National Institute of BUILDING SCIENCES™

2020

Annual Report
to the President
of the United States

Innovative Solutions for the Built Environment

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LETTER TO THE PRESIDENT

Carl Hedde

Dear Mr. President:

The National Institute of Building Sciences is pleased to provide you with this Annual Report to the President of the United States to highlight our work to improve the safety, performance and resilience of the nation's buildings and communities.

Remaining true to the objectives in our enabling legislation, NIBS continued the mission to provide an open forum for discussion among the various facets of the building sector.

NIBS establishes performance criteria, standards and other technical provisions to maintain life, safety, health and public welfare. We develop recommendations 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 engage with private organizations, institutions, agencies and federal, state, local and other governmental entities, giving 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.

2020 presented unprecedented challenges. The building industry and its deep workforce remained essential. We represent the builders and tradespeople, who kept building and renovating homes, office buildings, infrastructure, and temporary COVID-19 facilities. We represent the building owners, property managers and agencies, who had to adapt their properties to meet the needs of consumers, and we continue to fight to ensure business owners and renters feel safe returning. We also represent the code officials, who had dramatic challenges doing their work in a virtual environment and were forced to quickly pivot.

Early spring, NIBS launched a portal on the Whole Building Design Guide website to provide information around the pandemic. The Building Industry COVID-19 Resource Hub provided coronavirus-related updates and developments, financial assistance and continuing education information, webinars and events, and other impacts of the coronavirus on the building sector. The aim was to produce a living compendium of cross-disciplinary resources.

By May, our Consultative Council produced a series of COVID-19 virtual town halls around safely reentering buildings, mental health and sanitation of COVID-19 facilities, the future of design and construction, and healthy buildings and their effect on public health. This council is comprised of representatives from private, trade, professional and labor organizations; private and public standards, code and testing bodies; public regulatory agencies; and consumer groups. We received more than 4,400 registrants to the town halls.

2020 also brought awareness to the social equity issues in this country, and our role as a convener is to develop an action plan for change. We held an executive roundtable entitled, Improving the Workforce of the Built Environment through Social Equity. We engaged 50 leading organizations, along with associations that represented minority segments of the industry and the NAACP, to identify key obstacles, bias, and various industry data. Our next step is leading an industry-wide survey to gather more detailed information as it relates to culture, diversity, equity and inclusion. There is more work to be done, but the first step is to understand baseline data. The organizations that agreed to join us on this project are committed to do their part to diversify the building industry.

The 2019 Natural Hazard Mitigation Saves report, an updated and expanded multi-year study, continues to inform our work. The study was initially developed by our Multi-Hazard Mitigation Council in 2005 for the Federal Emergency Management Agency (FEMA). The information in the report helps raise the understanding of homeowners, businesses, and industry so they can select cost-effective measures to protect property and assets against natural disasters.

You understand the emergency we're up against with regard to climate change, and we applaud the Biden-Harris Administration Immediate Priorities, specifically where it states your Administration will "ensure we meet the demands of science, while empowering American workers and businesses to lead a clean energy revolution." There's so much work to do in this area of research, and your decision to free up as much as $10 billion with FEMA to protect against climate disasters before they strike is not only necessary – it will help save lives, Mr. President.

Lakisha Ann Woods, CAE

In another area of life safety, our Building Seismic Safety Council updated seismic provisions for the National Earthquake Hazards Reduction Program (NEHRP) in October. The 2020 NEHRP Provisions (FEMA P-2082) were developed by BSSC and published by FEMA as part of an ongoing program to advance national seismic design standards and model building codes.

Building codes regulate the design, construction, alternation, and maintenance of buildings and other structures. They are adopted and enforced by local jurisdictions and states. The development of the NEHRP Provisions is a great example of how the nation's public and private sectors work together to tackle complicated issues. To make this happen, we convene more than 130 subject matter experts and nearly 40 industry organizations.

As you can imagine, our work is never truly complete.

At the end of this report, you will find the 2020 Moving Forward Report: Findings and Recommendations from the Consultative Council, which offers a look at various ways to improve the performance of the nation's existing building stock. The focus this year is on healthy buildings, given the COVID-19 emergency. It is our hope the Moving Forward report will initiate a broader discussion that ultimately shapes the future of the industry and its workers.

Throughout 2020, NIBS initiated and continued several projects designed to shape the future of the organization and set in place a greater strategic plan to achieve success for the building community. We remain committed to leading and addressing the demanding issues that face our built environment.

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

Sincerley,

Carl Hedde
Chair, Board of Directors

Lakisha A. Woods, CAE
President and CEO

About NIBS

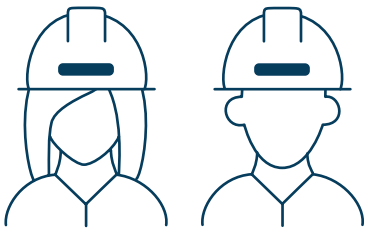
Nearly 50 years ago, the U.S. Congress established the National Institute of Building Sciences in the Housing and Community Development Act of 1974, Public Law 93-383. Congress recognized the need for an organization to serve as an interface between government and the private sector – one that brings together local, state, and federal representatives, the professions, industry, and labor and consumer interests by supporting advances in building science and technology to improve the nation's built environment.

VISION
Improving lives through collaboration to integrate science into the built environment.

MISSION
To serve the public interest by advancing building science and technology to improve the built environment.

NIBS represents an industry that has more than 680,000 employers* and creates over **7.35 million*** **construction jobs**, as of October 2020.

Each year, the industry creates nearly **$1.3 trillion worth of structures**.**



$1.3 trillion

7.35 million jobs

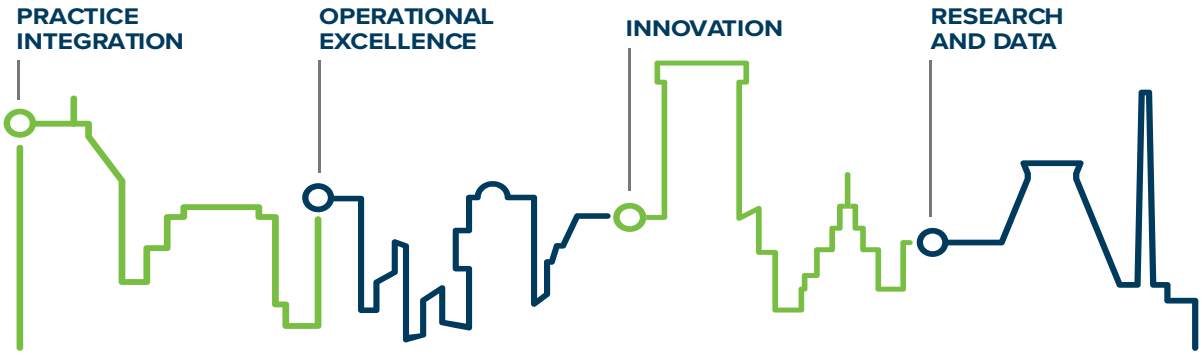
*https://www.bls.gov/iag/tgs/iag23.htm

**https://www.agc.org/learn/construction-data

NIBS is a 501(c)(3) non-profit that conducts research, establishes performance criteria, standards and other technical provisions to maintain life safety, health and public welfare. NIBS' work is supported through membership, donations, events, and government and private sector contracts.

Workforce | Building Resilience/ Sustainability | Technology | Mitigation | Healthy Buildings | Infrastructure | Transportation

Strategic Plan



The NIBS Board of Directors developed a three-year strategic plan to help guide the organization through 2022. It was developed in 2019.

The plan includes four major categories, each with a separate goal and multiple objectives to achieve maximum impact on the built environment. These categories include practice integration, operational excellence, innovation, and research and data.

The goal of practicing integration is to facilitate cooperation across industry segments to integrate science and technology into the built environment. This will require fostering collaboration among influential people, public and private organizations, industry associations, academic institutions, and federal agencies, including policy makers and thought leaders. It also requires a partnership strategy that fosters engagement with our stakeholders.

Under operational excellence, NIBS aims to enhance organizational norms and expectations to drive efficiency and effectiveness. The approach is four-pronged: diversifying the organization's business model; enhancing communication of outcomes, impact and value to increase awareness and adoption of innovative solutions; evaluating our programs to maximize stakeholder engagement and perceived value; and validating and enhancing a pricing strategy for products and services.

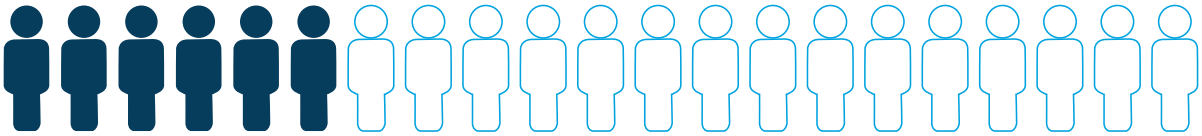
With regard to innovation, the goal is to foster new ways to deliver solutions for those who work, manage, and drive performance and sustainability in the built environment. The keys to this innovation involve advancing ideas within the building industry through solution-driven research. Reinvigorating our councils and committees to serve as centers of innovation also is a crucial step in this part of the strategic plan.

Finally, the best research leverages evidence and information to advance the national dialogue on building sciences and technology. Successfully sharing research requires translating data to support the application of research findings within the built environment and developing and promoting research that supports science and technology.

This strategic plan allows NIBS to achieve broader recognition as a trusted, unbiased convener of government and industry officials to come together as partners. NIBS also will achieve greater balance: A diversified and balanced portfolio of programs, products and services and sustainable business model that provides flexibility for the organization to carry out mission-driven activities.

Board of Directors

The National Institute of Building Sciences Board of Directors is comprised of 21 members. The President of the United States, with the advice and consent of the U.S. Senate, appoints six members to represent the public interest. The remaining 15 members are elected from the nation's building community and include both public interest representatives and industry voices. A majority of board members is required by the authorizing legislation to be in the public interest category.



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BIM Manager/Architect

Bob Payn
Senior Director, Information Technology

Ben Nolan
Web Manager

DeeDee Banks
Web Production Specialist

MEMBER SPOTLIGHT

Membership Overview

The National Institute of Building Sciences serves the public interest by advancing science and technology to improve the built environment.

Our members are building industry professionals – government, academic, non-profit, public and private sectors – these are the individuals we serve and they are critical to our work. Members develop and implement technical and procedural improvements through collaboration on our councils, events, and programs.

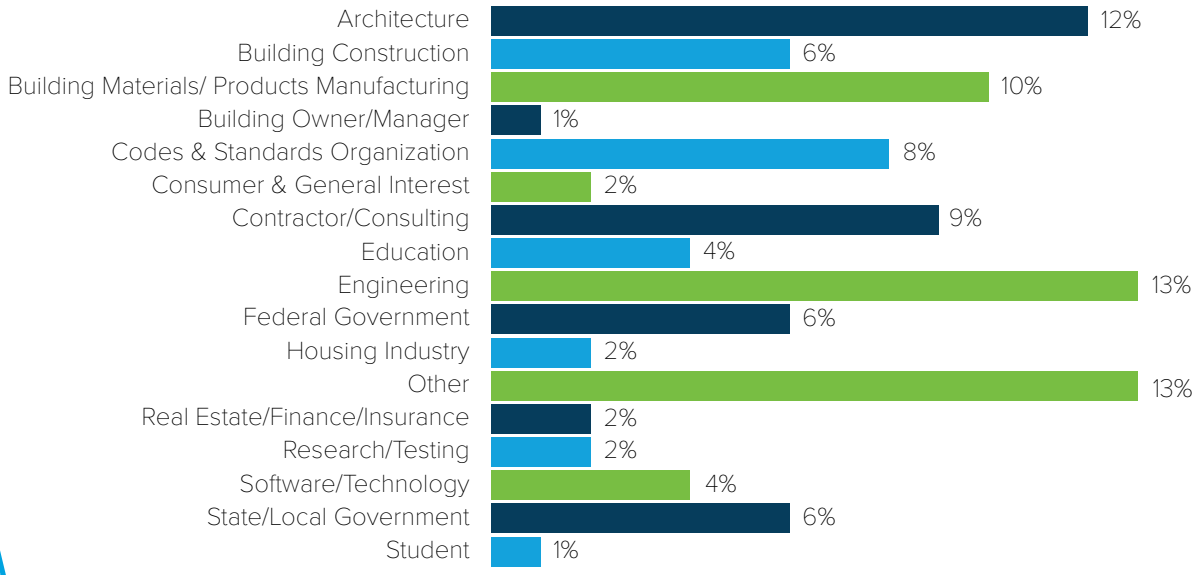
2020 allowed us to review the NIBS membership structure. In June, the NIBS membership team dove deep into our current structure, comparing it with similar industry organization models. NIBS staff engaged the NIBS Board of Directors and concluded it was best to keep the current model and better showcase the benefits of membership. We will continue to work to promote ourselves, build the NIBS brand, and continue recruiting new members, while retaining and engaging current members.

Toward this effort, we began redeveloping our website and a new membership campaign, #ThisIsNIBS, to tell our story and promote our value. Simultaneously, we laid the groundwork for a new membership platform called NIBS Engage to coincide with the launch of a new nibs.org website, both in 2021.

The new website is visually appealing, succinctly tells the NIBS story, and ultimately will help attract new members from all areas of the built environment.

NIBS staff also concluded an effort to personally contact all members. With some, Zoom meetings were held to gather feedback, ask what NIBS can improve upon with regard to membership, and discover what benefits keep them renewing. With the direct personal communication with members, NIBS was also able to refresh our association management database to gain a better picture of our membership makeup.

NIBS' current membership represents a wide cross section of the industry, allowing our members to effectively tackle the challenges faced in the built environment.



Organization Members

Membership provides access, at an individual or organizational level, to weigh in on member projects that shape the future of our building spaces. Organizational members often have multiple individuals, representing a variety of job roles, participating in NIBS councils.

AABC Commissioning Group (ACG)
American Institute of Steel Construction
American Iron & Steel Institute
American Wood Council
APA - The Engineered Wood Association
Architect of the Capitol
Armatherm
BOMA International
Compass Datacenters
Component Assembly Systems
Concrete Masonry Association of California and Nevada
Connex
Construction Specifications Institute
Fishbeck
General Motors Company
Green Building Initiative
International Institute of Building Enclosure Consultants
Insurance Information Institute
Insurance Institute for Business & Home Safety
International Association of Plumbing and Mechanical Officials
International Code Council, Inc.
International Institute of Building Enclosure Consultants
McCarthy Building Companies, Inc.
McDonough Bolyard Peck, Inc.
Modular Building Institute
National Association of Home Builders
National Fire Protection Association
National Ready Mixed Concrete Association
National Building Museum
NAVFAC
New Horizons Foundation
NCSEA
Onuma, Inc.
Charles Pankow Foundation
The Pew Charitable Trusts
Procore Technologies, Inc.
Professional Roof Consultants, Inc.
SEAOC
RICS
SpaceIQ
Structural Engineering Institute
Testing, Adjusting, and Balancing Bureau
Total Systems Commissioning, Inc.
U.S. Army Corps of Engineers
U.S. General Services Administration
U.S. Green Building Council
U.S. Resiliency Council
Vega Architecture

Member Spotlight

JANNA L. ALAMPI, AIA, NCARB, BECXP, CXA+BE
President & CEO, EPICx Studio
Secretary, Building Enclosure Council – National
Founder and Past Chair, Building Enclosure Council of Iowa
Ankeny, Iowa

Janna L. Alampi

NIBS has had a significant impact on my own professional career, in addition to providing opportunities to serve on councils by being a NIBS member. Through membership, I can collaborate with multiple committees and programs and help develop solutions for the built environment. Most recently, I participated in the Women Executives in Building Summit, which armed me with tools that I can utilize in my own practice as a business owner and the founder of the Building Enclosure Council of Iowa.

For the last three years, I have served on the board for Building Enclosure Council National. I also participate in the Building Enclosure Technology & Environment Council (BETEC), Building Information Management (BIM) Council, and Multi-Hazard Mitigation Council.

Participating on councils is a great membership incentive, and one of the best investments of my time has been serving on the BEC-National board. The professional relationships I have formed on the board and across the BEC chapters is invaluable, in addition to being able to collaborate with other individuals who actively support advances in the safety, performance and resilience of the nation's structures and communities.

Choosing which councils and projects to participate in and being able to dedicate quality time to them can be a challenge. There are numerous programs and technical committees, and the ones I have chosen to work with are directly related to my profession as an architect and building enclosure commissioning provider. The NIBS councils work toward the common goal of serving the nation and public interest, and I frequently look to the other councils for guidance and strategies that affect whole building performance and integrative thinking.

INDUSTRY SOLUTIONS

Overview

While the built environment received great scrutiny in 2020, the industry itself never ceased operating, as much of its workforce remained critical and essential to the nation and its communities.

But the pandemic changed how buildings operated, were maintained, and ultimately were utilized. No detail was spared, from air filtration and ventilation systems to sanitation, building envelope upkeep, and new design for local environments.

Many buildings remained shut for the better part of the year, allowing systems to sit idle. So, the focus of this annual report begins with healthy buildings and the impact of the pandemic. In 2020, we also emphasized strengthening our workforce with diversity, equity, and inclusion at the center; focused efforts toward technology and strategies to create efficiency; and continued work on solutions for natural hazards.

Healthy Buildings and the Impact of the Pandemic

When the pandemic hit, the National Institute of Building Sciences launched the Building Industry COVID-19 Resource Hub on the Whole Building Design Guide website. This resource portal included up-to-date information on building industry developments, financial assistance, webinars and continuing education. The goal was answer questions around COVID-19 to serve the building industry.

By May, the NIBS Consultative Council hosted the first in a series of COVID-19 virtual town halls and found that reopening the nation's businesses would require a uniform approach by building operators, infrastructure employees, and local and state officials under the safety guidance of the Centers for Disease Control and Prevention.

"Bringing America back to work will take planning, vision, and expertise," said Lakisha A. Woods, CAE, president and CEO of the National Institute of Building Sciences, in retrofit magazine.

Creating and maintaining resilient and sustainable buildings has long been on the minds of anyone involved in building safety, said Ryan Colker, Vice President of Innovation with the International Code Council, in the October issue of Facility Executive.

"After all, buildings, whether residential or commercial, act as society's first line of defense against all types of threats—manmade and natural," he said. "This has never been truer than in 2020 where many communities are facing multiple threats that jeopardize facilities and their inhabitants."

LEADING IN THE PANDEMIC

The NIBS COVID-19 Virtual Town Halls received more than 4,400 registrants. These town halls placed subject matter experts before a wide audience of built environment professionals, members from the public and private sectors, and city, state, and federal government representatives.

Four town halls covered the following subjects:

- (5/7) Preparing for Reentering Buildings. Our expert panel covered preparing the office or workplace (cleaning, disinfecting, and decontamination), HVAC and water systems, elevators and transportation.
- (5/19) Mental Health and Sanitation of COVID-19 Facilities. Experts covered re-occupancy, sanitation

of spaces, and workforce mental health.
- (6/29) The Future of Design and Construction. Experts discussed how offices may be redesigned moving forward, the importance of facility management, what will become of co-work spaces, and the future of commercial buildings.
- (8/25) Healthy Buildings & the Effect on Public Health During the Pandemic. Experts discussed the importance of healthy buildings, public health, climate justice, and the green energy sector.

GENERAL SERVICES ADMINISTRATION STREAMLINING POLICY PROJECT

Every year, the GSA Streamlining Policy workshop series brings together representatives from GSA's national and regional leadership with the building industry's top subject matter experts in a day-long intensive workshop to share knowledge and best practices on topics of immediate concern.

Past workshop topics have included building information management, off-site construction, and knowledge sharing.

Due to COVID-19 restrictions, the 2020 workshop was transformed into four, two-hour virtual seminars to discuss emergency and long-term building response to COVID-19 and other potential disasters.

BIMSTORMS: COLLABORATING EFFICIENTLY AND EFFECTIVELY

Social and physical distancing was required throughout 2020.

"The silver lining is that never before have we been more equipped to collaborate and facilitate teamwork than now," says the BIMStorm website. "In the past, architecture and design collaboration required bodies to be in the same room. How does that work with physical collaboration grinding to a halt -- and valuable subject matter experts holed up in their homes?"

Enter BIMStorm @ a Distance for Rapid Healthcare Design. NIBS collaborated with long time partner Onuma's BIMStorm to produce virtual events that utilized available resources from the design community to assist in the rapid design and creation of healthcare facilities to meet the needs for extra hospital capacity due to the pandemic.

HEALTHY BUILDINGS AND THE WHOLE BUILDING DESIGN GUIDE

The Whole Building Design Guide is one of the largest web-based portals providing government and industry practitioners with one-stop access to up-to-date information on a wide range of building-related guidance, criteria and technology from a 'whole buildings' perspective.

The WBDG Workgroup guides the development of this resource, and its membership consists of representatives from more than 15 agencies, including the U.S. Department of Defense (NAVFAC Engineering Innovation and Criteria Office, U.S. Army Corps of Engineers, Air Force Civil Engineer Center), U.S. Department of Veterans Affairs, U.S. Department of Energy, U.S. General Services Administration (GSA), U.S. Department of Homeland Security, and U.S. Department of State Bureau of Overseas Buildings Operations (OBO). These members contribute their knowledge and experience to the WBDG and collaborate with industry organizations and subject matter experts to better serve the building community.

In 2020, the WBDG launched a new design refresh and continued content development, releasing updated sections to its Design Objectives and Spaces Types. Nine new resource pages were added on the topics of post-occupancy evaluations and wastewater treatment, along with dozens of updates to other content. More than 700 criteria documents and agency pages were updated and over 100 new continuing education courses and webinars were launched.

Building our Workforce with Diversity and Inclusion at the Forefront

The construction industry maintains more than 680,000 employers with 7 million-plus employees, creating nearly $1.3 trillion worth of structures each year, according to the Associated General Contractors of America.

AGC recently reported that employment decreased from January 2020 to January 2021 in nearly two-thirds of the nation's metro areas, according to its analysis of government employment data.

The reason for this huge drop? Project cancellations and a lack of new orders forced firms to reduce headcount. AGC officials expect more layoffs are likely for the industry amid spiking materials prices and uncertain demand for new projects.

"More contractors are telling us they are cutting headcount than adding workers, which is consistent with the new data showing the industry is shrinking in many parts of the country," said Ken Simonson, AGC's chief economist, in a release. "More than three-fourths of the firms said projects had been postponed or canceled, while only one out of five reported winning new work or an add-on to an existing project in the previous two months as a result of the pandemic. That imbalance makes further job losses likely in many metros."

THE JOBS NUMBERS

Construction employment fell in 225, or 63 percent, of 358 metro areas between January 2020 and January 2021. Industry employment was stagnant in 41 additional metro areas, while only 92 metro areas—26 percent—added construction jobs.

The areas that lost the largest number of construction jobs over the 12-month period include Houston-The Woodlands-Sugar Land, Texas (-32,900 jobs, -14 percent); New York City (-23,000 jobs, -15 percent); Midland, Texas (-11,100 jobs, -29 percent); and Chicago-Naperville-Arlington Heights, Ill. (-10,400 jobs, -9 percent).

But the news wasn't all bad, and some areas did come out ahead. Adding the most construction jobs over 12 months were Sacramento--Roseville--Arden-Arcade, Calif. (3,500 jobs, 5 percent); Indianapolis-Carmel-

Anderson, Ind. (3,100 jobs, 6 percent); Boise, Idaho (2,500 jobs, 9 percent); and Seattle-Bellevue-Everett, Wash. (2,100 jobs, 2 percent).

THE CASE FOR TRADES

The American workforce is in desperate need of people who are ready to step away from digital devices and into the workshop, says We Are Generation T.

"Right now, only 5% of high school parents expect their children to go into the skilled trades," the group says. "We want to see that change."

Generation T is a movement, marking the end of an era where trade skills were looked down upon by the middle and upper class. It's a rallying cry – pulling together 70 national brands – to help redefine success in America.

Nationally, only 3% to 4% of the building trades workforce are women – with similar representation in related skilled trades, such as machinists and auto mechanics, according to Tradeswomen Inc.

Our national leadership needs to emphasize to youth the attractiveness of the trades as a valuable alternative to college. And business must work to engage schools and educators to start early on career training.

WOMEN IN CONSTRUCTION

We are in a perfect storm, says Constructech.

Progress finally is being made, in terms of women in the construction industry, but recent events, such as the pandemic, economic turmoil and the spotlight on systematic racism, are causing an upheaval in the labor force, particularly for women, Constructech reports.

Even Forbes reported in January 2021 that American women lost more than five million jobs in 2020.

"When COVID-19 hit, support systems—everything from schools, to childcare, to housekeepers—evaporated

WOMEN IN THE BUILT ENVIRONMENT

10.9% construction

24.1% transportation and utilities

27% architectural engineering & related services

6.6% of 3.5 million truckers in the nation

3% - 4% building trades workforce

overnight, and while some of that support has returned, much of it is still missing," Constructech says. "At the same time, women in construction have had to create new systems and procedures to keep workers safe on the jobsite or transition teams to remote work."

Here's the good news: While women are still underrepresented in construction, they're making progress in becoming leaders.

The World Economic Forum shows the progress this year not only has been larger than in the previous editions, but more widespread. Out of 149 countries and economies covered, 101 improved their score and 48 saw performance unchanged or reduced, Constructech reports.

Specifically looking to the construction industry, a new study by BigRentz shows a big portion of female executives and construction managers have been in their roles in the last five years, showing that women have been promoted more recently to leadership.

Of those working in construction, women make up just 10.3 percent. BigRentz reports that even smaller is the number of women on the front lines of a job site—only one for every 100 employees in the field.

Considering that women make up 47 percent of all employed individuals, this means that the construction industry is only benefitting from about 1.25 percent of women in the workforce, BigRentz reports.

SUPPORTING WOMEN IN LEADERSHIP

In October 2019, we started down a new road to convene female business leaders from across the built environment in the Women Executives in Building Leadership Series.

Throughout 2020, we remained committed to this group of powerful women, who are defying the odds in a predominantly male industry. We need to align to increase awareness of labor shortages and lack of diversity.

Our mission remains unchanged: Women executives in the built environment must come together, support each other and share thoughts and ideas on how we are providing value. Women in the c-suite of the built environment are invited to join us to share ideas, challenges and solutions to current issues.

In 2020, we tackled:

- Serving your respective customers in a time of crisis
- Strategies to help increase diversity and inclusion
- The secret to work/life balance
- Advancing women to achieve parity in leadership
- Mentorship and its impact on career growth

Technology and Strategies to Create Efficiency

Buildings act as society's first line of defense against all types of threats—manmade and natural.

"As many managers and owners are aware—when it comes to preparing their buildings against threats and risks, there is truly a cornucopia to think about," said Ryan Colker, Vice President of Innovation with the International Code Council, in his October 2020 piece, Resilient Buildings As First Line Of Defense. "However, by trying to guard against all threats, facility managers and owners run the risk of having an unfocused strategy and depleting their available resources on unnecessary preparations. Not every threat should be given the same priority!"

When it comes to the exterior of a building battling weather elements, roofs and walls can help a building stand up to increasingly severe events, reported FacilitiesNet, in its April 2020 story, Building Exteriors Enhance Resilience Against Extreme Weather.

"The many benefits and impacts of creating a more resilient building outweigh first costs, sometimes over the long-term and sometimes immediately if the building reasonably faces a natural disaster within one to five years," FacilitiesNet said.

FacilitiesNet continued: The savings transcend any first costs from purchasing higher quality finishes, adding air-sealing, or installing higher quality equipment. While in many cases, these investments will result in better performing buildings that save energy, the benefits to occupants, and sometimes the surrounding community, will far outweigh any energy savings when there is an extreme weather event.

BUILDING ENCLOSURE COMMISSIONING (BECX) WORKSHOPS

NIBS' BECx workshops program creates and delivers an eight-module series of workshops that will lead to

a certificate, developed in cooperation with the ASTM International and the International Institute of Building Enclosure Consultants (IIBEC, formerly RCI).

In 2020, the General Services Administration hired NIBS' team of subject matter experts to deliver workshops on three of the modules in a series of three, two-hour workshops over the course of six weeks. More than 200 GSA employees participated.

GSA POST OCCUPANCY EVALUATIONS

The GSA POE Program conducts a series of post occupancy evaluations on six to seven GSA-owned buildings a year. Using a multidisciplinary team of subject matter experts, the POE team evaluates in-use buildings and their surrounding sites, in terms of structural, mechanical, architectural, interior, and lighting and energy performance. The team also evaluates projects, in terms of current issues, including COVID-19 protocols.

Despite COVID-19 restrictions, NIBS was able to complete five of seven projects in its third year of POEs. In these evaluations, a team of experts collects first-hand data through direct observations and on-site interviews to determine how an existing GSA facility actually is functioning. The SME team then shares their results through a "Lessons Learned' report that is widely distributed within the agency.

FORWARD MOMENTUM: BUILDING INFORMATION MANAGEMENT

When it comes to technology and strategies to create efficiency, building information management (BIM) was the national trending discussion.

The buildingSMART alliance (bSA) was renamed the NIBS BIM Council, and it continued to support the United States National CAD Standard® (NCS) and National BIM Standard – United States® (NBIMS-US™). The NBC NBIMS Planning Committee (PLC) launched the update of the next edition of the national standard with workgroups addressing core content (core BIM components, construction to facility management handover (COBie), BIM uses and BIM execution plans) for the updated standard to be released in part in 2021.

While the next version of the standard continued to be developed, the NBC continued to push for the development of a complimentary U.S. National BIM Program akin to the United Kingdom's successful nationwide BIM program, working with representatives of the Centre for Digital Built Britain and leading owners, AEC professional firms, industry organizations, and academia.

BIM FOR INFRASTRUCTURE AND ROADMAP MANAGEMENT

NIBS provided advisory support on bridge model standardization to the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures (SCOBS) Technical Committee on Technology and Software (T-19) for a BIM for Bridges pooled fund project to continue to develop and deploy BIM for design and construction of bridges. Expanding from bridges to roads, the NIBS team planned and participated in a Federal Highway Administration Global Benchmarking Study on BIM for Infrastructure, participating in the final report development.

NIBS also continued with implementation of the BIM and management roadmap developed for the U.S. Department of State Overseas Building Operations (OBO). Following the roadmap, the NIBS project team helped OBO develop and implement integrated workflows for OBO space planning and asset management systems. In addition to data management support, the team worked with OBO to revise and update OBO BIM requirements and standards; expand and update space plan modules and groups; support integrated digital design review procedures; and expand record modeling practices for existing and historic buildings using a site visit to the U.S. Embassy compound in Bogota, Colombia to study and expand practices to address capture and management of facility data.

Construction comprises **13%** of the global economy

but it has not enjoyed the productivity improvements of the digital age, averaging **only 1% growth in the past 20 years.**

Demand for design and construction **will increase** in the coming decade

as **the public sector requires $2 trillion in infrastructure investment** that must be delivered as efficiently as possible.

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

ADDITIONAL BIM RESOURCES

Building on the National BIM Guide for Owners, NIBS and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) are working on a BIM Standard for Owners. This will complement the NBIMS-US and the ISO 19650 Organization and digitization of information about buildings and civil engineering works.

NIBS also collaborated with BIMStorm to produce virtual events that utilized available resources from the design community to assist in the rapid design and creation of healthcare facilities to meet the needs for extra hospital capacity due to the pandemic. This series was called BIMStorm @ a Distance for Rapid Healthcare Design.

MODULAR CONSTRUCTION TO SERVE MULTIFAMILY NEEDS

With continued focus on alternative construction methods, the NIBS Off-Site Construction Council (OSCC) worked with Fannie Mae to develop the "Multifamily Modular Construction Toolkit," a tool for lenders, developers and stakeholders interested in pursuing multifamily modular construction.

The toolkit was published by Fannie Mae in May 2020. The NIBS OSCC serves as a research, education and outreach center for relevant and current information on off-site design and construction for commercial, institutional and multifamily facilities.

SUPPORTING OTHER AGENCIES ON TECHNOLOGY INITIATIVES

Our service to the nation's built environment and the agencies that serve its communities knows no boundaries. NIBS partners with the leaders from across the non-profit and association world and government agencies.

In 2020, we continued to support the workforce development program of the U.S. Department of Energy Federal Energy Management Program. We also provided criteria updates to the Unified Facilities Criteria (UFC) Program and guide specifications (UFGS) of the U.S. Department of Defense. The program pertains to the planning, design, construction, and operation and maintenance of real property facilities. It streamlines the military criteria system by eliminating duplication of information, increasing reliance on private-sector standards, and creating a more efficient criteria development and publishing process. The program is administered by the U.S. Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineer Center (AFCEC).

With regard to safety and security, NIBS served the U.S. Department of Homeland Security, supporting the Best Practices for Anti-Terrorism Security (BPATS) assessment tool for commercial facilities. We worked with the DHS Science & Technology (S&T) Office of Safety Act Implementation (OSAI) on the tool, which helps assessors and building owners conduct facility security assessments. NIBS hosted the BPATS tool, providing training in its use.

FACILITY LIFECYCLE MANAGEMENT DURING A PANDEMIC

The pandemic brought unique challenges to the U.S. Department of Defense - Defense Health Agency (DHA) and the facility industry.

NIBS supports DHA in the area of facility lifecycle management and specifically programs that enhance the process of evaluating its military healthcare facilities. We work with DHA to continually assess metrics that have a financial impact in the construction and operating of its facilities. NIBS also provides valuable analysis related to investing in facilities. This analysis is used to influence and model capital investment decisions to fulfill operational excellence within the DHA Facility Enterprise division.

Throughout 2020, NIBS continued to support DHA with technical expertise and access to valuable analysis tools to refine the facility budget cost models of DoD DHA's real property portfolio. NIBS provided guidance to DHA on proposing the framework of the CIDM 6.3 (Capital Improvement Decision Model) process. Additionally, our experts produced recommendations in the areas of space planning of facilities, which led to strategic policies to produce a minimal viable clinic space.

In 2021, NIBS will continue working on newly awarded task orders that facilitate DHA's initiative to share data with other federal agencies and consider lifecycle management principles in sustaining and maintaining medical facilities.

PROJNET™: DIGITAL SUPPORT FOR PLANNING, DESIGN AND CONSTRUCTION

ProjNet™ is an integrated suite of web-based modules designed to support stakeholders in the development and collaboration of planning, design, and construction phases of capital improvement and renovation projects.

ProjNet™ can be utilized in its entirety as a project management platform, or customers may choose only the modules they need. NIBS manages the secure, integrated, internet-based suite of design and construction tools, providing sales support, operation and maintenance, development, information assurance/security, and customer and help desk support activities. ProjNet™ is widely used by federal and state agencies, private firms, and educational institutions.

In fiscal 2020, more than 36,000 public and private design and construction users and their stakeholders worldwide used the accredited, secure, online ProjNet™ suite of tools. Early in the year, NIBS hired the OM Group, Inc team to migrate ProjNet™ from its on-premise enclave environment to the cloud.

The first phase of the transition consisted of moving the ProjNet™ servers from its current contractor owned on-premise operating environment to USACE's ERDC-CERL Research and Development Enterprise (RDE) facility in Champaign, Illinois. Following the successful transition of the servers and stabilization of the systems, the team worked to provision a cloud archive environment to backup 20 years of data currently stored in ProjNet™. The ProjNet™ cloud environment will be moved to Microsoft Azure Cloud Environment during the first half of 2021. During the second half of 2021, the ProjNet™ team will develop a plan to modernize the ProjNet™ code and develop a new interface for the system. The new interface will provide a modern dashboard landing environment and new capabilities to the system without changing its current basic functionalities.

Solutions for Natural Hazards

The rising cost and frequency of disasters, as well as the fiscal impacts of the COVID-19 pandemic, are putting pressure on budgets across all levels of government: federal, state, and local, reported The Pew Charitable Trusts, in its September 2020 story, How States Can Manage the Challenges of Paying for Natural Disasters.

Pew pulled NIBS' Mitigation Saves research to help uncover three actions that state policymakers can take to improve their understanding of the fiscal impact of natural disasters on state budgets and assess how resources might be better allocated for the long term:

- **Comprehensive tracking**. States should track their spending on disasters across all of the agencies and disaster phases—response, recovery, mitigation, and preparedness.
- **Budgeting mechanism assessments**. States should examine the budgeting methods they use to pay for disasters to determine if those approaches are meeting their needs.
- **Mitigation integration**. States should consider how their spending and budgeting practices incorporate investments in disaster mitigation—efforts undertaken to reduce harm from future disasters; every mitigation dollar spent can save an average of $6 in post-disaster recovery costs.

An April 2020 story on Weather.com quoted information from the Natural Hazard Mitigation Saves 2019 Report.

"The cost to move 1 million single-family homes from areas that repeatedly flood would be $180 billion, but $6.45 would be saved for every dollar spent, according to the Natural Hazard Mitigation Saves: 2019 Report," Weather.com reported. "The study said the figure of 1 million is probably at the low end of a realistic range of single-family dwellings in the 100-year floodplain that predate their flood maps."

UPGRADING INFRASTRUCTURE BY DEMONSTRATING INCENTIVES TO BUILDING OWNERS

Collaboration is key to creating more resilient communities, and the Multi-Hazard Mitigation Council is calling for incentivizing more resilient buildings.

An August 2020 report supported by the MMC and led by its Committee on Finance, Insurance and Real Estate (CFIRE), removes silos and incentivizes investors, owners, lenders, insurers, developers and local governments to work together to increase community resilience. Details are outlined in MMC's initiative, A Roadmap to Resilience Incentivization. In short, if we expand relationships and broaden the scope to develop more resilient communities, governments will spend less repairing and replacing properties after disasters. Insurance for protecting properties will decrease, and property values and security will strengthen. This is a win-win.

Through MMC/CFIRE, NIBS offers a national and authoritative forum to unite the strengths of member organizations through strategic collaboration across the building science, finance, insurance and real estate industries. MMC/CFIRE is the collective voice that convenes the public and private sectors to set a resilience agenda.

Some questions the MMC initiative aims to solve include:

- How will COVID-19 affect our nation's preparedness on natural hazards like flood and wildfire?
- What are the long-term financial impacts and the expected shortcomings on mitigation spending by both federal and local governments in the future?
- How should communities adjust/prepare for that and how do we help vulnerable populations?

EARTHQUAKE RESPONSE: RECOMMENDATIONS TO NATIONAL STANDARDS AND MODEL BUILDING CODES

The Building Seismic Safety Council published the 2020 NEHRP Recommended Seismic Provisions for New Buildings and Other Structures (NEHRP Provisions) in September. BSSC prepared the report for the U.S. Department of Homeland Security, Federal Emergency Management Agency. It marks the 10th edition of this landmark publication since the creation of the National Earthquake Hazards Reduction Program (NEHRP) in 1979.

Prior to the publication of the 2020 NEHRP Provisions, BSSC unveiled a new web-based tool for Future Seismic Design Map Values. The ground motion values for both Conterminous U.S. (CONUS) and Outside Conterminous U.S. (OCONUS) locations, including Alaska, Hawaii, Guam and the Northern Mariana Islands, Puerto Rico, U.S. Virgin Islands, and American Samoa, are extracted directly from the U.S. Geological Survey (USGS) web services.

Other solutions for natural hazards and major NIBS project work include:

- NEHRP Future Provisions and Research Needs (April 2020)
- BSSC Project 17 Report on the Development of the Next Generation of Seismic Design Value Maps for the 2020 NEHRP Provisions (February 2020)

CONTINUING SCIENTIFIC RESOLUTION PANEL WORK WITH FEMA

Scientific Resolution Panels (SRPs) are part of an ongoing program developed under a contract with FEMA. SRPs are convened by NIBS in response to requests from communities challenging and appealing the correctness of FEMA proposed Flood Hazard Maps issued under the Risk Mapping, Assessment and Planning (Risk MAP) and the National Flood Insurance Program (NFIP). An SRP is an option after FEMA and a local community have been engaged in a collaborative consultation process for at least 60 days without a mutually acceptable resolution.

In 2020, NIBS worked with FEMA to convene seven scientific resolution panels that included four riverine appeals and three coastal appeals. The riverine appeals were from communities in New Jersey and Maryland, while the coastal appeals were from communities in California and Maine.

Community Spotlight: Environmental "Savings," Mitigating Disaster and Leading the Fight Against Global Poverty

One of the biggest stories of 2020 was how the pandemic changed transportation and the commute of many Americans. While many of the nation's workers worked from home, exactly how much did this stop or even reverse climate change?

Unfortunately, the benefits were minor.

We covered the hidden costs of environmental savings from remote work in our first Resilience 2021 webinar. We found that while reduced activity associated with COVID-19 lockdowns was expected to cut carbon emissions by 4-7% for the year, the decrease was insignificant in the long run.

That's because carbon emissions continued almost unabated because lockdowns do not reduce overall energy consumption. Lockdowns only affect mobility.

The Washington Post reported in August that by mid-April, automobile traffic fell to just 52 percent of pre-pandemic levels, according to traffic research firm INRIX.

"But the reprieve was short-lived," wrote Matt Alderton, with The Washington Post. "As states and cities reopened their economies, drivers restarted their vehicles. By late June, INRIX reported, travel nationwide had already reached pre-pandemic levels, and in many states traffic was actually exceeding those levels."

The nation's transportation system is not set up to recover and regain functionality after a major disruption or disasters, said Paula Pagniez, director of the Climate and Resilience Hub at global risk management firm Willis Towers Watson, in the Post story.

But Pagniez quoted NIBS' Natural Hazard Mitigation Saves research in the story: "The nation can save $6 in future disaster costs for every $1 invested in hazard mitigation. Beyond a misuse of taxpayer dollars, the consequences of not acting include lives and livelihoods lost and assets damaged — sometimes beyond repair."

FLOODING: THE COSTLIEST AND MOST COMMON NATURAL DISASTER TO AFFECT OUR COMMUNITIES

Since 2000, flood-related disasters have cost taxpayers more than $845 billion, with much of this spending on projects to maintain the status quo instead of building better and stronger for tomorrow, reported the South Florida Sun-Sentinel in an opinion piece entitled, "Flood mitigation revolving fund deserves congressional action."

"This broken cycle of misguided, disconnected emergency spending is unsustainable in even the best times," wrote Gary Williams, executive director of the Florida Rural Water Association (FRWA), in May 2020. "Now, as our state and nation come together and find ways to recover from the public health and economic toll taken by COVID-19, and prepare for the June 1 hurricane season, we simply cannot afford to continue down this path."

Williams quoted NIBS research to emphasize the savings that could be gleaned hazard mitigation spending.

IMPACTING COMMUNITIES AROUND THE WORLD

NIBS' white papers on building codes and resilience may soon have an impact on communities in far-reaching areas of the globe. This project marks the first study that NIBS undertook for the Millennium Challenge Corporation (MCC), an innovative and independent U.S. foreign assistance agency that is helping to lead the fight against global poverty.

The purpose of these studies to identify, evaluate, and document top-level considerations MCC could adopt for use in the planning, design, construction, operation, maintenance, and resilience of buildings funded through its programs. The resilience portion of the studies covers macro and micro levels of concern to communities.

INDUSTRY ENGAGEMENT

Association Collaboration

The National Institute of Building Sciences brings together a variety of interests from across the building industry. Each organization and association represents a vital piece and specific constituency of the greater building sciences map.

Adhesive and Sealants Council – NIBS signed a memorandum of understanding (MOU) with the Adhesive and Sealants Council (ASC) that will help both organizations connect the full value chain from manufacturer to design professional to end user with guidance on sealant technology in vertical wall assemblies. Initial efforts will center on repositioning and revising the sealants section of the Building Enclosure Design Guide section of the Whole Building Design Guide (WBDG).

American Association of State Highway and Transportation Officials – NIBS provided advisory support on bridge model standardization to the American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Bridges and Structures (SCOBS) Technical Committee on Technology and Software (T-19) for a BIM for Bridges pooled fund project to continue to develop and deploy BIM for design and construction of bridges. Expanding from bridges to roads, NIBS also planned and participated in a Federal Highway Administration Global Benchmarking Study on BIM for Infrastructure, participating in the final report development.

American Society of Heating, Refrigerating and Air-Conditioning Engineers – Building on the National BIM Guide for Owners, NIBS and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) are working on a BIM Standard for Owners that will complement the NBIMS-US and the ISO 19650 Organization and digitization of information about buildings and civil engineering works, including building information modeling (BIM) standard.

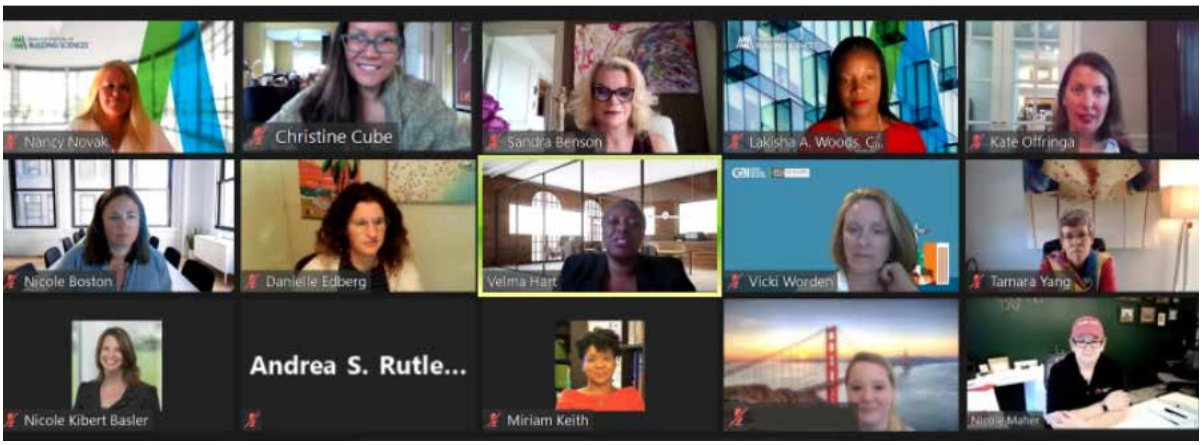
Building Enclosure Councils/Building Enclosure Technology and Environment Council – BETEC and BECs are joint ventures between NIBS and the American Institute of Architects (AIA). Members of the Building Enclosure Technology and Environment Council (BETEC) represent every facet of the building industry involved with building facades, from architects and engineers to material suppliers. BETEC members worked with the glass, masonry, and air barriers industries to garner updated material with which to refresh the Building Enclosure Design Guide portion of the Whole Building Design Guide. The Building Enclosure Councils (BECs), a joint venture between AIA and NIBS under the aegis of BETEC, host some 4,000 members in 34 local chapters, with BEC-Spokane being the latest addition to the family. Like BETEC, the BECs bring together members of all facets of the building industry, and they do it on the local level.

GSA Streamlining Project – The General Service Administration's (GSA) Public Buildings Service (PBS) Office of Design & Construction (ODC) partnered with NIBS in 2020 to facilitate the fifth in a series of workshops to streamline and improve design and construction. All virtual in format in 2020, the workshop was transformed into a series of four, two-hour workshops to share information about COVID-19 impact on the building industry, including rapid conversion of buildings into emergency treatment facilities. GSA and NIBS invited other federal owners and industry partners to participate, including the American Institute of Architects, U.S. Army Corps of Engineers, American General Contractors, and Design-Build Institute of America.

International Code Council Sponsorship – The International Code Council put a big stamp on the Building Innovation 2020 Conference & Expo by becoming the title sponsor for the annual meeting. The meeting was virtual in August 2020, due to the pandemic. International Code Council CEO Dominic Sims, CBO, said the council "remains committed to events that tackle important issues regarding building performance and sustainability."

Whole Building Design Guide Workgroup – The WBDG Workgroup (formerly known as the Advisory Council) consists of representatives from federal agencies who collaborate to guide the development of the WBDG. Meeting virtually throughout 2020, the workgroup has decided to pursue these strategies going forward: increase collaboration among federal agencies, states, public and private groups, and other government bodies; provide mechanisms for outreach and feedback; engage resources and expertise to promote/influence improved processes and policies; increase flexibility and adaptability to implement change faster, more efficiently and effectively; and optimize integrity, credibility, and relevance of the WBDG. The Advisory Committee devoted 2019 to examining and ultimately rewriting its mission and vision statements to align with those of NIBS. Its new vision statement reads: Integrating collaborative, dynamic resources to advance the high-performance built environment. Its new mission statement is: To foster communication and knowledge-sharing among federal, industry and academic partners by leveraging WBDG-Whole Building Design Guide services to advance high-performing facilities.

Women Executives in Building: Virtual Leadership Series



In these challenging and unprecedented times, women in the built environment must come together, support each other and share thoughts and ideas on how to provide value.

In 2020, many of you took time out from your busy schedules to virtually meet through our leadership series. Many of you were working from home, while managing and keeping teams inspired and motivated.

We continue this mission to invite women in the c-suite of the built environment to meet, share ideas, and find solutions to current challenges.

NIBS held five Women Executives in Building virtual meetings in 2020. They included:

- June 25: Strategies that will help increase diversity, equity and inclusion in the building industry. Solutions discussed during the meeting: Creating incentives for companies or organizations to seek out diverse candidates; recognizing and awarding talent; showcasing success stories; working with community colleges to apply credits to built environment programs; and building an online mentorship program to help employees achieve professional goals.

- July 30: Finding balance when work and home are the same place. Ideas to balance home, family, and professional lives ran the gamut, from exercise and eating well to weekly mindfulness and meditation programs online. Boundaries need to be intentional. Other shared secrets: Not scheduling meetings over lunch or at the last hour of the work day; keeping strict rules to detach from the phone and electronically cutting oneself off when work has concluded.
- September 23: Advancing women to achieve parity in leadership. Some companies do a good job of keeping unconscious biases in check. Take Amazon Web Services: Before every interview, AWS managers and directors must watch a 30-minute unconscious bias video to prep prior to meeting prospective candidates. This process helps managers get into the headspace to interview, said Sandra Benson, Worldwide Head of Engineering, Construction and Real Estate with Amazon Web Services.
- November 19: Mentorship and its impact on career growth. Judy Dinelle, building ambassador with 84 Lumber Company, said her mother was her greatest mentor.

"Whether you're a young lady or a young man coming into this industry, dream big and work hard," Dinelle said. "Stay focused and surround yourself with good people. Teams function best when they have a shared purpose."

84 Lumber signed on to sponsor the Women Executives in Building Virtual Leadership Series in November.

Member Spotlight

T.J. MEEHAN, AIA, LEED AP
Vice President, CADD Microsystems
Co-Chair, COBie Workgroup
Alexandria, Virginia

T.J. Meehan

In the past several years, NIBS membership has impacted me tremendously. COBie is a big part of my professional work, and being involved in the leadership of the next version of the COBie standard has been particularly important and fulfilling to me.

As co-chair of the COBie Workgroup, I collaborate with the member organizations that are typically my customers– both directly and indirectly. I get to step away from being their consultant and assist them on a different level to help drive the standards that they are utilizing on a day-to-day basis. I get to be seen as a thought leader in this space instead of being seen as a vendor. I can take off my sales hat and work with them, hand-in-hand, to drive the industry standards that they utilize daily.

The best part of being a member of NIBS is these relationships. Membership allows me to build and maintain these close relationships in a way that is not possible without an organization like NIBS.

COVID-19 Town Hall Series

Bringing America safely back to work and restarting the economy takes planning and vision.

The National Institute of Building Sciences hosted a series of four COVID-19 virtual town halls in 2020. The town halls were sponsored by the Consultative Council. NIBS placed subject matter experts before more than 4,400 registrants. Our audience included built environment professionals, members from the public and private sectors, and city, state, and federal government representatives.

Here is a snapshot of each COVID-19 virtual town hall:

MAY 7: PREPARING FOR RE-ENTERING BUILDINGS.
The panel included Dr. G. Scott Earnest, Acting Director for the Office of Construction Safety and Health, National Institute for Occupational Safety and Health (NIOSH); Thomas H. Phoenix, Principal, CPL Architects & Engineers, PC, Treasurer, NIBS Board of Directors, and Fellow, ASHRAE; Henry H. Chamberlin, President & Chief Operating Officer, Building Owners & Managers Association (BOMA); Daniel Nichols, Assistant Director of Fire/Life Safety, Metropolitan Transportation Authority (MTA) Metro-North Railroad; and Pete DeMarco, Executive Vice President of Advocacy & Research, International Association of Plumbing and Mechanical Officials (IAPMO). Carl Hedde, Head of Insurance Practice, One Concern and Chair of the NIBS Board of Directors, served as moderator.

The town hall received more than 1,800 registrants from throughout the building industry. It was found that exposure control strategies are key, when it comes to COVID-19. Three categories of prevention include physical separation, PPE and measures, and decontamination of environmental surfaces. Companies also should perform an audit of the HVAC system, making improvements where necessary with regard to filtration and disinfection.

MAY 19: MENTAL HEALTH AND SANITATION OF COVID-19 FACILITIES.
The panel included Michael (Mike) Schultz, SES, Chief of Interagency and International Services, United States Army Corps of Engineers; Arthur C. Evans, Jr., PhD, Chief Executive Officer, American Psychological

Association; Mac Campbell, CTA, CVP, Deputy Director, Baltimore Convention Center; Shari L. Solomon, President and Founder, CleanHealth Environmental, LLC; and John Hogan, Vice President of Design and Project Management, Marriott Hotels. Mark Dorsey, FASAE, CAE, CEO of the Construction Specifications Institute (CSI), served as moderator.

When it comes to mental health and sanitation, our subject matter experts pointed to the critical role that communication plays in moving toward reopening businesses, offices, and communities. For a big part of 2020, the pandemic required many communities to come up with temporary facilities to care for COVID-19 patients and medical personnel. Alternate care and treatment facilities were created in spaces like convention centers and hotels. The U.S. Army Corps of Engineers said its strategy involved four phases, with involvement by state and local authorities: planning, building, supply, and staffing of facilities.

JUNE 29: THE FUTURE OF DESIGN & CONSTRUCTION.

The panel included Darrell X. Rounds, Operations Group Manager, Community Operations, General Motors; Mindy W. Saffer, LEEP AP, Managing Principal, Cresa; Jennifer Kolstad, Global Design Director, Ford Motor Company; J. Kevin Heinly, AIA, LEED AP, Managing Director & Principal, Gensler; and Dr. Alisha Wilkins, Owner/ Founder, Hera Hub Temecula. Katharine E. Morgan, President of ASTM International, served as moderator.

During the town hall, we learned what small and large companies are doing to prepare for building reoccupation by workers. The panel also covered staging and population structuring, signage, touchless technology, and the probability of at least some level of continued telecommuting. There's no such thing as a viral-proof building, but mechanisms can be put into place to encourage occupant wellness and health.

AUGUST 25: HEALTHY BUILDINGS & THE EFFECT ON PUBLIC HEALTH DURING THE PANDEMIC.

The panel included Mahesh Ramanujam, President & CEO, U.S. Green Building Council and Green Business Certification, Inc. (GBCI); Stephanie Carlisle, Research Scientist, Carbon Leadership Forum; Ruth Thomas-Squance, PhD, MPH, Director of Field Building, Build Healthy Places Network; and Joseph G. Allen, Assistant Professor, Harvard T.H. Chan School of Public Health. Vicki Worden, President & CEO, Green Building Initiative, served as moderator.

Healthy buildings and resilience are intertwined. Green recovery and safely getting back into schools and work is much bigger than space planning and systems design, said Stephanie Carlisle, Research Analyst with the Carbon Leadership Forum.

Good leaders have their eyes on what's next, said Joseph G. Allen, Assistant Professor with the Harvard T.H. Chan School of Public Health. Said Allen: "This is not rocket science, we've long known how to operate our buildings effectively."

Member Spotlight

DARRELL X. ROUNDS, FMA, C.E.M.
Operations Group Manager, General Motors Co.
Detroit, Michigan

DARREELL X. ROUNDS, FMA, C.E.M.

I became a member of NIBS in 2013, when my company, General Motors, became a contributing member. I began as a member of the Facility Maintenance and Operations Committee (FMOC) and after serving for a few years, I was elected its chairman. A couple of years later, I was elected to the NIBS Board of Directors, where I currently serve as the Chair of the Awards Committee as well as a member of the Budget and Finance Committee. I act as a Board Liaison to the Facilities Maintenance and Operations Council as well as the Whole Building Design Guide Advisory Workgroup.

Being a member of NIBS helps me to identify better ways to do my job. Facilities Management and Construction are evolving fields with a great deal of innovation occurring right now. To be in the company of those who are looking to improve their quality of work output and optimize their skill sets keeps me sharp. Also, working as a leader on the Board of Directors helps me to hone my skills in interacting with others.

The best part of being a member of NIBS is the opportunity to meet people from different arenas who bring different perspectives. The friendships – both personal and professional – that I've been able to establish are very valuable to me.

The most challenging part of being a member of NIBS is the fact that I have a "day job." The NIBS councils present opportunities to explore many different aspects of the built environment. The knowledge and content are inexhaustible, and there's not enough time to explore the all the opportunities. Therefore, I leverage opportunities like Building Innovation to get out of my comfort zone and explore different options for learning about other aspects of the built environment.

Building Innovation 2020: Virtual Edition

Like many organizations in 2020, we weren't quite sure how our annual meeting would pan out.

National Institute of Building Sciences
BUILDING INNOVATION
Virtual Edition

By mid-year, we made the decision to hold the Building Innovation Conference online based on scientific guidance, our commitment to the health and safety of our staff and Building Innovation attendees, and how little we knew about this virus.

It was the right call.

Thanks to all who helped make our first virtual annual conference an incredible success. NIBS hosted more than 1,000 registrants, from 45 countries worldwide. Meeting attendees tuned in to 16 sessions with 31 speakers across three tracks: Resilience, Workforce, and Technology.

DAY ONE: TUESDAY, AUGUST 18, 2020

National Institute of Building Sciences CEO Lakisha A. Woods, CAE, opened the show with some encouraging words about the built environment and NIBS' position as a convener of individuals and organizations across the building industry.

"Choosing to be a convener is no longer just a nice to have," Woods said. "It's an essential action not only for a healthy economy, but also a healthy citizen. Strong relationships and the pursuit of knowledge are powerful currency. [They] fund our humanity, our togetherness, and our future."

The rest of the first day of BI2020 was filled with educational sessions that covered a wide range of resilience, technology, and workforce material. These included extending virtual design and construction for facilities management, opportunities and training for green jobs, and zero energy, which looked closely a case study

in Florida and its first zero-energy school. This school is expected to save the school district of Osceola County, Florida more than $115,000 annually on energy costs and was constructed within the state-mandated budget.

3D Printed Homes for Affordable and Resilient Housing

In his opening Technology keynote, Evan Loomis, co-founder and chairman of Austin-based ICON, shared some startling facts about housing.

"With home construction, more often there's more waste than house," he said, about the need for sustainable construction. "Over one billion humans don't have adequate housing. This is a crisis."

Says Loomis: "We've been building homes the same way for 1,000 years. The future is 3D printed."

Home prices also are skyrocketing, he pointed out, which "brings a lot of pain to the average American."

So imagine if one could download and 3D print a home in 24 hours for half the cost. Maybe you could print 1,000 homes in a row, and they all could be different with just a small tweak in the design. And aside from the actual printer, the only other tool you'd need is your iPhone to manage the project.

3D printing involves near zero material waste. The total energy required for 3D printing, including production, transport, and installation of materials, is much less than for conventional wood or concrete construction, Loomis says.
"We will further advance sustainability by incorporating recycled materials and other ingredients into our concrete mixes that lock up carbon dioxide and reduce energy input even more," he said. "Materials science is one of the most exciting frontiers for us at ICON so we can continue to drive down costs and increase sustainability over time."

Convergence of Design and Resilience in a Hospital

A three-person team broke down the innovation and design behind the new Stanford Hospital in Palo Alto, California. The hospital features a host of state-of-the-art elements and reflects how resiliency is integrated with technology, sustainability, long-term adaptability, and design vision.

The panel included Judy Ou, associate principal with Perkins Eastman Architects, Carlos L. Amato, principal with CannonDesign, and Robin Whitehurst, technical principal with Bailey Edward Design, Inc.

The Stanford Hospital includes cutting-edge architecture, a 40,000-square-foot rooftop garden, LEED Silver-equivalent sustainability features, patient-centric design details, hospitality-infused furnishings, and sculptures, paintings, and commissioned installations by world-class artists.

One component of the project – the simulation lab – received its inspiration from a theater with a "center stage" and support spaces on the wings.

"Medicine is art," Whitehurst said. "The intent of this [project] is to elevate that artform."

And in today's COVID-19 environment, systems like HVAC must be intelligent, the panel said. Modularity is key, and the networks are extensive.

"On the New Stanford Hospital, we have double-stacked air handling units, one set of which is a backup," Ou explained. "Also, patient pods can draw air from other the HVAC units of other pods if their respective one needs to be shut down."

NIBS Awards Honors Lifetime Achievement and Two HBCU Students

The afternoon of Day 1 closed with an awards ceremony, honoring architect Stephen T. Ayers, FAIA, LEED AP, who served as the 11th Architect of the Capitol.

Ayers was awarded NIBS' highest honor – the Mortimer M. Marshall Lifetime Achievement Award. The award is always given to a person who has demonstrated a lifetime of dedication to the mission and goals of NIBS. The award is named after the first member of NIBS; it was established in 2011.

Also, two students of architecture and engineering studying at a historically Black college or university (HBCU) were honored with scholarships.

The Betty and Mort Marshall Memorial Scholarship Fund was established to promote diversity in the building sciences. The winners were Jenna Greer, an architecture student at Howard University, and Tanaka Chakanyuka, a civil engineering student at Southern University.

Chakanyuka said she believes engineering can make the world a better place.

"With the depletion of resources and pollution to the planet, I believe responsible engineering will help secure the planet for future generations," she said.

The Courage and Genius of Sustainability

Closing the conference was George Bandy Jr., a global leader for corporate social responsibility and sustainability. Bandy served as the former chairman of the U.S. Green Building Council.

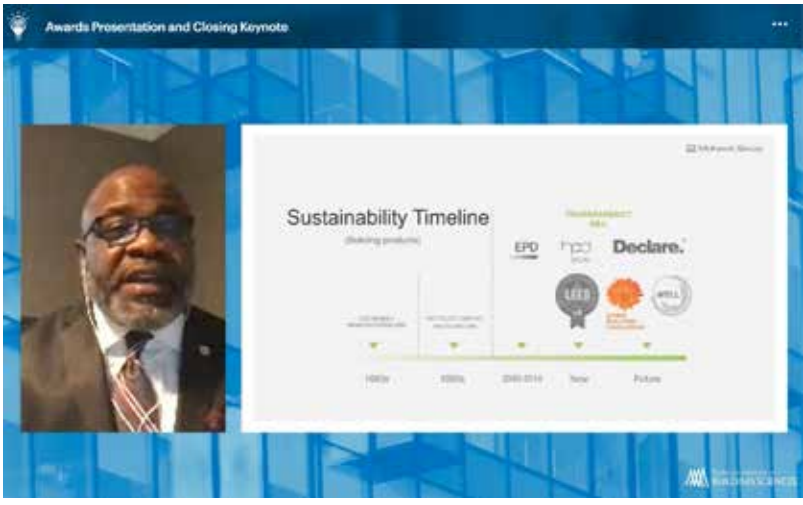
Bandy discussed the genius of living buildings – essentially, a program that took someone "taking a risk that wasn't done before."

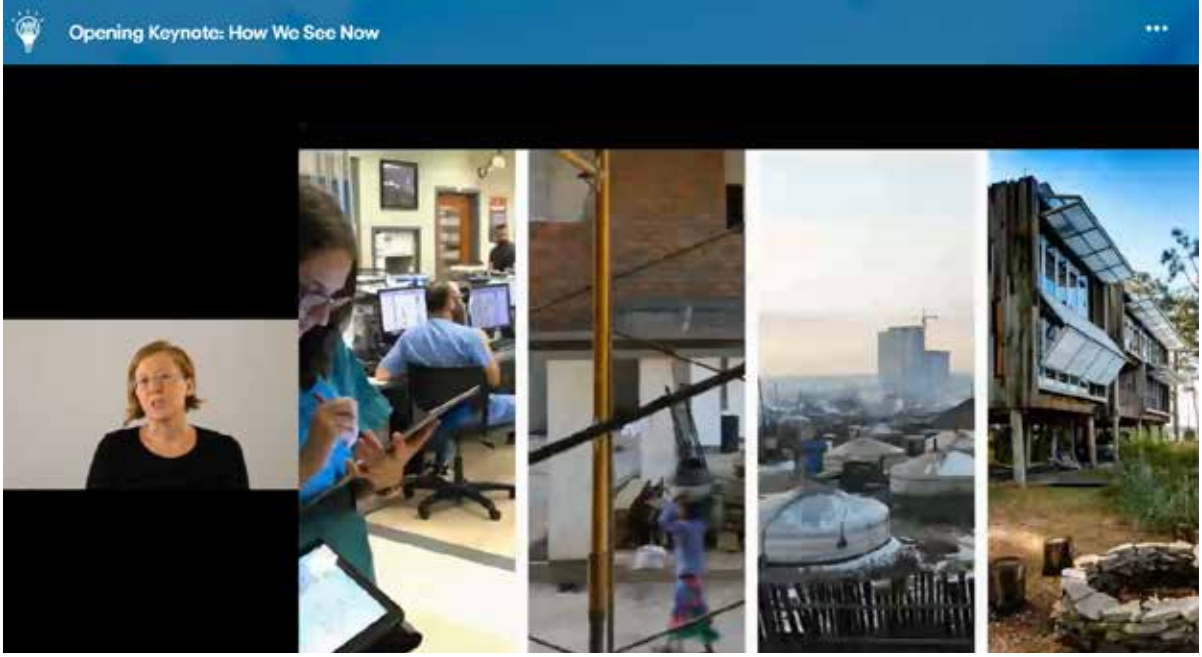
"Courage requires us to take risks," he said.

Also, for the first time, there are more people living in cities than do not. Millennials and Generation Z also value work/life balance over financial reward.

What does this mean for building and construction? How do we become relevant for customers?

The spaces where people experience the best success are not in cubicles with no light or plants, he said. "Different kinds of work require different kinds of spaces," Bandy said.





DAY TWO: WEDNESDAY, AUGUST 19, 2020

Day 2 of the meeting kicked off with Billie Faircloth, partner with KieranTimberlake, whose opening Resilience keynote, How We See Now, covered adaptive architecture, building types, design strategies, and several case studies.

The afternoon was peppered with more educational sessions on a national BIM standard and roadmap, mitigation, housing affordability, workforce development, and diversity and inclusion.

Drs. Perry Daneshgari, president and CEO of MCA, Inc. and Heather Moore, vice president of operations with MCA, Inc., presented on the Workforce of the Future: Using Data to Advance Industrialization of Construction.

The team painted a picture about construction today: Industrial dropped from 50 percent to 30 percent in a decade. Consumers are looking for faster, cheaper construction.

Processes for managing work to improve productivity include agile construction (to detect and quickly respond to issues), job productivity assurance and control, and analysis around scheduled work.

How to Pay for Mitigation

A four-person panel tackled the very complex issue of how to pay for mitigation. The panel featured Kayed I. Lakhia, director of Hazard Mitigation with FEMA/DHS; Sean Kevelighan, president and CEO of the Insurance Information Institute; Michael Hernandez, vice president of housing access with the Affordable Housing Initiatives of Fannie Mae; and Carl Hedde, principal with CGH Consulting, LLC and NIBS chair.

Kevelighan mentioned a host of action partners and tools to help change behavior and move toward a "resilience movement."

"We want businesses and communities to think about risk and management as a top-of-mind exercise all the time," he said, adding that there were tools that could be used to be more dynamic and interactive with customers and business programs.

During the presentation, Hedde announced the release of a new NIBS resource by the Multi-Hazard Mitigation Council and its Committee on Finance, Insurance, and Real Estate: A Roadmap to Resilience Incentivization. The report proposes to develop and demonstrate a set of public and private incentives to owners of buildings and other infrastructure to facilitate the upgrade of existing infrastructure and better design of new infrastructure. Lakhia also shared that FEMA plans to allocate more funds for mitigation efforts through its Building Resilient Infrastructure and Communities (BRIC) program. BRIC replaces the organization's pre-disaster mitigation grant program.

Using Modular Construction to Tackle Affordable Housing Supply Crisis

Libby O'Neill, a Multifamily Affordable Product research analyst with Fannie Mae, presented a session on Modular Multifamily Housing as an Affordable Supply Strategy.

Fannie Mae defines multifamily as rentals with five or more residential units. According to O'Neill, some of the housing development cost drivers include development costs like market forces (land, labor and materials), regulation and financing costs, and hard construction costs, which comprise 65 percent to 73 percent of total development costs.

"We need a variety of solutions to address this crisis," she said. Some of the advantages of modular construction include a reduced development timeline, quality control, safety, cost savings and cost certainty, sustainability, and productivity.

Says O'Neill: "With modular construction, many have recognized this as one potential solution to the housing affordability crisis … One of the benefits is time savings. We can get more units built in less time."

The NIBS Off-Site Construction Council worked with Fannie Mae to develop the "Multifamily Modular Construction Toolkit," a tool for lenders, developers, stakeholders interested in pursuing multifamily modular construction. The toolkit was published by Fannie Mae in May 2020.

Improving Construction Safety to Recruit a Stronger and More Diverse Workforce

The closing Workforce keynote on Day 2 was given by Nancy Novak, chief innovation officer with Compass Datacenters, and Doug Mouton, general manager of Global Datacenter Procurement & Construction with Microsoft. The two discussed construction safety and how it leads to stronger recruiting and a more competitive environment.

"To get safety right, you've got to be a good planner," Mouton said, adding that there's a discernible pattern that projects with excellence in safety also improve in quality, schedule, and cost.

Novak said unhealthy behaviors can evolve to create to create a toxic work environment "Sometimes the hard conversations need to happen for meaningful change," she said.

Some calls to action include creating a safe environment on sites for all workers, leadership must embrace the obligation to maintain safe and inclusive work sites, and intentional hiring and development of diverse talent.

Thank You to Our Sponsors

Annual Awards

The National Institute of Building Sciences recognizes built environment leaders and organizations that have provided outstanding service to NIBS, the greater building community, and nation.

In 2020, we retired a number of categories, including the Honor, Member, and President's awards. For 2021, we opened several new awards categories, including NIBS Distinguished Service, NIBS Innovator, Exceptional Woman in Building, Future Leaders, and NIBS DEI Leadership awards. Stay tuned for more information on these honors and awards.

THE 2019 MORTIMER M. MARSHALL LIFETIME ACHIEVEMENT AWARD

Our highest honor goes to someone who has demonstrated a lifetime of dedication to the mission and goals of the National Institute of Building Sciences. Established in 2011 and named after the first member of NIBS, this award is bestowed upon those who exhibit the passion upon which NIBS was founded.

The 2019 award was given to The Honorable Stephen T. Ayers, FAIA, NAC, CCM, LEED AP.

On February 24, 2010, President Barack Obama nominated Ayers to serve as the 11th Architect of the Capitol. On May 12, 2010, the U.S. Senate, by unanimous consent, confirmed Ayers, and on May 13, 2010, the President officially appointed Ayers to a 10-year term as Architect of the Capitol.

Ayers was responsible for facilities maintenance and operation of the historic U.S. Capitol Building, the care and improvement of more than 570 acres of grounds and the operation and maintenance of 18.6 million square feet of buildings, including the House and Senate Congressional office buildings, Capitol Visitor Center, Library of Congress buildings, U.S. Supreme Court Building, Thurgood Marshall Federal Judiciary Building, and other facilities. He was responsible for the care of all works of art in the Capitol under the direction of the Joint Committee on the Library and was responsible for the maintenance and restoration of murals, outdoor sculpture and other architectural elements throughout the Capitol complex. He also serves as Acting Director of the U.S. Botanic Garden and the National Garden.

As Architect of the Capitol, Ayers was a member of the Capitol Police Board and Congressional Accessibility Services Board, as well as an ex-officio member of the United States Capitol Preservation Commission. Additionally, the Architect of the Capitol is a member of the District of Columbia Zoning Commission, President's Advisory Council on Historic Preservation, National Capital Memorial Commission, Art Advisory Committee to the Washington Metropolitan Area Transit Authority, and National Institute for Conservation of Cultural Property.

Under Ayers' leadership, the Architect of the Capitol reduced carbon emissions, improved energy efficiency and implemented sustainable design practices throughout the Capitol complex. Ayers was also committed to supporting small businesses to help facilitate competition and support local communities and has implemented several programs to actively award contracts to companies that reflect the diversity of our country. The Architect of the Capitol has approximately 2,300 employees and an annual budget of more than $730 million.

THE BETTY AND MORT MARSHALL MEMORIAL SCHOLARSHIP FUND

Two students of architecture and engineering studying at a historically black college or university (HBCU) were honored with scholarships in 2020.

The Betty and Mort Marshall Memorial Scholarship Fund was established to promote diversity in the building sciences. It has been made possible because of a generous endowment from Betty and Mort, a sponsorship from NIBS, and contributions from friends, family and colleagues.

The winners were Jenna Greer, an architecture student at Howard University, and Tanaka Chakanyuka, a civil engineering student at Southern University.

Winners of the Betty and Mort Marshall Memorial Scholarship Fund, Jenna Greer, Architecture Student at Howard University (top left and right) and Tanaka Chakanyuka, Civil Engineering student at Southern University (bottom left).

Councils

BETEC/BEC

The Building Enclosure Technology and Environment Council (BETEC) fosters a better understanding of how building components interact with each other and with the environment in order to optimize energy use.

In 2020, BETEC members worked virtually to share knowledge of existing and new technologies and practices, with an eye focused on revamping the extensive Building Envelope Design Guide portion of the Whole Building Design Guide, an ongoing effort. Updates to the exterior wall section, fenestration, and masonry sections are underway, and new sections on Adhesives and Sealants (done in conjunction with the Adhesives and Sealants Council) and Post Occupancy Evaluation are on track to the be published in early 2021.

Similarly, the Building Enclosure Councils (BECs), a joint venture between the American Institute of Architects and the Institute under the aegis of BETEC, kept up with each other virtually through a series or quarterly Zoom meetings of the BEC chairs. Individually, the 4,000 members in 34 BECs chapters employed a variety of means to connect members and continue building enclosure education through webinars and virtual meetings.

Chair: Stephen Shanks, Chief Operating Officer, CTI Consultants Inc.

Vice Chair: Dudley McFarquhar, PhD, PE, Owner, McFarquhar Group Inc.

BEC National Chair: William Babbington, AIA, Principal, Studio NYL

BEC National Vice Chair: John Burningham, Principal, UNVC

NIBS Board Liaison: Paul R. Bertram, Jr., FCSI, PRB Connect

NIBS Staff: Stephanie Stubbs, Director of Lifecycle Management

Building Research Information Knowledgebase

NIBS and the American Institute of Architects collaborate on the development of the Building Research Information Knowledgebase (BRIK), an interactive portal to support incorporation of multidisciplinary research in the design, construction and operation of high-performance buildings.

The BRIK Council serves in an advisory capacity to the project. Members meet annually at the Building Innovation Conference and quarterly via teleconference. BRIK now has more than 3,000 pieces of research contributed by 22 organizational and private partners. Exhibit booths at AIA and NIBS annual meetings foster the importance of research in the design and construction industries.

Staff Liaison: Virginia Ebbert, Manager, Research & Archives, American Institute of Architects

NIBS Staff: Stephanie Stubbs, Assoc. AIA, PMP, Director, Facility Lifecycle Management

Building Information Management Council

The Building Information Management (BIM) Council (formerly known as the buildingSMART alliance®) is a unique organization helping the North American real property industry become more efficient. The BIM Council leads in the creation of tools and standards that allow projects to be built digitally before they are physically built through the use of building information modeling.

Its mission is to lead the development and deployment of broadly adopted national information exchange standards and best practices for the built environment, with a focus on significantly improving project delivery and operational processes.

BIM Council membership is comprised of individuals and organizations representing government agencies, academia, and the private architect, engineer, and construction firms. It includes 160 participating organizations.

Chair: Van Woods, BIM Program Manager, U.S. Army Corps of Engineers

Vice Chair: Rachel Riopel, Digital Practice Leader, HDR Inc.

Secretary: Nancy Novak, Chief Innovation Officer, Compass Data Centers

Past Chair: John I. Messner, PhD, Director Computer Integrated Construction, Dept. of Architectural Engineering, Pennsylvania State University

NIBS Board Liaison: Lane Beougher, Program Manager, Ohio Facilities Construction Commission

NIBS Staff: Roger J. Grant, CSI, CDT, Executive Director, Building Information Management

NIBS Staff: Dominique Fernandez, Program Director, Building Information Management

Innovation Advisor: Ian Keough, CEO, Hypar

Building Seismic Safety Council

The Building Seismic Safety Council (BSSC) deals with the complex technical, regulatory, social and economic issues involved in developing and promulgating building earthquake risk mitigation provisions that are national in scope. It brings together needed expertise and relevant public and private interests to resolve issues related to the seismic safety of the built environment through authoritative guidance and assistance backed by a broad consensus. It enhances public safety by providing a national forum that fosters improved seismic planning, design, construction and regulation in the building community.

BSSC was established in 1979 as one of the important initiatives under the National Earthquake Hazards Reduction Program (NEHRP). Over the past 40 years, BSSC has developed 10 editions of the NEHRP Recommended Seismic Provisions for New Buildings and Other Structures (Provisions), collaboratively worked with the United States Geological Survey and Federal Emergency Management Agency to develop and update the national applicable seismic maps, advised government bodies on their programs and seismic research, and encouraged and promoted the adoption of the seismic provisions in model building codes. Following strategic planning recommendations, the BSSC BOD is forming four task groups, focusing on functional recovery design of new buildings, lifelines, existing buildings, and innovations, respectively.

Chair: Charles J. Carter, SE, PE, Ph.D., President, American Institute of Steel Construction

Vice Chair: Kent Yu, PhD, SE, Principal, SEFT Consulting Group

Secretary: Roberto Leon, P.E., Ph.D., D.H. Burrows Professor of Construction Engineering The C. E. Via Department of Civil and Environmental Engineering , Virgina Tech

Member-at-Large: Craig A. Davis, PhD, PE, GE, Water System Resilience Program Manager & Seismic Manager, Los Angeles Department of Water and Power (retired)

Member-at-Large: Joann Browning, Ph.D., P.E., Dean, College of Engineering, University of Texas at San Antonio

Past Chair: James Cagley, P.E., S.E., President, Cagley & Associates

NIBS Board Liaison: Anne Ellis, P.E., FACI, F.ASCE, Executive Director, Charles Pankow Foundation

NIBS Staff: Jiqiu (JQ) Yuan, Ph.D., P.E., PMP, Executive Director of the Multi-Hazard Mitigation and Building Seismic Safety Councils

Consultative Council

The Consultative Council assembles leaders within the building industry to discuss common issues and challenges, making recommendations to the executive and legislative branches of government to improve the nation's buildings and infrastructure.

The council is responsible for publishing the Moving Forward Report, which examines challenges facing the building industry and offer findings and recommendations on how to overcome them. The summarized report becomes part of NIBS' annual report, which goes to the President of the United States and the U.S. Congress.

Chair: Mark N. Dorsey, CAE FASEI, CEO, Construction Specifications Institute

Vice Chair: Katharine E. Morgan, President, ASTM International

NIBS Board Liaison: Thomas Izbicki, PE, FSFPE, Principal, CPL Architects and Engineers

NIBS Staff: Kyle Barry, PMP, Sr. Project Manager

Facility Management and Operations Council

The Facility Management and Operations Council (FMOC) provides industry-wide, public and private support for the creation of higher quality facilities through improved maintenance and operation and real property management. In order to achieve this purpose, the FMOC has the following objectives: 1) to increase maintenance and operations influence in the facility acquisition process; 2) To promote the sharing and integration of facilities maintenance and operations procedures and information; and, 3) to identify and disseminate "best" practices for the maintenance and operations of facilities.

Chair: Rolf Alexis, Senior Global Capital Asset Analyst, Global Facilities, General Motors

Vice Chair: Emily Herndon, LEED AP, Senior Consultant, Woolpert, Inc.

Member-at-Large: Casey Martin, Senior Consultant & Program Manager, Jacobs

NIBS Board Liaison: Darrell X. Rounds, FMA, C.E.M, Operations Group Manager, General Motors

NIBS Staff: Kyle Barry, PMP, Senior Project Manager

Multi-Hazard Mitigation Council

The Multi-Hazard Mitigation Council (MMC) brings together a body of experts in a multitude of related fields that can address the challenges associated with the identification and implementation of effective mitigation practices. The work of MMC has informed thousands—perhaps tens of thousands—of mitigation decisions that led to effective public policy on many levels. The council's goals are simple: promoting disaster resilience, while becoming a focal point of credible information and promoting whole building strategies.

Chair: Sara Yerkes, Senior Vice President of Government Relations, International Code Council

Vice Chair: Anne Cope, PhD, P.E., Chief Engineer, Insurance Institute for Business and Home Safety

Secretary: Russ Strickland, Executive Director, Maryland Emergency Management Agency

Member-at-Large: Lauren Alexander Augustine, Executive Director, Gulf Research Program, National Academies of Sciences, Engineering, and Medicine

Member-at-Large: Bryan Koon, Vice President of Homeland Security and Emergency Management, IEM

NIBS Board Liaison: Carl Hedde, CPCU, Head of Insurance Practice, One Concern

NIBS Staff: Jiqiu (JQ) Yuan, Ph.D., P.E., PMP, Executive Director of the Multi-Hazard Mitigation and Building Seismic Safety Councils

Committee on Finance, Insurance, and Real Estate

Chair: Daniel Kaniewski, Ph.D., Managing Director, Public Sector, Marsh & McLennan Companies

Off-Site Construction Council

Off-site construction is the planning, design, fabrication, and assembly of building elements at a location other than their final installed location to support the rapid and efficient construction of a permanent structure. Off-site construction is characterized by an integrated planning and supply chain optimization strategy.

In 2013, NIBS established the OSCC to serve as a research, education and outreach center for relevant and current information on off-site design and construction for commercial, institutional, and multifamily facilities.

Chair: Laurie Robert, Vice President Sales & Marketing, NRB Inc (a Horizon North Company)

Interim Vice Chair: Aundre Oldacre, Managing Partner at AoRa Development

Member-at-Large: Tom Hardiman, Executive Director, Modular Building Institute

NIBS Board Liaison: Paul Bertram, CSI Distinguished Member, FCSI, CDT, LEED AP, GGP, Owner, PRB Connect

NIBS Staff: Kyle Barry, PMP, Sr. Project Manager, National Institute of Building Sciences

Whole Building Design Guide Workgroup

The WBDG Whole Building Design Guide® Workgroup, formerly known as the WBDG Advisory Committee, consists of representatives from federal agencies who meet quarterly to guide the development of the WBDG, a comprehensive, internet-based portal to more than 12,000 design criteria, standards, and programs of whole-building performance.

Meeting virtually, the workgroup has decided to pursue these strategies going forward: increase collaboration among federal agencies, states, public and private groups, and other government bodies; provide mechanisms for outreach and feedback; engage resources and expertise to promote/influence improved processes and policies; increase flexibility and adaptability to implement change faster, more efficiently and effectively; and optimize integrity, credibility, and relevance of the WBDG.

Chair: Sherri McMillion, Specifications and Criteria Manager, NAVFAC

NIBS Board Liaison: Darrell X. Rounds, FMA, C.E.M, Operations Group Manager, General Motors

NIBS Staff: Bob Payn, Sr. Director, Information Technology

Member Spotlight

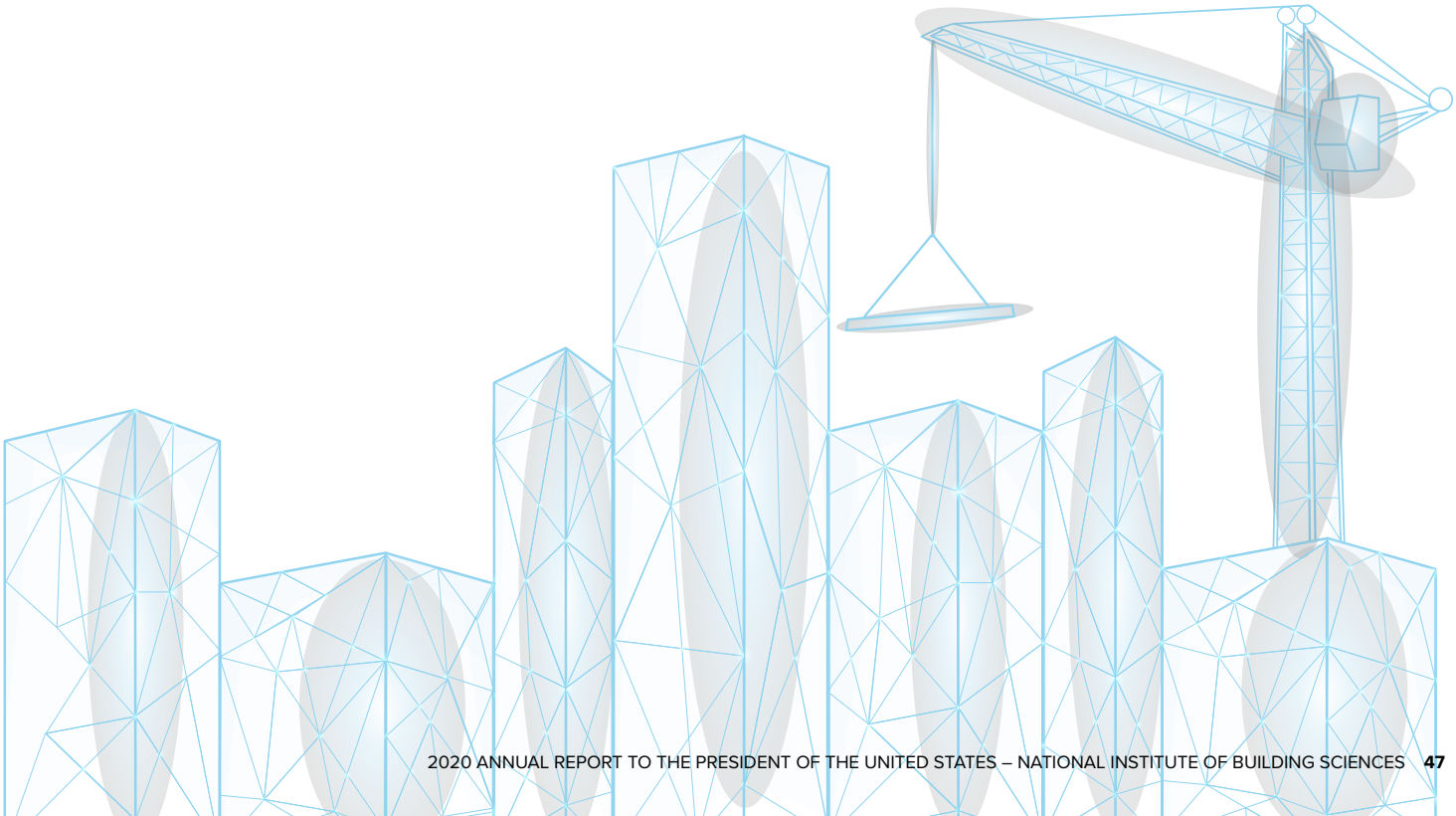
WILL BABBINGTON, AIA, PE, LEED AP BD+C
National Chair – Building Enclosure Council | Building Enclosure Technology and Environmental Council
Façade Design Director, Principal, Studio NYL | SKINS Group
Building Enclosure Council - Colorado Past-Chair
AIA Alternate Representative to ASHRAE SSPC 90.1 Envelope Subcommittee
ASTM Committee E06 on Performance of Buildings
NIBS/ASTM Developer and Trainer - Building Enclosure Commissioning Certificate

Will Babbington

As the National Chair of the Building Enclosure Council (BEC) of the Building Enclosure Technology and Environment Council (BETEC), I'm involved in helping our open network of architects, engineers, enclosure specialists, contractors, owners, and educators disseminate and share information. We currently have over 30 local BECs across the United States.

The connections to knowledge within NIBS to the and multidisciplinary professionals both pertinent and peripheral to built environment stakeholders are fantastic. There is almost too much information within the NIBS network. Mining that amount of information, even being aware of its existence, can sometimes be its own job.

Over the years I've "grown up" with the Building Seismic Safety Council as a structural engineer. When I transitioned to architecture and then enclosure design, my involvement with the Building Enclosure Council, reinforced by the Whole Building Design Guide's resources, were invaluable in filling gaps in enclosure design that most architectural and engineering programs do not cover. These and other NIBS resources, like the Building Research Information Knowledgebase (BRIK) and Off-Site Construction Council, are also conduits through which I now actively participate and contribute back to the building and design profession.



Moving Forward: Findings and Recommendations from the Consultative Council

INTRODUCTION

The National Institute of Building Sciences (NIBS) is authorized by the U.S. Congress to serve the public interest as the essential forum for discussing issues and identifying opportunities within the building community. The NIBS Consultative Council assembles high-level building community leaders to make collective recommendations directly to policymakers – and by NIBS to the President of the United States – to improve our nation's buildings and infrastructure.

Each year, the Consultative Council publishes the Moving Forward Report to investigate key challenges facing the building industry and to make recommendations to policymakers to help overcome those challenges. The 2020 Moving Forward Report will examine the critical area of "Ensuring Healthy Buildings: How Buildings Can Protect and Promote Public Health."

THE CRITICAL NEED TO DEVELOP AND PROMOTE HEALTHY BUILDINGS

On average, Americans spend approximately 90% of their time indoors, according to the U.S. Environmental Protection Agency (EPA). One of the most difficult facets of the COVID-19 pandemic has been a fear of interacting with our loved ones, acquaintances, colleagues, or even with total strangers while indoors. Ensuring that the spaces where we work and live are healthy and safe for continued occupancy is critical to overcoming the COVID-19 pandemic, and should be seen as a fundamental pillar of public health and community resilience.

The concept of healthy buildings does not simply include continual sanitation of a building's indoor environment to eliminate pathogens. The Healthy Buildings for Health program at the Harvard T.H. Chan School of Public Health developed the 9 Foundations of a Healthy Building report, highlighting nine key areas for ensuring healthy buildings.

- Ventilation
- Air Quality
- Thermal Health
- Moisture
- Dust and Pests
- Safety and Security
- Water Quality
- Noise
- Lighting and View

Developing and promoting healthy buildings is intricately tied to community resilience and social equity, and includes the full spectrum of a building's lifecycle: planning, design, construction, commissioning, ongoing operations and maintenance, and renovation. It also includes ensuring continual communication and knowledge transfer between building owners, operators, regulators and public health and public safety officials to protect the health and safety of occupants.

This report examines and provides recommendations for policymakers and building owners regarding three components of healthy buildings:

- Indoor environmental quality
- The importance of design in promoting health
- Promoting knowledge transfer between building owners and public health officials

INDOOR ENVIRONMENTAL QUALITY

The National Institute for Occupational Safety and Health (NIOSH) refers to indoor environmental quality (IEQ) as "the quality of a building's environment in relation to the health and wellbeing of those who occupy the space within it."[1] The indoor environment presents unique risks to building occupants, and varies greatly by building type, building operations, and geographic location. Studies by the U.S. EPA have shown that harmful contaminants can be present in concentrations that are two to five times higher than outdoors.[2] These pollutants have been shown to negatively affect hundreds of thousands of individuals every year, including

1 "Indoor Environmental Quality." National Institute for Occupational Safety and Health. Center for Disease Control and Prevention. https://www.cdc.gov/niosh/topics/indoorenv/buildingventilation.html
2 Indoor Air Quality." U.S. Environmental Protection Agency. https://www.epa.gov/report-environment/indoor-air-quality

incidence of respiratory issues, cancer, and even adverse behavioral impacts. Promoting healthy IEQ in our nation's buildings can lead to healthier, happier, and more productive occupants.

The COVID-19 pandemic, transmitted by an airborne pathogen, spotlights the particular importance of indoor air quality (IAQ) in promoting public health in the built environment. Though pandemic conditions perhaps require a change in a building's normal operations[3], clean, properly-ventilated, and well-filtered air is critical to healthy occupants at all times. Poor IAQ can have both an immediate and/or long-term impact on a building's occupants, with some effects not materializing for years. As cited in the Harvard Business Review, one CDC study of 3,000 individuals across 40 buildings found that 57% of sickness can be attributed to poor ventilation.[4] Improper operation and maintenance of HVAC systems is one of the most common problems that impact indoor air quality,[5] and can increase indoor pollutant levels via improper ventilation and filtration, high temperatures, and high humidity levels.

There are many common sources that may contaminate indoor air:[6]

- Building materials such as paints, coatings, sealants, carpeting, and furniture that may emit unhealthy volatile organic compounds (VOCs)
- Combustion processes from mechanical systems
- Cleaning materials
- Mold from indoor moisture
- Radon, methane, or other harmful substances off-gassing
- External inputs, such as particulates and smoke from wildfires and other disasters

In addition to safe indoor air, there are other factors that impact indoor environmental quality. Building performance and resilience, especially as it relates to IEQ, is critical to ensuring public health. Other factors that can promote healthy indoor environments include:[7,8]

- Low VOC materials
- Access to daylight, views, and proper lighting
- Improved building controls, including occupant enabled controls
- Good acoustics
- Maintaining healthy work practices during construction and renovation
- Replacing combustion appliances and equipment with electric counterparts
- Pest control
- Safety and security from natural hazards

The building industry and policymakers should prioritize investments in IEQ, including increased funding for research, real world testing, and incentives to promote healthy IEQ in new and existing buildings, with particular focus on disadvantaged or underserved communities. In fact, of critical importance will be understanding the full impact of the potentially disruptive change (both positive and negative) brought on by a society-wide change in remote work for our communities.

THE IMPORTANCE OF DESIGN TO PROMOTE HEALTH

Architects and engineers have been increasingly focused on the importance of health in building design and operations; this trend needs to continue to accelerate. As the American Institute of Architects "Design and Health Initiative" notes, "when health impacts and equitable access to healthy places become central to the design and planning process, transformational outcomes quickly appear."[9] A 2016 SmartMarket report showed

3 ASHRAE Building Readiness Guide. https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf

4 Allen, Joseph and Macomber, John. "What Makes an Office Building "Healthy"". Harvard Business Review. April 2020. https://hbr.org/2020/04/what-makes-an-office-building-healthy

5 "Indoor Environmental Quality." National Institute for Occupational Safety and Health. Center for Disease Control and Prevention. https://www.cdc.gov/niosh/topics/indoorenv/buildingventilation.html

6 Volatile Organic Compounds." U.S. Environmental Protection Agency. https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality

7 "Green Building 101: What is indoor environmental quality?" U.S. Green Building Council. https://www.usgbc.org/articles/green-building-101-what-indoor-environmental-quality

8 Continental Automated Building Association. "Intelligent Buildings and COVID-19." https://www.caba.org/wp-content/uploads/2021/02/CABA-IBCOVID-ES-WEB.pdf

9 American Institute of Architects. "AIA's Design and Health Initiative." http://new.aia.org/pages/3461-aias-design-health-initiative

that upwards of 70% of building owners and designers indicated that the impact of buildings on occupant health influenced the building's designs and operations, an increase from a previous survey in 2014. The American Society of Interior Designers "2020 Interior Design Resiliency Report" noted that, due to the COVID-19 pandemic, more than one-third of surveyed interior designers anticipated changes involving material specifications and certifications focused on health as well as product specification or certifications focused on health.[10]

There are currently several rating systems, certification programs, and building codes that focus on occupant health, and provide pathways and tools toward developing and maintaining healthy buildings:

- Fitwel Standard
- Green Globes Standard
- Indoor AirPLUS
- International Green Construction Code (IgCC)
- LEED Green Building Rating System
- NGBS Green Certification
- RESET Standard
- Verified Healthy Buildings Program (UL)
- WELL Building Standard

Healthy buildings are a critical component of our national infrastructure, and should be intricately entwined with the concepts of resilience and social equity, both on a building by building basis and in the surrounding community.[11] Sustainable land use, walkability, multimodal transportation, access to healthcare and healthy food options, and the surrounding landscape all contribute to a healthy, vibrant workforce. Building owners and public health officials should work with planners, architects, and designers to ensure that sound practices in building design and resilience are core components of community development.[12] The federal government must also recognize the critical role that buildings play in our national infrastructure, and encourage healthy buildings programs that enable occupant health and happiness in both our homes and workplaces.

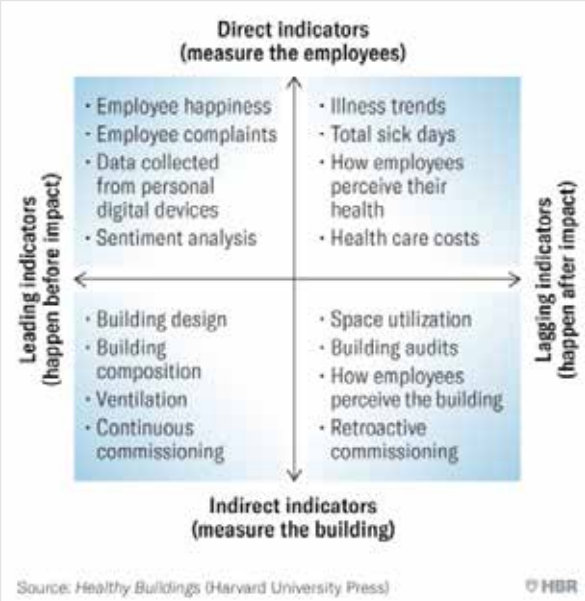
10 American Society of Interior Designers. "2020 ASID Interior Designer Resiliency Report.

11 National Institutes of Health. "Elements That Contribute to Healthy Building Design." Environmental Health Perspectives. June 2007. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1892106/

12 The Alliance for National & Community Resilience's (ANCR) Community Resilience Benchmarks (CRBs) provide tools to look across community functions to support resilient communities.

PROMOTING CONSISTENT KNOWLEDGE TRANSFER BETWEEN BUILDING OWNERS AND PUBLIC HEALTH OFFICIALS

The U.S. EPA, in its Healthy Buildings, Healthy People: A Vision for the 21st Century report, listed as a primary goal the importance of improving professional education and communications, both within and between the building community and medical/public health professionals.[13] Particularly critical is the development of common risk assessment methodology, research into common risks associated with health and buildings, common baselines from which to measure risk, and the quick communication of those risks and proposed solutions. Establishing clear communication protocols and promoting data-sharing among the building industry and public health and medical officials can help to protect public health and provide additional tools for combating future crises.



John Macomber and Joseph Allen, of Harvard University, developed "Health Performance Indicators" to help determine leading and lagging indicators of worker health and building performance.[14] Building owners and operators should work with public health and medical professionals to incorporate baseline metrics into their facilities.

The industry must convene and discuss the optimal way to ensure that medical professionals, including general practitioners, pediatricians, and mental health professionals, are aware of the critical nexus between the built environment and public health. A survey by McGraw Hill Construction found that a bare majority of medical professionals in these groups were aware of this connection.[15] Additionally, the survey noted that only 15% of medical professionals receive any information on the connection between health and buildings. A majority of those surveyed indicated that receiving additional information on this topic would have an impact on their practice and advice for patients. The building industry should work with public health officials and advocates or associations on developing a common framework for communicating to medical professionals and the general public the importance of the built environment in promoting health.

Additionally, the building industry should streamline the regulatory development process in order to make it more anticipatory of emerging hazards.[16] Anticipating the impacts of climate change in building regulations, which will include an increase in the risk of natural disasters and pandemic events, will be critical to ensuring healthy, resilient, and equitable communities.[17] This will require a sustained connection between the building industry and science and public health officials.

NIBS AND CONSULTATIVE COUNCIL ACTIVITIES IN 2020

In 2020, the NIBS Consultative Council hosted a series of virtual town halls related to COVID-19 and its impact

13 U.S. Environmental Protection Agency. "Healthy Buildings, Healthy People: A Vision for the 21st Century." https://www.epa.gov/indoor-air-quality-iaq/healthy-buildings-healthy-people-vision-21st-century

14 Allen Joseph and Macomber, John. "What Makes an Office Building 'Healthy?'" Harvard Business Review. April 2020. https://hbr.org/2020/04/what-makes-an-office-building-healthy

15 McGraw Hill Construction SmartMarket Report. "The Drive Toward Health Buildings: The Market Drivers and Impact of Building Design and Construction on Occupant Health, Well-Being and Productivity." http://content.aia.org/sites/default/files/2016-04/DH-Drive-Toward-Healthier-Buildings-SMR1_0.pdf

16 Diamond, Rick and Eisenberg, David. "After COVID-19: Opportunity for Changing Building Regulations?" Buildings and Cities. May 2020. https://www.buildingsandcities.org/insights/commentaries/after-covid-19-regulation.html

17 American Institute of Architects. "Disruption, Evolution, and Change: AIA's Vision for the Future of Design and Construction." https://content.aia.org/sites/default/files/2019-06/ADV19_Disruption_Evolution_Change.pdf

on the built environment. The series was designed to engage with experts in the buildings and public health communities to help America's workforce prepare to reenter buildings during and/or after the COVID-19 pandemic, in accordance with current (and shifting!) health and safety guidelines.

- Preparing for Re-Entering Buildings (May 7, 2020): an expert panel covered preparing the office or workplace (cleaning, disinfecting, and decontamination), HVAC and water systems, elevators, and transportation, and what to do if a colleague contracts a virus in a shared workspace.
- Mental Health and Sanitation of COVID-19 Facilities (May 19, 2020): an expert panel covered re-occupancy of spaces used to house COVID-19 patients and/or medical personnel, sanitation of spaces, and workforce mental health.
- The Future of Design and Construction (June 29, 2020): an expert panel covered how offices may be redesigned moving forward, the importance of facility management, what will become of co-work spaces, and the future of commercial buildings.
- Healthy Buildings and the Effect on Public Health During the Pandemic (August 25, 2020): an expert panel will discuss the importance of healthy buildings, public health, climate justices, and the green energy sector.

The National Institute of Building Sciences also established a COVID-19 resource hub on the NIBS Whole Building Design Guide. The WBDG team built a permanent resource for those looking for recent developments, financial assistance information, webinars and events, continuing education, and other impacts of the coronavirus on the building sector.

LOOKING AHEAD TO 2021

In December 2020, the Consultative Council held a CEO Roundtable entitled "Improving the Workforce of the Built Environment through Social Equity." The roundtable discussed the current state of diversity, equity, and inclusion (DEI) within the building industry and how leaders present could help drive the industry forward. This included the need to develop survey work related to DEI to inform industry activities, develop core metrics for tracking progress, and partner with core industry stakeholders to drive critical DEI initiatives. Throughout 2021, the Consultative Council will lead these efforts to affect positive change in diversity, equity, and inclusion in our workforce and the larger built environment.

RECOMMENDATIONS:

- The Administration, DOE, CDC, EPA, NIST, and other relevant federal agencies should increase investment into critical research on the impacts of IEQ and resilience on health and productivity. Of particular importance is research into how retrofits to the nation's existing building stock can be used to improve IEQ.

- Federal agencies, including DOE, NIST, EPA, GSA, 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. This should include opportunities to shorten the regulatory and code development process, and enable it to be more anticipatory of current and future disruptions to public health.
- Congress, DOT, HUD, DOE, FEMA, and EPA, with input from the community-based organizations, advocates, and the private sector should identify and enact policies, including incentive programs, that encourage building owners and operators to invest in critical activities that promote healthy IEQ. Clean water, healthy high performing buildings, clean interior and exterior air, and fair and equitable access to healthy and resilient places are critical components of our nation's infrastructure. Particular incentive should be given to supporting improvements in disadvantaged communities or populations that are impacted by flaws in existing structures, those constructed with unsafe or toxic materials, or that present unsafe living or working conditions to occupants.
- The Administration and GSA should encourage federal agencies to "lead by example" and adopt best practices in healthy buildings in all federal facilities. This should include that all new federal buildings meet standards that promote healthy buildings.
- The Administration, DOE, EPA, HHS, CDC, other relevant federal agencies, and the private sector should develop and engage in a national campaign to increase awareness of the importance of the indoor environment to public health. A specific goal of this campaign should be to increase awareness among medical practitioners on the critical role of buildings in promoting and protecting public health, and how medical professionals can communicate with building owners and public health professionals regarding potential risks, dangers, and solutions.
- The Administration, DOL, and the U.S. Department of Education should extend their efforts to advance apprenticeships and workforce development to include careers within the buildings and construction workforce, with additional programs focused on promoting women and minority groups in the trades.

NIBS CONSULTATIVE COUNCIL

- American Institute of Architects
- American Institute of Steel Construction
- American Planning Association
- American Society of Civil Engineers
- American Society of Heating, Refrigerating and Air-Conditioning Engineers
- Associated Builders and Contractors
- Associated General Contractors of America
- Association for Equipment Management Professionals
- ASTM International
- Building Owners and Managers Association International
- Connex FM
- Construction and Demolition Recycling Association
- Construction Management Association of America
- Construction Specifications Institute
- Continental Automated Buildings Association
- EEBA
- Green Building Institute
- IIBEC
- Insurance Institute for Building and Home Safety
- International Association of Plumbing and Mechanical Officials
- International Code Council
- Modular Building Institute
- National Energy Management Institute Committee
- National Ready Mixed Concrete Association
- New Buildings Institute
- Royal Institution of Chartered Surveyors
- U.S. Green Building Council

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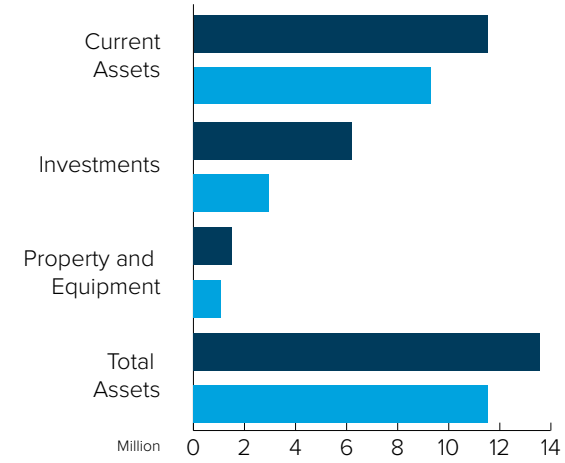
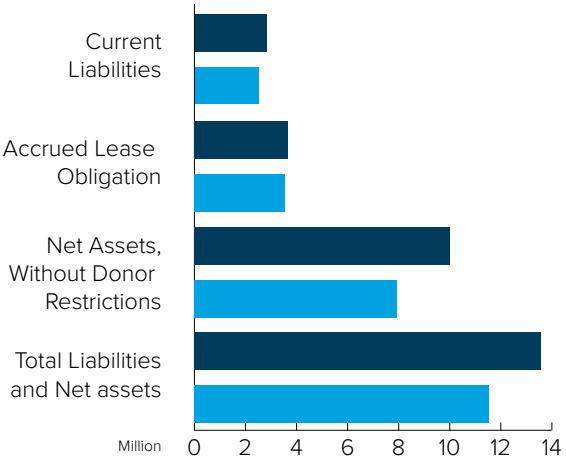
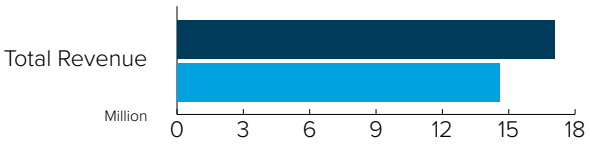
2020 Financial Statements

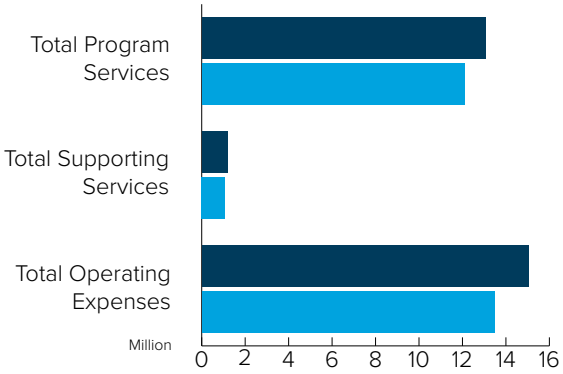




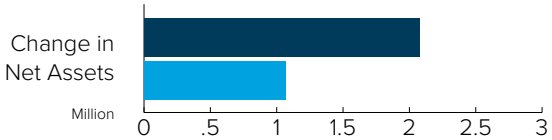
	2020	2019
Current Assets		
Cash & Cash Equivalents	$ 5,530,182	$ 3,098,366
Accounts Receivable	5,819,024	6,184,209
Prepaid Expenses & Deposits	176,654	105,078
Total Current Assets	11,525,860	9,387,653
Investments	1,403,051	1,352,414
Property and Equipment		
Furniture & Equipment	643,869	536,245
Leasehold Improvements	751,864	751,864
Software	31,483	-
Total	1,427,216	1,288,109
Less: Accumulated Depreciation & Amortization	(755,059)	(632,331)
Total Property & Equipment, Net	672,157	655,778
Total Assets	$ 13,601,068	$ 11,395,845
Current Liabilities		
Accounts Payable & Accrued Expenses	$ 1,574,028	$ 2,394,914
Accrued Lease Obligation, Current Portion	58,627	45,730
PPP Loan	635,500	
Deferred Revenue	592,776	233,683
Total Current Liabilities	2,860,931	2,674,327
Accrued Lease Obligation, Net of Current Portion	745,569	804,196
Total Liabilities	3,606,500	3,478,523
Net Assets, Without Donor Restrictions		
Undesignated	8,592,879	6,566,696
Designated - Cash Reserves	1,401,689	1,350,626
Total Net Assets	9,994,568	7,917,322
Total Liabilities and Net Assets	$ 13,601,068	$ 11,395,845



	2020	2019
Revenue		
Contracts & Grants	$ 16,313,653	$ 14,331,420
Other Publications Sales	48,837	10,458
Member & Other Contributions	100,454	116,728
Investment Income (Loss), Net	56,336	107,280
Meeting and Other	305,194	110,058
Total Revenue	16,824,474	14,675,944



Expenses		
Program Services:		
Federal Grants & Contracts	12,614,469	11,445,010
Publication	616,532	652,896
Other Publication	-	19,407
Other	138,924	104,393
Total Program Services	13,369,925	12,221,706
Supporting Services:		
General & Administrative Expenses	1,261,835	1,129,639
Membership	115,468	234,180
Total Supporting Services	1,377,303	1,363,819
Total Operating Expenses	14,747,228	13,585,525
Change in Net Assets	$ 2,077,246	$ 1,090,419



Thank you for being a part of our community.

The National Institute of Building Sciences serves the public interest through research, advancing building science and coordinating the expertise necessary to overcome challenges in the built environment.

Our goal: To build and rebuild a better tomorrow.

So, to our members and the local, state and federal government agencies who support our mission: Thank you for participating and making this industry better. Thanks to your hard work and dedication, our nation can look forward to a brighter and more sustainable future.

NIBS serves the built environment at the pleasure of those who created us: Congress. But we receive no Congressional funding.

Please consider donating to the National Institute of Building Sciences, as our work is critical to the safety and health of the nation's buildings, communities and cities.

Every dollar that is donated supports our mission and the U.S. built environment. Your donation may be tax deductible, please check with your tax advisor.

The National Institute of Building Sciences brings together the industry, private and public sectors, and federal agencies. This work truly is never complete.

Thank you for supporting us and for putting your stamp on the future of the built environment.

Member Spotlight

RACHEL RIOPEL, AIA, NCARB
Digital Practice Lead, HDR
Vice Chair, BIM Council
Minneapolis, Minnesota

Rachel Riopel

I got involved with NIBS in 2011, through the recommendation of a coworker. Discussions very much began to focus on defining and implementing BIM in the building sectors. Not long after, in 2014, the Transportation Research Board's annual meeting and NIBS' Building Innovation conference overlapped a bit. It was at this combined workshop, I remember as the first time the industry was starting to look at BIM across the entire building industry. It was interesting to see a movement beginning to take shape.

From a NIBS perspective, NBIMS-US Version 3 was the big involvement I had, starting in 2014. This fell under the former buildingSMART alliance, and I joined the project committee and technical and standard practice subcommittees.

The BIM Council and the network of experts you work with is amazing. It's been invaluable to dialogue with people about things that are important to what we do. I wholeheartedly believe that's how my career has been what it is – it's the people. On my own, I could do research and figure things out unilaterally, but working with this informal team and network of industry people is where I talk things through. Then, I bring it back to my company. When you become part of a group as diverse as this, you get to see things from multiple perspectives. The only real challenge is time, and trying to fit things in within a schedule sometimes can be hard. But that's the benefit of working as a team – together, we can keep the momentum moving forward.

For anyone thinking about membership, my advice is to just get involved. You see something created at a national level and you might think, "I'm working on my projects for my clients, how can what I do actually impact a national standard?" But that's exactly what helps build these standards. Everyone's input can be beneficial. I highly recommend trying it out and getting involved. The network is important to develop. The door is open.

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