Continuing Education

Renovating for a Greener, More Accessible Future
Case Studies of Product Solutions
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C.C. Sullivan

An unexpected symposium at the 2010 Build Boston conference addressed a topic that few of the event’s attendees had learned much about before: socially sustainable design. The term, and the symposium raised some eyebrows at the time — “What’s social sustainability?” many asked.

Yet, the series of workshops and events led by Valerie Fletcher, executive director of Boston’s Institute for Human Centered Design (IHCD), proved a watershed moment, introducing a sweeping and valuable mindset to a growing audience — and a growing body of renovation work. Topics covered included enhanced pedestrian design, facilities that accommodate children with autism and dual-sensory impairments, and ways to make the city’s Quincy Market area more accessible to people with disabilities. Clearly, inclusive design is at the heart of social sustainability — and it is driving more of today’s renovation and new construction projects.

“The biggest takeaway from the workshops was that many architects still treat these criteria as limitations rather than opportunities,” wrote Flavia Gnecco, a user-experience designer at Novartis Institutes for BioMedical Research, Cambridge, Mass., who attended the symposium. By using a collaborative approach with clients or potential end-users, she says, “designers can avoid jumping into sketching from assumptions and concentrate on finding innovative solutions that gracefully satisfy multiple needs at one time.”

Architects should use inclusive design principles — also known as adaptive, universal and accessible design — says IHCD’s Fletcher, not merely out of selflessness but also out of a market-based rationale. “Human diversity of age and ability has never been greater and is expected to increase steadily over the next 40 years,” she says. Today about 35 million U.S. citizens are over the age of 65, and about 78 million baby boomers will increase the number. An astounding 54.5 million have a disability, according to statistics compiled by the IHCD.

Impressed with the notion of social sustainability, a number of professional associations and trade groups are working to incorporate the concept more broadly into their work. The U.S. Green Building Council (USGBC), for example, has long recognized the three pillars of “economic, environmental and social sustainability.”
School Interiors Promote Adaptability

For recent school renovations, the emphasis has been cost but also flexibility for a range of uses and user groups. The approach, which has been called responsive design or adaptive design, is defined as interior environments having the customized equipment needed to ensure all children, including those with disabilities, “can participate fully in home, school and community,” according to New York City’s Adaptive Design Association.

Architects are showing how proven adaptive furnishings and learning tools can be complemented by school interiors that work better for the entire school population, regardless of learning challenges or physical handicaps. The Texas Association of School Boards, for example, pursued a unique approach to classroom flexibility for new elementary schools in the state’s independent school districts. At Kay Granger Elementary School in Keller, Texas, architects from Dallas-based SHW Group employed operable glass walls to meet the vision of the curriculum director, who believed school interiors could be more responsive to frequent changes in classroom setup and teaching approach.

SHW proposed an adaptable floor plan concept to create “flex space” that would both increase flexibility while also reducing the costs of installing labs at the schools. Using folding glass walls, the common floor areas between 30 pairs of classrooms can now be reconfigured during the day by teachers and staff. The monumental, standard aluminum folding system, can provide openings of more than 40 feet, with additional paired panels to increase the opening size.

“The multiuse space we designed to adjoin each pair of classrooms needed great visibility and flexibility, with good acoustical separation,” says Konrad Judd, AIA, the project’s lead designer for SHW Group, and the folding glass wall “maximizes the view and flexibility of the space when closed or open.” Judd adds that the glass walls are “very elegant and simple systems” that are “safe and easy for teachers and students to use.”

Other examples include the Booker T. Washington Elementary School STEM Academy in Champaign, Ill., in which operable glass walls have been used to increase the transparency and flexibility of the educational setting. For the LEED Gold-rated expansion, architects from Cannon Design and Bailey Edward Design used glass partitions to improve visual links and create larger class spaces — called “learning studios” — that increase access, visual connections and flexibility.

“Further evidence of the trend is that the USGBC has indicated there will be a credit for universal design features in future versions of LEED,” says Gunnar Baldwin, a water efficiency specialist with TOTO, a plumbing products manufacturer. Pilot Credit 34, “Design for Adaptability,” which was updated last August for the LEED 2012 draft, provides for points for homes and mid-rise construction that must meet the Fair Housing Amendments Act — those with four or more residential units and an elevator. “It all fits into our mission: to make sure that buildings are not just accessible but friendly.” (Note: LEED 2012 has not been finalized as of the date of this publication, April 2012.)

A variety of adaptable design approaches can contribute to social sustainability, says Matt Thomas, marketing director at NanaWall Systems, a maker of operable glass wall systems. “Beyond the mere removal of barriers of entry, architects are using adaptive design, where adaptability means accommodating a user’s need or changing needs based on daily usage,” he explains. “At a school, for example, adaptability means the space provides for modifications based on what the instructors and students need to do, day after day. A more flexible floor plan is also more sustainable, as they tend to use less square footage, less land and fewer materials.”
The new Martin Luther King, Jr., National Memorial in Washington, D.C., has a very heavy volume of visitors, including seniors and visitors with limited mobility who enjoy a range of universal design features throughout the monument. Photo courtesy of E. Schapp

Adaptable interior systems in schools can contribute to social sustainability by removing barriers of entry and accommodating changing needs. This may be more sustainable, as adaptable interiors tend to use less square footage, less land and fewer materials. Photo courtesy of New Wall Systems

For renovation projects, the opportunity to make building systems more adaptable extends to many building assembly and product choices, notes Terry Zeimet, AIA, CSI, CCPR, commercial marketing manager with Pella Corporation. Ample, 36-inch-wide doorways provide effective clearances for wheelchair access or occupants handling baby strollers or walkers, and window designs that allow cleaning from indoors are safer and more convenient for all occupants. Some casement and awning windows have a sash that moves toward the center of the frame a full 4 inches — wider than typical casements — with unison-style hardware that secures two locks with a single, easy-to-grasp handle and an integrated crank.

“Cordless, between-the-glass fabric shades and blinds are ideal for universal design,” says Zeimet. He cites several benefits, including reduced potential for damage, protection from dust on the shades and low maintenance. “For these reasons,” he adds, “they have become a very popular choice for schools.”

For facilities that address the older population segments, recent trends have shown how to make restrooms and other accommodations more comfortable, safe and enjoyable for seniors. “Architects are using toilets in the universal-height range of about 16.5 inches, rather than the lower seats at 15 inches,” says TOTO’s Baldwin. “The difference in effort required is noticeable, and people can use them longer and feel more independent.” This effect contributes to seniors’ ability to live at home longer — which arguably helps reduce overall health costs by reducing the need for assisted living facilities.

Similarly, says Baldwin, bidet-type seats supplied with water and electricity are growing in popularity for the aging-in-place market. “Surveys show that these hygienic seats are seen as helping users preserve their dignity and use the bathroom independently, even if they are dealing with disabilities,” he explains.

New public projects are an ideal place for universal restrooms, Baldwin says, pointing to the new Martin Luther King, Jr., National Memorial in Washington, D.C. The design-build team — including the local architecture firm McKissack & McKissack, along with Turner Construction Co., Arlington, Va.-based MEP firm TM/R Engineering, and civil engineering firm Gilford Corporation — were looking for sustainable, high-performance plumbing products for these heavily trafficked public restrooms. The designers specified high-efficiency, 1.28-gallon-per-flush (gpf) toilets along with 0.5 gpf urinals with matching sensor-activated flush valves.
For older population segments, toilets in the universal-height range of about 16.5 inches reduce the effort required to use the fixtures, which helps reduce overall health costs.

Photo courtesy of TOTO

A number of these units are set at universal design heights — heights that also meet Americans with Disabilities Act (ADA) height requirements — to accommodate visiting patrons who are physically challenged. Adding to the monument’s socially sustainable profile, high-efficiency 0.5 gpm sensor faucets, like the flush valves, use flowing water to power their electronics, creating a “sustainable loop” that obviates the need for hard wiring. With a minimum of 10 uses per day, the backup batteries installed will last up to 19 years, reducing toxic battery waste.

“With this high-profile project, I wanted to design restrooms that were both highly efficient and low maintenance, offering a new performance standard for the National Parks Service,” says Brian Russell, TM/R senior plumbing designer. “I knew there would be an extremely heavy volume of people visiting Dr. King’s national monument, so reliability and performance were crucial.” The invisible accommodation of seniors and visitors with limited mobility, thanks to various restroom design features including the 17-inch toilet seat heights, reflects user testing by manufacturers and best practices in creating unobtrusive, adaptive and accessible facilities.

Like the novel recharging batteries powered by water, this “intergenerational bathroom design,” which is increasingly common in a range of building types, provides for the long view of building sustainability.

**A Global View of Sustainability**

Social sustainability goes beyond adaptive and universal design. According to ESP Design, an online resource for sustainable product design, the idea of social sustainability involves five basic precepts:

1. Protect the mental wellbeing of all stakeholders.
2. Protect the physical health of all stakeholders.
3. Encourage community.
4. Treat all stakeholders fairly.
5. Provide all stakeholders with essential services.

This definition reframes the meaning of environmental degradation and energy efficiency as “community” and “stakeholder” considerations in the broadest sense. In this way, social sustainability takes a global view — and a long view — of reducing energy use.

“Green certifications like LEED will eventually be more about carbon footprint than other measures,” says Wally Johnson, vice president of marketing and sales for U.S. Concrete, a producer of ready-mix, precast, and other concrete solutions. “For example, supplementary cementitious materials, or SCMs, can help earn points under LEED, but if it’s slag imported from China for a building project in Houston, you’re defeating what you’re trying to accomplish.” With that in mind, the company provides information on carbon footprint for every mix it brings to market, says the 40-year industry veteran, cognizant of the fact that Portland cement may make up as much as 9% of all carbon emissions in the world.

LEED projects such as the Trinity River Audubon Center in Dallas used supplementary cementitious materials, or SCMs, instead of Portland cement to help the projects earn points under LEED and also to reduce carbon footprint.

Photo courtesy of U.S. Concrete, Inc.
“Cement manufacture requires high temperatures and lots of energy and CO₂, including for the decalcification of lime, which is ground up and processed into cement,” says Johnson. For every pound of cement, the manufacturing processes produce as much as a pound of CO₂ — close to a 1:1 ratio. For this reason, some manufacturers have developed operational processes that use alternative cementitious materials. Johnson adds, “This not only produces greener and more sustainable concrete mixes, but also stronger and more durable concrete products.”

This global view is essential to social sustainability, but so is a long-term view. Proponents like Harvard’s Amartya Sen, a Nobel Prize-winning economist who created the United Nations Human Development Index, also argue that social sustainability requires thinking about intergenerational equity. Sustainable human development, Sen has said, can be seen as development that “promotes the capabilities of present people without compromising capabilities of future generations.”

The drive for intergenerational sustainability has boosted the emphasis on renewable material and energy sources, notes John J. Bailey, Jr., senior vice president of sales and marketing with ClimateMaster, which manufactures water-source heat pumps. “The best renewable technologies are those that are widely and easily applied regardless of building constraints,” he contends. “Many renewable approaches, such as for geothermal, need a flat roof or a cooling tower, or they conflict with skylights. But there are distributed systems that are ideal for retrofit and renovation projects because they are small, individual units scattered throughout the building.”

The same holds true for architectural products that boost the performance of buildings with little or no adaptation. These qualities make them more widely applicable to historical adaptive reuse and other renovations — the “whole-building recycling projects” that currently make up the lion’s share of green building work.

High-Rise Structure, Low Carbon Impact

A number of new building projects and renovations have pointed to novel structural and precast concrete systems that limit the use of Portland cement, which may make up as much as 9% of all carbon emissions in the world, says U.S. Concrete’s Wally Johnson. A growing trend is that building product manufacturers will often provide the carbon footprint of their products or structural systems. Smaller carbon footprints reflect both operational process and the use of materials, such as alternative cementitious products, that reduce greenhouse gasses.

Recent projects include One World Trade Center, part of the new World Trade Center complex in New York City. A hybrid structural design created by architect David Childs of Skidmore, Owings & Merrill with the local structural engineer WSP Cantor Seinuk, the building employs steel and concrete structural columns as well as innovative concrete core walls with steel frames for lateral force resistance and other security needs.

The concrete mix uses a proprietary mix as well as an admixture optimization service by another supplier that determines the optimal combination of recycled materials and tailor-made chemical admixtures needed to improve the desired slump, setting characteristics, strength and durability of concrete used. The results of the approach include two high-strength core wall mixes that exceed project requirements.

Beyond the enhancements to the strength and durability of the concrete structure, the combined technologies are credited with a significant change in the project’s environmental profile: The optimized mix has saved more than 30,000 gallons of fresh water, 8 million kWh of energy and nearly 750,000 pounds of fossil fuel. According to Johnson, the carbon footprint is smaller by at least 12 million pounds of CO₂ emissions as compared to what would have been required for a similar high-strength, hybrid high-rise.

Other LEED Platinum projects are also using concrete mixes meant to dramatically cut carbon emissions, says Johnson. One example is the Trinity River Audubon Center in Dallas, designed by Antoine Predock Architect of Albuquerque, N.M., with architect-of-record Brown Reynolds Watford Architects of Dallas and the local engineer Lopez Garcia Group. Designed for LEED Gold certification, the center is built to meet its mission of people, forest, river and wildlife coexisting successfully. Part of that mission is built into its 10,026 cubic yards of low-carbon concrete mix, comprising 30% fly ash and 50% pier mix; the outcome is the avoidance of at least 1.8 million pounds of CO₂.
Geothermal for Nonprofit Headquarters

For a renovation of the charitable group United Way’s headquarters for Central Oklahoma, the local firm of HSE Architects used metal cladding and a perforated aluminum panel system to update the organization’s image. Costing about $3 million, the updating of the 28,000-square-foot facility combined the distinct historic characteristics of a 1911 church with contemporary commercial office space. Low maintenance was one goal, according to the architects, as was a high level of accessibility through multiple entrances. A new canopy structure identifies the main, universally accessible entry.

To reduce energy use, the design-build project includes low-E glazing and exterior sun shading on south and west façades. “In keeping with sustainable solutions and forward thinking, a geothermal system was installed with 25 wells located beneath the new parking lot,” according to the architects.

According to ClimateMaster’s Bailey, the dozens of heat pumps match the need for environmental zones within the building. Vertical packaged units are located in small mechanical closets or the basement and draw from 63 vertical bores of about 300 feet deep using steel/copper piping and variable-speed pumping. The geothermal engineering, Bailey adds, helped keep the costs at a reasonable level, including: the geothermal installation (about $690,000), the water loop with a fluid cooler and boiler ($542,000), the 23-zone fan coil with air-cooled chiller and boiler, as well as rooftop makeup air units ($617,000), and 16 new gas/electric rooftop units and three split systems ($400,000).

Renovations for Whole-Building Recycling

One effective way to reduce carbon emissions is through the use of existing structures that can be renovated for better function or for adapting to other uses. According to the AIA’s Committee on the Environment, “by 2050 more than a third of the built environment will exist in the form of new renovation projects. In reversing the climate change crisis, this is a key opportunity to avoid otherwise demolishing more than 25% of our building stock and instead promoting adaptive reuse design.”

For Abington Senior High School in Abington, Pa., the firm AP3C Architects of Philadelphia, reinvention of the modernist brick school building was envisaged to support its vision of providing an excellent community for young people that would increase success in school and prepare students for life outside of school.

A major part of the renovation was the need for new, thermally broken projected windows to match the original frame depths, sightlines and infill thicknesses. The thermal barrier in the windows’ vents and frames would also help meet the school’s desired performance ratings and energy conservation goals. Also, to improve access to the school while maintaining standards for security and code-mandated egress, AP3C Architects selected a commercial-duty replacement package of wide-stile doors that would provide maximum flexibility for hardware as well as student needs and administration uses.

Testifying to the success of the renewed three-year high school, last October the Abington school district received a “100 Best Communities for Young People” award — the fifth it has received — as part of a competition that recognizes communities taking action to help reduce local dropout rates and create better futures for young people.

Renovation for Sustainability and Adaptability

Examples of these retrofit-ready solutions are widespread, and include new techniques for reducing the solar heat gain coefficient (SHGC) of existing curtain walls and window assemblies, says Erik Sutton, manager of product marketing for EFCO, a Pella Company. Among other fenestration products, manufacturers are introducing lightweight, integral light shelves for curtain wall and storefront systems. The most recent light shelf designs are easier to install than in the past and may offer a tilt-down feature for improved access and cleaning.

According to the Oak Ridge National Laboratories, light shelves also benefit building users by improving the distribution of natural lighting within work and living spaces. Their
efficacy, as shown in an ORNL study, depends directly on the surface materials used and the light shelf's geometry and orientation. Passive or fixed light shelves, the study concluded, were found to be equivalent to automated light shelves, in which the angles of the shelf and fins are adjusted according to time of day or solar angle of incidence.

Between-the-glass shades and blinds — a technology that dates to the late 1960s — provide similar benefits of daylight redirection and reduced thermal gain, including enhanced insulation value at night. Protected within a double- or triple-glazed assembly, the daylight control method requires limited maintenance and is easy to operate. Recent improvements to these window assemblies have addressed aesthetics as well as improvements to access of the blinds, thanks to an interior hinged access panel.

**Historic School Renovation Upholds Social Sustainability**

A renovation project at the McGinnis School in Perth Amboy, N.J., demonstrates the approach for aluminum-clad wood windows in punched openings. As part of an expansion to increase the middle school’s floor area by one-third, project designers at Philadelphia-based A/E firm Vitetta captured 28,000 square feet of a space within the 100-year-old structure by enclosing an interior courtyard, adding a mezzanine level, turning the auditorium balcony into library space, and converting the basement into a cafeteria by relocating the mechanical systems to the attic.

The firm also focused on restoring its original building’s turn-of-the-century character, according to Steve Carlidge, Vitetta’s principal-in-charge, and the double-hung, fixed windows with fixed transoms incorporate custom muntins for the appearance of historically accurate divided light. The double-hung units — and replacements of the schools original circlehead windows, which had been boarded up for decades — are clad in custom-finished aluminum to match the original tan color. Yet the new windows still allow for blinds between the glass, which can be adjusted to control daylighting, solar heat gain and views to the classrooms. The window treatments required little maintenance, since they are protected.

According to Pella’s Zeimetz, “The potential for damage is gone and the blinds just don’t get dirty, two reasons this window choice has become very popular for schools.” The protected blinds and shades are now available for sliding doors up to 4 feet by 8 feet and fixed windows up to 5 feet wide by 6 feet high.

Based on the definition of social sustainability, the school project provides better for the physical health of all stakeholders, and provides teachers, students and custodial staff with essential services that relate to window selection. The design by Vitetta also encourages community and greater efficiency through its more cohesive new floor plan.

**Standards and Codes**

A number of new standards and codes are also driving the move toward social sustainability. An important example is Pilot Credit 34, “Design for Adaptability,” which is included in the LEED 2012 draft, which is intended to reward designs for future use and modifications. (NOTE: LEED 2012 has not been finalized as of the date of this publication, April 2012.) “Waste from demolition and remodeling accounts for a significant portion of what goes into landfill,” according to LEED user, an online tool published by Brattleboro, VT.-based BuildingGreen, Inc. “Designing for future use and modifications can reduce the intrusiveness of renovations, significantly reducing the future waste.”

Pilot Credit 34 also aims at homes, as well as mid-rise multifamily construction of the minimum size for meeting FHAA requirements. In order to earn the credit, building designs must do better than code, and have at least twice the number of accessable units. FHAA criteria than what is required by code. Under the LEED point available for Universal Design Features, the project design must meet multifamily criteria for universal design and, in the case of homes, at least one of three design options. Universal design for mid-rise construction must include:

- **Zero-step main entrance.** Entrances should not have any “abrupt changes in level” and otherwise provide access to all dwelling units and site amenities.

- **Accessible doorway.** A minimum clear width of 32 inches is given for entry doors when they are open, with room for maneuvering both inside and outside the doorway.

- **Accessible passage.** There must be an accessible, smooth route of at least 36 inches in width for access to the building areas and living units.

- **Adaptable bathroom.** Pilot Credit 34 also calls for a minimum area of clear floor space of at least 32 inches by 48 inches, as well as standard shower and toilet fixtures that meet ADA or accessibility criteria.

- **Accessible HVAC and lighting controls.** For mechanical and electrical systems, positions of the controls, switches and outlets must be free and clear of obstructions and meet accessibility requirements also, located not lower than 15 inches from the floor and not higher than 48 inches.

- **Living areas on the accessible level.** The accessible level of the living units should include that core dwelling spaces: bedroom, kitchen, dining and living areas and an adaptable full bathroom.

Alternative points under Pilot Credit 34 include “Open Building Structural Systems,” which should allow for flexibility in rearranging rooms, living areas and the entire floor plan without need for significant renovation and material waste. The types of systems that quality may be “clear-span” structures with partitions or simple, flexible ceiling or floor systems including as open-web floor trusses, raised or plenum floors, and suspended ceilings.

A second option for Pilot Credit 34 can be earned by using “Organized and Accessible MEP Systems,” defined as stacked plumbing risers, mechanical systems and electrical conduit. This technique assumes the typical strategy of stacking rooms that need plumbing or ducts, such as kitchens and baths, with MEP services in common walls and directly above each other from floor to floor. This not only reduces construction costs, it also eases repairs and upgrades; a similar optional credit can be earned by keeping MEP systems separate from...
Principles of Universal Design

Among the minimum criteria for socially sustainable architecture, says IHCD’s Fletcher, is accessibility. “Accessibility is just a baseline; it’s a floor,” she explains, “while universal design is only a bump up from accessibility.” While Fletcher encourages building designs that evolve into “transformative” solutions for socially sustainable design, the principles of universal design, as defined by North Carolina State University’s The Center for Universal Design, provide additional guidance on directions to achieve such design breakthroughs.

The basic definition of universal design, according to the North Carolina State group, is an environment that is “usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” The school offers seven principles that can be used to evaluate existing building designs, inform the process of designing new environments, as well as educating end-users on the best building and interior concepts:

1. **Equitable use.** This refers to designs allowing end-users with diverse abilities to use the building and amenities in equivalent ways. Ideally the means of use are identical, which helps avoid the “segregating or stigmatizing any users” and ensures that privacy, security, safety and other architectural benefits can be available to all occupants or visitors.

2. **Flexibility of use.** Consider the needs of right-handed vs. left-handed users: The best product or building design will not require one or the other to switch. Instead, the building should adapt to the handedness, strength, pace and other natural proclivities of any end-user.

3. **Simple and intuitive.** Similarly, the best designs work well “regardless of the user’s experience, knowledge, language skills, or current concentration level.” In this way, architecture is most effective when it is easy-to-use and consistent with user expectations and intuition. Safety precautions, for example, should not require the use to read.

4. **Perceptible information.** That concept relates also to the user’s sensory abilities under a variety of ambient conditions — darkness, for example. A mix of tactile, physical, pictorial and verbal safety precautions can be used to make a building safer for an entire and diverse population under emergency conditions. Add to that technologies — such as devices used by people with hearing or sight challenges — and the maximum information is available to the building population during a fire or other event, with sensory limitations.

5. **Tolerance for error.** Clearly, buildings should minimize “hazards and the adverse consequences of accidental or unintended actions,” as well. In the built environment, this may include removing, isolating or shielding hazardous conditions to protect occupants.

6. **Low physical effort.** This principle is guiding the design of universal-height toilets like those used at the Washington, D.C., monument as well as door handles, window operation and many other user interface situations. As the Center for Universal Design recommends, designs should allow for efficient and comfortable use without undue fatigue — a great benefit for senior and young populations alike.

7. **Size and space for approach and use.** Principle seven is similar to an admonition to use good ergonomics. All building features should match human needs to the extent possible, including for “approach, reach, manipulation, and use regardless of user’s body size, posture, or mobility.”

The Principles of Universal Design offer an effective framework for universally usable design. But as seasoned architects and experts like Fletcher attest, building design will always bring more to the table for socially sustainable outcomes: economic, engineering, cultural, gender, and environmental concerns are among the many that impact the architect’s decisions.

Fletcher points out that disability is contextual. According to the World Health Organization, neither the medical model — where disability is seen as a feature of the person that requires treatment — nor the social model, which assumes that the “problem is created by an unaccommodating physical environment,” is fully adequate. Instead, the WHO concluded almost a decade ago that “disability is always an interaction between features of the person and features of the overall context in which the person lives.” A biopsychosocial model is more effective at describing the challenges for the broad population.

“With this in mind, the issues are no longer framed as being about people in wheelchairs — that is, a small number of people who require a facilitating environment,” Fletcher contends. “Human-centered design is about creating and imagining a new and different environment that is ultimately transformative. And while standards are valuable, we prefer enticement and precedent to achieve these goals.”

ENDNOTES


CONTENT DEVELOPER INFORMATION - Knowledge & Experience Background in Disability Access Requirements:

C.C. Sullivan is principal of a marketing and content agency that specializes in the architecture, design and construction segments. He is former editor-in-chief of the magazines Architecture and Building Design + Construction.

Since 1993 the CEU developer has been creating and writing educational content on accessibility, the ADA and universal design for professional audiences including architects, interior designers, building owners and facility managers. The CEU developer has a degree in Architecture and six years of experience as an architectural designer and project manager, including the design, detailing and specification of ADA-compliant layouts for offices, houses, storefronts, restrooms and kitchens.

Course Provider: Architectural Record/McGraw-Hill Construction
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