efforts and offer information on potential mitigation strategies that communities can implement to reduce the impacts of natural hazards.

THE 2018 PRESIDENT’S AWARD
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. Institute President Emeritus Henry L. Green, Hon. AIA presented the award to Executive Assistant to the President Holly A. Velez, in recognition of her years of unparalleled support, insightful assistance and dedication to the National Institute of Building Sciences and for being a confidant to him during his role as president.

THE 2018 MORTIMER M. MARSHALL LIFETIME ACHIEVEMENT AWARD
The Mortimer M. Marshall Lifetime Achievement Award is the Institute’s highest honor. It is awarded 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 who passed away in 2018, this award is bestowed to those who exhibit the passion upon which the Institute is founded. Chairman Donovan presented the 2018 Mortimer M. Marshall Lifetime Achievement Award to President Emeritus Henry L. Green, Hon. AIA, to recognize his extraordinary contributions to the Institute over his decade of service.
There are over 5.6 million commercial buildings in the United States. About half are more than 35 years old. An additional 118 million housing units, of which only 3% were built in the past 10 years, make up the nation’s existing building stock. The average age of an existing building in the United States is 41.7 years; over 80% are 15 years or older. The vast majority, both by number and square footage, are small (less than 50,000 square feet). When it comes to achieving high-performance buildings, existing buildings present a unique set of challenges.

Existing buildings, both commercial and residential, represent the single largest component of a community’s infrastructure. They serve as important components of the nation’s economy, facilitating commerce, education, health and shelter. They also embody a significant portion of the nation’s wealth and investments; North American real estate assets are valued at over $47 trillion.

Existing buildings can serve as physical symbols of communities, either due to their historic contributions, the activities they house or their aesthetic qualities. Millions of labor-hours and massive quantities of products and materials have gone into their design, construction and operation. Millions of people walk through their doors daily and rely on the essential services they provide.

In this report, the Consultative Council addresses ways to improve the performance of the nation’s existing building stock. The Council outlines efforts undertaken to date and the challenges that remain. The content contained herein is intended to be a starting point for a much broader dialogue across the building industry and with policymakers.

Existing buildings are a key asset to the nation. However, they can become a drag on communities and the economy if they no longer meet the needs of today’s society. Meanwhile, the needs of society are shifting. Policymakers, building tenants and owners are placing increased emphasis on the performance of buildings, including sustainability, health and resilience. The existing building stock must be prepared to respond.

Workplaces also are changing. Densification of work spaces and co-working, the sharing economy and the freelance economy; and the increasing impact of technology are changing how people use buildings. These changes not only impact the design and use of space, but the economics of the buildings affected, with diminishing management, brokerage and parking fees. While asset values have increased, revenues from building operations are changing as the result of the growth of emerging technologies and the trend of more people moving into downtowns and leaving their cars behind. Management fees for operating facilities have been trending down for years as companies introduce more efficient means of delivering services. The ability to automate part of the leasing and brokerage functions has reduced this traditional revenue source. With people turning away from automobiles to mass transit, car sharing, bikes and walking to work, parking revenue is trending down in many cities as well. The business of buildings is changing and will continue to do so.

It is estimated that upwards of two thirds or more of existing buildings will be dysfunctional within the next 10 years. Tenants want to utilize space differently and integrate emerging technologies into their facilities. The growth of artificial intelligence presents an opportunity to accelerate improvements in building performance. It is truly a time for reinvention and change.
CHALLENGES TO ADDRESSING EXISTING BUILDINGS

Existing buildings in the United States offer the single best opportunity to make a significant impact on sustainability, resilience and energy efficiency. The industry’s success in addressing the existing building stock will have exponential impacts on the resilience of communities dealing with disasters, and provide updated and better functionality for buildings in communities as they adapt to economic, social, industry and natural changes in their regions. Enhanced focus on upgrading existing buildings also can contribute to creating and keeping jobs across all building-related disciplines, including architects and engineers, contractors, financiers and tradespeople.

Efforts to improve the existing building stock are underway on numerous fronts. However, unlike in new construction, improving existing buildings at scale offers a unique challenge. The existing building stock encompasses techniques, technologies and practices implemented over two centuries, with various renovations conducted along the way. Addressing the sustainability and resilience potential of the existing building stock requires a significant investment in time, education and resources.

An article in the Harvard Business Review summarized the challenge of working with existing buildings as follows:

“A traditional energy overhaul of a building (retrofits that include replacing mechanical systems, windows, insulation and other features during a remodel) requires significant investment, and is therefore typically timed with major renovations or capital-intensive building system replacement. While the customized approach can drive deep energy savings for an individual building and has its place in the market, it is not a model that can be deployed rapidly or at scale.

A more industrialized approach is needed, one that will reduce cost and simplify the decision-making process for buyers. However, just as each city skyline is unique, every building represents a one-of-a-kind combination of uses, systems and opportunities for efficiency — so the challenge is how to undertake an industrialized retrofit process that will address the uniqueness of each building. To gain market traction, retrofits need to be:

- Relevant (appropriate to their building)
- Fast (a project lasting less than a year),
- Capital-light (or better yet, funded by low-cost capital provided by a third party)
- Affordable (with a simple payback of less than 4 years, and ideally closer to 2).”

HIGHLY VARIABLE

No two buildings are alike. Even if constructed from the same plans, variations exist in installation and operations practices, occupant behavior and site conditions. Changes in both technology and practice over time create further variations from building to building. The commercial building stock includes buildings from before 1920 through today. When constructed, each of these buildings was designed to use different technologies and serve different purposes. Renovations since then have added even more variations.

LIMITED OPPORTUNITIES FOR INTERVENTION

Today, building codes provide the greatest opportunity to influence how a building performs over its lifetime. However, building codes largely are applicable when buildings are initially constructed and during major renovations. In most cases, buildings can go at least a decade without triggering a code requirement. Effectively transforming the existing building stock will require the implementation of mechanisms to encourage action. Incentive programs administered by government or utilities can provide some inducement. Market-based efforts ranging from competitions to benchmarking and transparency laws also drive some improvements. A few jurisdictions have implemented statutory mechanisms to begin improving the local building stock. With the level of retrofits needed to meet national or local goals, the existing triggers are not sufficient. More intervention points will be necessary.

Building codes provide an important mechanism for the incorporation of new research and practices into new construction and major renovations. However, without an event triggering compliance with such requirements, a code-based approach to upgrades represents a slow path toward improving the building stock.
VARYING OWNERSHIP MODELS
The ownership structure and philosophy for buildings vary significantly. Some buildings may be designed, constructed and operated as owner-occupied structures where the entire life cycle of the building is managed by a single entity. Other owners may purchase a building for a short period of time with the intent to sell. Each set of owners has very different motivations for performance improvements. Tenant lease structures also influence the ability and interest in improvements.

Where owners have been involved in the design process, and occupy and operate the building, incentives for upgrading commercial structures may only require education and cost-to-benefit studies. For leased space, green lease provisions designed to overcome the split incentives challenge have contributed to progress in aligning tenant interests with building improvements.

PRESERVING OUR NATION’S HISTORY
Nearly 100,000 properties in the United States are listed on the National Register of Historic Places. Several thousand more properties possess some degree of historic relevance. Maintaining their historic character while upgrading these buildings to meet 21st century performance requirements presents a challenge. In many cases, upgrades require specialists with the creativity, experience and knowledge to devise effective solutions that do not significantly alter historical elements.

EVOLVING WITH THE ELECTRIC GRID
The United States and many other countries are in the process of transforming and modernizing the electric grid. Today, the electric grid primarily is a one-way service that provides reliable electricity to end users. The vision for a future “smart grid” is much more complex. It will incorporate new sensing technology to monitor the state of the grid, make greater use of distributed sources of generation, increase the use of variable renewable energy sources and utilize information technology for collaborative interactions between energy providers and energy consumers. Achieving this vision for a smart grid cannot happen without the cooperation and integration of building systems of all types because homes and buildings consume nearly 74% of the electricity that is produced.

Changes occurring in the electric grid infrastructure will require new design and operation considerations for new and existing buildings. Facilities can be operated in ways that support the grid while potentially lowering their own costs by managing loads and storage to contribute to balancing grid-wide demand and changes to the generation mix. As the modern grid develops, building management systems are being provided signals about the condition of the grid and current prices or values for electricity or grid services. Building operators will have increasing economic or reliability incentives for responding appropriately to grid conditions. Buildings and their operations staff must be prepared to function within this new grid infrastructure and take advantage of the opportunities it provides. New tools, such as ASHRAE’s Smart Grid Applications Guide, are being developed to enable this communication, which will improve building performance as well as help optimize grid operations.

DEFINING GOALS
Policymakers and citizens have identified multiple goals for their communities, including energy efficiency, resilience, affordability and attractiveness to business. Aligning the existing building stock to meet these needs requires a careful definition of goals; the development of programs and policies to communicate the goals; and mechanisms to encourage building owners to implement them. Sustainability and occupant health represent additional priorities to address in existing buildings. As cities pick up the mantel to reduce energy use and greenhouse gas emissions, existing buildings squarely will be in their sights.

Structural improvements to the existing building stock are an important component in advancing resilience to natural hazards. Recent disaster events have shown the importance of structural retrofits to withstand these risks. The National Institute of Building Sciences is examining the benefits of such retrofits as part of its ongoing Mitigation Saves study, with results available in 2019.

Data Sources: [https://hbr.org/2016/01/old-buildings-are-u-s-cities-biggest-sustainability-challenge](https://hbr.org/2016/01/old-buildings-are-u-s-cities-biggest-sustainability-challenge) • [https://www.nps.gov/hr/research/index.htm](https://www.nps.gov/hr/research/index.htm)
ADDRESSING THE CHALLENGES
The Consultative Council and others have identified potential strategies that would benefit public and private entities for moving the existing building stock to increasingly higher levels of performance. No single approach will be successful on its own—a holistic strategy designed to address the identified challenges is needed. Though not examined in-depth, the Consultative Council looks at a number of factors below.

FINANCING AND INCENTIVES
While most building and home owners recognize the benefits that can happen when a building or home is upgraded, in almost every case, those changes require financing. Some financing models have proven effective for certain segments of the industry and for certain desired outcomes. Identifying additional financial mechanisms and incentives for implementation will be essential for widespread activity.

PERFORMANCE CONTRACTS
Energy savings performance contracts (ESPCs) and utility savings performance contracts (USPCs) have become effective models for improving energy and water performance in the municipal, university, school and hospital (MUSH) markets, where buildings typically are owner-occupied. However, such tools have not found their way into other markets and for use in addressing other high-performance attributes. Entities that rely on a combination of owned and leased properties (such as federal or state governments) could potentially benefit from a space utilization performance contract, where a third party would finance improvements in an owned property to allow improved utilization, thus reducing the need for leased space. Other performance financing models could be developed around resilience based on accompanying reductions in insurance costs.

PROPERTY-ASSESSED FINANCING
Property assessed capital expenditures (PACE) and on-bill financing have presented opportunities for energy, water and some resilience measures to be financed. While residential programs have struggled to overcome policy decisions made by federal mortgage agencies, commercial programs have been expanding. These programs have addressed one key challenge—assuring that the value and the cost of the implemented measures remain with the property.

INCENTIVES
Incentives for building and home owners will vary depending on an owner’s motivation, but generally all are incentivized at some level by the cost savings in operating the building post-renovation, and the potential for greater building safety and resilience. Finding ways to incentivize owners will advance the overall impacts of sustainability and resilience at a fast rate, providing improved building performance, cost savings and even additional jobs in communities.

Through certain tax credits and deductions, the federal government has encouraged investing in energy efficiency improvements in existing residential and commercial buildings. This includes the 179D tax deduction, which was first enacted in 2005. This deduction retroactively was reinstated for 2017 and provides a deduction of up to $1.80 per square foot for “energy efficiency improvements to lighting, heating, cooling, ventilation and hot water systems of commercial buildings.”

The effectiveness of incentives (particularly tax-related incentives) is dependent on their recognition in the marketplace and the opportunity for implementers and other related parties to establish an economy of scale. The short-term or retroactive application of incentives does not provide such an opportunity and limits the pick-up of such incentives.

For energy-related retrofits, utility programs generally have been effective in encouraging improvements. However, these programs tend to offer component-based solutions. As communities set more stringent goals, it is becoming increasingly obvious that component-based solutions will not provide the savings necessary to meet these goals. Holistic, systems-based approaches with measured savings will be required. Such approaches add complexity, but can deliver significant savings.

COORDINATING EFFORTS
Many of the incentives highlighted in this report have a financial element. Creating a holistic and coordinated approach across these elements will be necessary to drive action. The National Institute of Building Sciences, through its Multihazard Mitigation Council (MMC) and Council on Finance, Insurance and Real Estate (CFIRE), with the engagement of industry

* Details on incentivization are available at https://www.nibs.org/page/mmc_projects
stakeholders, has developed a concept termed incentivization. Incentivization focuses on developing a package of coordinated incentives offered by both the public and private sectors to cost effectively capture the benefits and costs across all stakeholders. One particular incentivization program under development is a resilient mortgage that aligns incentives to support property improvements at or near the time of sale, resulting in increased property value and decreased risk. These benefits improve the resilience of the property, while translating into the same or lower mortgage costs.

CODES AND STANDARDS
In the United States, a number of codes and standards developing organizations publish documents that specifically relate to existing buildings and the challenges discussed here.

EXISTING BUILDINGS
Throughout the nation, cities and communities are confronted with abandoned and decaying buildings. Existing building codes provide a path to renovate these structures and bring them into use without the burden of having to raze them or the cost of erecting a new building, making it more cost effective for developers and building owners. Currently, 23 states have adopted the International Existing Building Code (IEBC) developed by the International Code Council for statewide use, leaving many communities with the costlier alternative of requiring owners who renovate to comply with the same requirements as new construction.

ENERGY USE
The IEBC does not include requirements related to the energy-related upgrade of existing buildings; this requirement falls to energy codes. The International Energy Conservation Code (IECC), adopted by most states, includes ANSI/ASHRAE/IES Standard 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings as an alternative compliance path, which generally requires building alterations and additions to comply with the same efficiency requirements as new construction. A change in occupancy that would result in increased energy use triggers increased efficiencies. However, in many renovations, and in buildings that do not undergo permit-inducing work, unaltered portions of the building remain in their existing state.

ANSI/ASHRAE/IES Standard 100-2015 – Energy Efficiency in Existing Buildings provides a comprehensive approach to retrofits of existing buildings for increased energy efficiency. This resource offers over 100 typical energy efficiency measures (EEMs) that can be applied to enable buildings to meet set energy targets and identifies commonly applied elements that can improve building performance.

BUILDING COMMISSIONING
Systems commissioning provides an avenue for assuring the design intent is being continued throughout a building’s life cycle. Commissioning is the verification of some or all of the building systems and confirming they are installed and operating in accordance with the design documents. This is done through design reviews, observations and testing during all phases of construction. Commissioning is proving to be a critical piece in confirming and ensuring that building systems perform and maintain the performance intended in the design. Ideally, commissioning should be conducted on an ongoing basis to assure design intent continues to be met over the building’s lifetime. Standards for whole building commissioning and the commissioning of individual systems provide additional resources to support the ongoing realization of original design intent.

PROPERTY MAINTENANCE
Other codes centered on property maintenance provide requirements for all residential and non-residential structures and the premises. Adoption of a property maintenance code aids in maintaining minimum standards for habitability, and requires that repairs or alterations be made to meet the code. Adoption of codes like the International Property Maintenance Code (IPMC) help to prevent rundown, blighted areas and requires owners, rather than municipalities, to maintain their properties.

COMPLIANCE PATHS
The model codes typically provide two paths to code compliance—a prescriptive path and a performance path. The prescriptive path specifies detailed requirements for building design and construction. The performance path provides more flexibility in meeting the intent of the code. A third option is emerging—an outcome path—where compliance is based on the measured and verified achievement of

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overall code objectives. Given the variations in existing buildings, code requirements based on a prescriptive path may not be easily implemented. Existing systems may make such requirements technically infeasible or cost prohibitive. Performance path requirements provide increased flexibility, but they still may require approaches that may not be ideal for the identified building. For community priorities that are highly measurable and can be achieved independently of the specific designs deployed (e.g., energy and water use), an outcome-based path would allow for the greatest flexibility and support the most cost- and technically effective approach to building upgrades.

MATERIALS AND WASTE
Existing buildings, both in their initial design and construction and in operations, have a significant influence on resource use.

RECYCLE AND USE
The materials used in a building’s initial construction represent a significant investment in energy and other resources to transition them from raw materials to building products. When an existing building no longer fulfills its purpose, some of these materials may still be suitable for use in other projects. Capturing these materials, evaluating them for future use and keeping them out of landfills all provide significant benefits. However, standards are needed to assure that deconstruction is done in a manner that protects future uses, and that the resulting materials are fit for a purpose and the acceptable uses are defined.

WORKER SAFETY
In some cases, the renovation or deconstruction of existing buildings may pose potential harm to the workers undertaking such activities. This is particularly true in the case of projects where materials like lead or asbestos may be present. Assuring that workers have the proper training and protective devices is essential.

REDUCING WASTE
Building operators are looking at ways to manage waste and utilize better recycling techniques to reduce solid waste going to landfills. Real estate practitioners are focusing more attention on benchmarking their water and waste consumption and associated costs, and implementing best practices to improve performance. Resource management is a growing issue nationwide. Much of the benchmarking is being done within the ENERGY STAR program, utilizing Portfolio Manager. There is much that can be accomplished by comparing waste management best practices and successful case studies. One example is the Building Owners and Managers Association’s Water and Waste Challenge. The results benefit the environment and are good business.

WORKFORCE
To effectively execute retrofit measures and the ongoing operations and maintenance of buildings, the nation requires a workforce with the necessary skills and abilities. Unfortunately, as identified in recent Consultative Council reports and elsewhere, the building industry continues to struggle with a severe labor shortage and skills gap that impacts every trade, across every component of the building sector. U.S. Census and American Community Survey data show that the share of workers in the construction sector who are age 24 or younger—the prime age for the often challenging physical jobs in the industry—has dropped in 48 states since 2005, declining almost 30% nationwide. The result of these labor shortages translates into a direct impact on the ability of the industry to complete projects and further contribute to the economy’s health, as well as the loss of important trades skill sets that are vital to an industry that cannot outsource most of its work to other nations since it relies almost entirely on a U.S.-based workforce.

TRAINING PROGRAMS
Even before the economic downturn of 2008, high schools and community colleges were eliminating trades training programs, choosing instead to focus on training in the “high-tech” jobs of the future. After the downturn, the loss of trades training programs accelerated, with fewer young workers willing to risk jobs in an industry that was so deeply cyclical. Even fewer parents were willing to urge their children to pursue careers in an industry with such high rates of physical labor, that didn’t require a college degree, with a pay scale reported to be lower than the high-tech sector.

If there is one area that seems to unite lawmakers on both sides of the aisle and all portions of the construction industry, it is an acknowledgement that it is vitally important to develop
new ways to incentivize students, U.S. military veterans and non-traditional construction workforce segments (such as women) to pursue construction trades training and subsequent careers in the building industry.

The Trump Administration has taken up the workforce issue through the issuance of Executive Orders. However, the construction industry largely has been left out of taking advantage of the innovative approaches identified. The first Executive Order on apprenticeships acknowledged that the federal government can play a role in promoting the development of strong, reliable and high-quality industry-recognized credentials and training that targets skills development. Unfortunately, the final implementation of this Executive Order declared that the programs in the construction industry would not be eligible for this new, innovative Department of Labor (DOL) effort. The second Executive Order on Workforce Development would create the President’s National Council for the American Worker, charged with developing recommendations on how the federal government can work with the private sector, educational organizations and state and local governments to create and promote workforce development strategies that provide evidence-based, affordable education and skills-based training to prepare workers for the jobs of today and of the future. As this new body comes together, members of the Consultative Council implore the National Council to consider the important needs of the construction sector and its important role in facilitating all other sectors of the economy, including the technology sector.

While an array of quality training programs already exist to support careers in construction, the scale of the labor shortage problem illuminates the need for expanded efforts. As the federal government turns its attention to preparing the workforce of the future, the construction industry must be part of that initiative.

PERSONNEL CREDENTIALING
In addition to assuring there are workers available, those workers must have the skills necessary to manage increasingly complex buildings. Personnel credentials are one means to assess a worker’s capabilities and whether they can deliver on the performance measures implemented by building owners and policymakers. However, credentials vary widely in quality, and building owners and policymakers have challenges identifying the credentials that meet their needs. To help address this need in building-related energy careers, the U.S. Department of Energy (DOE) and the National Institute of Building Sciences developed the Better Buildings Workforce Guidelines, a set of national guidelines that can be used to develop high quality and nationally recognized training and certification programs to address challenges found in the energy efficiency workforce with quality, consistency and scalability across certification and certificate programs. These voluntary national guidelines aim to improve the quality and consistency of commercial building workforce credentials for four key energy-related jobs: Building Energy Auditor, Building Commissioning Professional, Building Operations Professional and Energy Manager. The development of these guidelines is an important first step in creating the programs the industry needs to address key workforce challenges.

INFORMATION RESOURCES AND MARKET DRIVERS
Information is power. Improving the building stock and individual buildings requires information on their current status and a potential future state to strive for. Fortunately, several tools exist to help provide such information. Building rating tools focused on existing buildings provide building owners with useful criteria. Such tools include ENERGY STAR, LEED, GreenGlobes, BREEAM, BOMA 360 and IBHS FORTIFIED.

A partnership between the U.S. Environmental Protection Agency (EPA) and DOE, the ENERGY STAR program has helped businesses and homeowners save over $16 billion in energy costs. More than 30,000 commercial buildings are ENERGY STAR certified, using 35% less energy than standard commercial buildings and commanding higher prices and rental rates because of their lower operating costs. ENERGY STAR labeled products provide consumers with information on products that can improve energy performance.

The Advanced Energy Design Guides, developed through the support and engagement of both public and private sector organizations, provide guidance for achieving energy savings beyond minimum levels contained in energy codes.
Two guides have been completed as part of the Energy Efficiency Guides for Existing Commercial Buildings:

- **The Business Case for Building Owners and Managers** — Provides the rationale for making economic decisions related to improving and sustaining energy efficiency in existing buildings.
- **Technical Implementation** — Provides technical guidance for implementing energy efficiency measures in existing buildings.

**EXISTING GOVERNMENT BUILDINGS**

As the largest operator of existing buildings in the United States (with over 400,000 buildings), the federal government greatly would benefit by increasing its high-performance building stock. In fact, the U.S. General Services Administration (GSA) found buildings that meet or exceed the Guiding Principles for Sustainable Federal Buildings save energy and water, cost less to operate, produce less waste and have more satisfied occupants compared with typical buildings.

Compared to legacy stock buildings, GSA’s high-performance buildings have:

- 23% lower energy use
- 28% lower water use
- 23% lower building operating expenses
- 9% less waste landfilled and higher overall tenant satisfaction

If 100 of GSA’s legacy stock buildings met the average performance rates of high-performance buildings, they could save taxpayers over $44 million per year.

The High-Performance Building Adoption Task Group of GSA’s independent Green Building Advisory Committee issued recommendations to accelerate the adoption of high-performance federal buildings. Those recommendations include doubling the annual rate of retrofits to achieve high-performance, particularly through the use of enhanced financing options. In order to accelerate the implementation of cost-effective improvements, GSA should work with the
Office of Management and Budget (OMB) to identify opportunities for agencies to retain savings from the measures they implement.

The Federal Buildings Personnel Training Act (FBPTA) was passed by Congress in 2010 to recognize the role trained building operators and managers play in achieving and maintaining high-performance buildings. While GSA has made significant progress in the development of tools to facilitate implementation of the Act, implementation across agencies has been uneven. Further, while required by the Act, the requirements for federal contractors working on federal buildings have yet to be fully incorporated into procurement requirements. Updates to the legislation may be necessary to reiterate Congress’s prioritization of this approach to protecting investments made in new and existing federal buildings and establish an enforcement method.

RECOMMENDATIONS

To address the findings outlined above, the Consultative Council offers the following recommendations:

- Congress should maintain strong support for federal-ly-developed, voluntary programs such as ENERGY STAR and WaterSense, which collectively have saved Americans billions of dollars and serve as widely recognized mechanisms to achieve energy and water efficiency.
- Congress should pass long-term tax incentives that encourage investments in the retrofit of existing buildings and the establishment of an infrastructure to support such incentives.
- All building owners, including federal, state and local governments, should identify opportunities to recognize personnel credentials to support achievement of their missions through both hiring practices and the process of procuring services.
- Federal entities including the Small Business Administration, the U.S. Department of Housing and Urban Development (HUD), U.S. Department of Agriculture, U.S. Department of Veterans Affairs and Fannie Mae and Freddie Mac, along with private sector stakeholders, should encourage the development of products and services that facilitate holistic consideration of resilience strategies and effectively distribute costs and benefits to all stakeholders.
- GSA should review and implement the recommendations of the High-Performance Building Adoption Task Group of its Green Building Advisory Committee to accelerate the rate of improvement and the realization of cost and resource savings.
- Congress and federal agencies, including DOE, Federal Emergency Management Agency (FEMA) and National Institute of Standards and Technology (NIST), should support research to identify modular, plug-and-play retrofit strategies that work with common building types or vintages.
- Congress, with input from the private sector, should identify and enact policies, including incentive programs, that encourage increased investment in natural and man-made hazard mitigation for existing buildings and other infrastructure. This includes ensuring FEMA mitigation grants and tools receive the necessary funding to effectively capture the significant benefits pre-disaster mitigation provides.
- The Administration, DOL and U.S. Department of Education should extend their efforts to advance apprenticeships and workforce development to include careers within the buildings and construction workforce.
- Congress and applicable federal programs should require the adoption and enforcement of building codes for all federally supported communities. If a state or locality receives federal funding or technical assistance associated with community development, infrastructure, public safety or community governance, the federal agencies providing oversight should require it to adopt and effectively enforce building codes that meet or exceed the latest model building codes.
- Federal agencies, including DOE, NIST, EPA and HUD, should support research aimed at identifying improvements to building codes and other criteria that can provide cost-effective approaches to enhanced building performance.
- Standards developers, with the support and expertise from federal agencies, including EPA and NIST, should undertake standards development focused on the effective reuse of building products in recognition of their embodied energy.
# 2018 Financial Statements

## Statements of Financial Position
September 30

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<td>Accrued Lease Obligation, Current Portion</td>
<td>$82,326</td>
<td>$82,326</td>
</tr>
<tr>
<td>Deferred Revenue</td>
<td>$349,529</td>
<td>$592,754</td>
</tr>
<tr>
<td>Total Current Liabilities</td>
<td>$1,859,825</td>
<td>$2,094,041</td>
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<tr>
<td>Accrued Lease Obligation, Net of Current Portion</td>
<td>$800,477</td>
<td>$730,068</td>
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<tr>
<td>Total Liabilities</td>
<td>$2,660,302</td>
<td>$2,824,109</td>
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<tr>
<td>Net Assets Unrestricted</td>
<td></td>
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<tr>
<td>Undesignated</td>
<td>$5,573,644</td>
<td>$4,723,473</td>
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<tr>
<td>Designated – Cash Reserves</td>
<td>$1,253,259</td>
<td>$1,264,318</td>
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<tr>
<td>Total Net Assets</td>
<td>$6,826,903</td>
<td>$5,987,791</td>
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<tr>
<td>TOTAL LIABILITIES AND NET ASSETS</td>
<td>$9,487,205</td>
<td>$8,811,900</td>
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</table>
## STATEMENTS OF ACTIVITIES

Years ended September 30

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REVENUE</strong></td>
<td></td>
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</tr>
<tr>
<td>Contracts and Grants</td>
<td>$14,503,292</td>
<td>$13,703,874</td>
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<tr>
<td>Other Publications Sales</td>
<td>$518,629</td>
<td>$30,509</td>
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<tr>
<td>Member and Other</td>
<td>$255,752</td>
<td>$228,330</td>
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<tr>
<td>Contributions</td>
<td>$(10,737)</td>
<td>$1,788</td>
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<tr>
<td>Meeting and Other</td>
<td>$679,206</td>
<td>$132,371</td>
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<tr>
<td><strong>TOTAL REVENUE</strong></td>
<td>$15,446,142</td>
<td>$14,096,872</td>
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<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPENSES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contracts and Grants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel</td>
<td>$1,351,597</td>
<td>$1,394,965</td>
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<tr>
<td>Subcontractors and</td>
<td>$9,606,905</td>
<td>$9,351,850</td>
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<td>Consultants</td>
<td></td>
<td></td>
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<tr>
<td>Overhead Allocated to</td>
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<td>$1,006,555</td>
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<td>Contracts and Grants</td>
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<td></td>
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<tr>
<td>General and Administrative Expenses</td>
<td>$872,936</td>
<td>$884,666</td>
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<tr>
<td>Travel</td>
<td>$191,977</td>
<td>$165,758</td>
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<td>Meetings</td>
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<td>$78,768</td>
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<td>Materials, Supplies, and</td>
<td>$5,208</td>
<td>$1,222</td>
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<td>Printing</td>
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<tr>
<td>Other</td>
<td>$65,748</td>
<td>$72,411</td>
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<tr>
<td>**Total Contracts and</td>
<td>$13,148,531</td>
<td>$12,956,195</td>
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<tr>
<td>Grants Expenses</td>
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<td></td>
</tr>
<tr>
<td>Institute Programs and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Related Activities</td>
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</tr>
<tr>
<td>Personnel</td>
<td>$348,106</td>
<td>$283,582</td>
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<tr>
<td>Subcontractors and</td>
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<td>$19,800</td>
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<tr>
<td>Consultants</td>
<td></td>
<td></td>
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<tr>
<td>Overhead Allocated to</td>
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<td>$235,905</td>
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<td>Contracts and Grants</td>
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<tr>
<td>General and Administrative Expenses</td>
<td>$174,127</td>
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<td>Travel</td>
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<td>Meetings</td>
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<tr>
<td>Materials, Supplies, and</td>
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<td>$4,639</td>
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<tr>
<td>Printing</td>
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<tr>
<td>Other</td>
<td>$6,912</td>
<td>$32,017</td>
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<tr>
<td><strong>Total Institute Programs and Related Activities Expenses</strong></td>
<td>$1,458,499</td>
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<td><strong>TOTAL EXPENSES</strong></td>
<td>$14,607,030</td>
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<tr>
<td><strong>CHANGE IN NET ASSETS</strong></td>
<td>$839,112</td>
<td>$286,549</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
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