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Spring 2019

**Annual Strategic Planning:
How to Set Yearly Goals for Success**

**6 Ways Cities are Reclaiming
Public Space for the People**

**Utility Companies,
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How to Set Yearly Goals for Success



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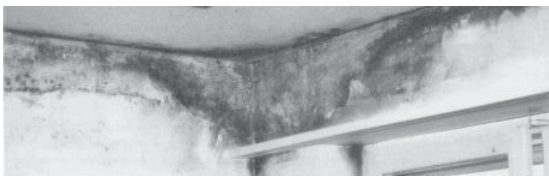
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Welcome to our Spring issue of Licensed Architect (LA) and reminders of many informative and enjoyable events to come.

First, I want to thank Cheryl Ciecko for her presentation on "Moisture Management for Wood Buildings". Corey Zussman will be delivering "How to Improve Your Drawings for Better Construction Detailing" in May. Make arrangements to attend! Multiple code programs, lunch & learns, and tours are planned for all chapters this year. Please check the ALA homepage at alatoday.org and take advantage of upcoming events.

Did you know that registration is already open for golf? Friday, June 28th is our annual Golf Outing at the Golf Club of Illinois, Algonquin. Sign up today!

Friday, June 21st is the deadline for intent to participate in this year's Design Awards program. Looking ahead, the Awards presentation will be on Monday, October 28th at the Drury Lane Conference Center,

the evening before our annual conference. Details about projects and program entries can be found on the ALA website. What a great way to showcase your ideas and talents.

Speaking of Drury Lane, please plan to join us Tuesday, October 29th for ALA's Midwest Architecture Conference. Our Call for Speakers is due on April 26th. We have continued to secure exhibitors and sponsors for the Conference, which is a one day format. Exhibit space is filling up as always. If you are interested in a booth, and have not yet reserved one, please contact the ALA office and do so. Attendees can earn CEUs and gain tremendous product knowledge by walking the trade show floor. Besides seeing all the products, you can benefit from socializing with fellow members, enjoy some good food, and compare notes with the various product vendors. Bring a list of questions with you to ask the various representatives there.

Looking forward to seeing you throughout the seasons for all of these events. 



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Annual Strategic Planning: How to Set Yearly Goals for Success

BY: RENA M. KLEIN, FAIA

Why write an annual plan for your firm? You could similarly ask, “Why do architectural drawings before constructing a building?” Sure, you can figure it out as you go along, but most architects will say it’s a good idea to have a plan. Having a vision and a holistic view of how all the parts fit together can help anticipate problems, avoid mistakes, and is more likely to produce an outcome that works. This is true for building a business as well.

Business planning should be a no brainer for architects, who apply their design abilities to a host of different problems needing to be solved. Nevertheless, few firm owners actually plan their businesses, be it for the coming year, 5 years out, or 20 years in the future. The common approach to firm development is often more opportunistic than strategic, which may be good for a start-up, has its limitations as a firm matures.

Each January brings the opportunity to reflect on the past year and make plans for the new year ahead. Design firm leaders who want stability and success would be wise to develop specific annual goals for their firm in the areas of finance, business development, and operational improvement. This article provides a roadmap for that process.

Gather Data on Past Performance

While past performance is not a guarantee of future results, it can give you an understanding of what is likely to occur. The annual strategic planning process always begins with a look back at the previous year. Here is a sample of the data that should be collected:

I. Financial Metrics

	Formula	Best Practice
Net Operating Revenue (NOR)	Total Revenue minus Project Related Expenses (aka: Gross Profit)	\$120,000 - \$140,000 per Full Time Person
Total Expenses	All Operating Expenses, including Salary, Wages and Draws	80% - 90% of NOR
Profit (before distributions)	Net Operating Revenue minus Total Expenses	10% - 20% of NOR
Total Salary Expense	All Salary, Wages, and Draws	55% of NOR
Average Utilization Rate	All Hours Worked on Projects / Total Hours Worked for all staff and principals	60% - 65%
Total Direct Salary Expense	Value in Dollars of Hours Worked on Projects for all staff and principals	28% - 32% of NOR
Break-Even Ratio	Total Expenses / Total Direct Salary Expense	2.3 – 2.8
Profit Ratio	Profit / Net Operating Revenue	10% - 20%

II. Business Development Metrics

A. Revenue per Market Segment - How much net revenue was earned in each of the project types done by the firm?

Project Types (Customize for your firm)	NOR per Project Type	Percent of NOR per Project Type	Number of Projects per Project Type
Residential			
Commercial			
Institutional			
Other			

B. Procurement Sources - Where do your jobs come from? How successful are you in converting leads to projects?

Project Lead Source (Customize for your firm)	Number of Inquiries	Conversion Rate
Referral		
Repeat Client		
Website		
Houzz, Instagram, or other Social Media Platforms		
Other		

III. Operations & Culture Reflections (sample questions to ask yourself and your staff)

A. Operations Effectiveness

- Establishment of firm-wide attention to project budgets and schedules that is proactive?
- Establishment of standard processes for repeatable tasks and aspects of projects?
- Have adequate administrative support?
- Have tools for tracking time and project status relative to budget, schedule and profitability?
- Have clear understanding of firm development and management responsibilities among firm leadership?
- Have clear understanding of roles and responsibilities on projects?
- Have clear understanding of on-boarding best practices?

B. Firm Culture

- Staying true to mission and vision?
- Impact of new hires or staff departures?
- Level of staff morale?
- Level of transparency and staff engagement?
- Level of career satisfaction among firm leaders?

Determine Goals for the Year

Once data about the just past year is gathered, planning for the new year can begin.

I. Financial Goals

To determine financial goals for the coming year, two documents need to be prepared – a Profit Plan and an Annual Budget. The Profit Plan will help determine your firm's Net Operating Revenue Goal based on the production capacity of your staff. The Annual Budget will be similar in structure to the firm's Profit-Loss reports, with line items for revenue and each type of operating expense.



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• Profit Plan Sample

	FTE	Salary	Target Utilization	Direct Labor Hours	Billing Rate	Potential Billable Dollars
Principal	1	\$90,000	50%	1040	\$150	\$156,000
Project Architect	1	\$65,000	80%	1664	\$125	\$208,000
Designer	1	\$50,000	85%	1768	\$100	\$176,800
Office Manager	.5	\$25,000	5%	104	\$75	\$7,800
Total	3.5	\$230,000		4576		\$548,600
Annual Net Operating Revenue Goal = Adjusted Potential Billings (80%)						\$438,880
Monthly Net Operating Revenue Goal						\$36,573

This Profit Plan example shows a firm that has the potential to earn around \$550,000 in a year, if every hour worked on projects is invoiced to clients. However, most firms are not able to invoice 100% of their project hours. This gap between hours worked and hours invoiced is usually due to scope creep, over-delivery, ineffective operations or simply not charging enough. In this case, the Potential Billable Dollars are discounted 20% to determine an achievable Net Operating Revenue Goal for the year. The ratio between potential revenue and actual revenue achieved is known as the Billable Ratio. Here we have a Billable Ratio of 80%. Industry best practice for Billable Ratio is greater than 85%.

The annual Net Operating Revenue forecast might be adjusted based on amount of work under contract and by comparing it to previous year results to see if the forecast seems realistic. Based on work under contract or expected upcoming

contracts, the profit plan might also include additional staff that could be hired during the year.

• Annual Budget

Once the Net Operating Revenue forecast is determined, estimating operating expenses is the next step in developing the annual budget. Most expenses can be determined by reviewing the line item in the previous year and adjusting it based on knowledge of current costs. It is common to assume that most expenses will go up 3% – 5% each year due to general increases to the cost of doing business. Refer to the Profit Plan for the annual salary expense totals.

Ideally, the total operating expense budget should be 80% - 90% of the Net Operating Revenue (NOR), leaving 10% - 20% for profit before taxes and distributions. Salary expense should be about 55% of the NOR, including owners' base

salary or draw. Compare the totals and percentages to previous year to ensure that your budget entries are reasonable. If the profit is not at the desirable percentage, examine expenses, billing rates, and operational effectiveness to see if it is possible to increase revenue and/or reduce expenses.

II. Business Development Goals

Metrics on net revenue per project type and procurement sources, plus conversion rates will give you direction in terms of forming business development goals and marketing strategy. Based on percentage of total Net Operating Revenue accomplished in each project type in the previous year, determine the percentage and NOR goal for each project type for the coming year. Compare this amount to the current contracted amount in each project type to determine where your marketing efforts should be directed. Creating a table such as the one below can be helpful.

Project Types (Customize for your firm)	Percent of NOR Goal per Project Type	NOR Goal per Project Type	Current Contract Amounts Not Yet Invoiced (arch fees only)	Delta
Residential	46%	\$200,000	\$50,000	\$150,000
Commercial	46%	\$200,000	\$150,000	\$50,000
Other	8%	\$38,880	\$20,000	\$18,880
Total	100%	\$438,880	\$220,000	\$218,880

In this example, it is clear that business development efforts need to be put toward Residential projects in order to meet the stated NOR goal.

Using data collected on procurement sources will help formulate marketing strategy. If most projects come from referrals, then an effort to reconnect

with past clients may be effective. If leads are being generated by social media posts or website views, then focus on continuing these efforts plus

developing a process to pre-qualify these leads and move them through the pipeline to become actual jobs.

Formulate three or four strategic marketing goals along with tactics for achieving them. Create a marketing calendar and business development processes that enable tracking and follow-up with potential leads and project opportunities. Most importantly, no matter the size of your firm or how busy you are, be disciplined about consistently devoting three to four hours per week minimum to marketing and business development activities.

III. Operations and Culture Goals

Based on considerations of your firm's current culture and operational effectiveness, develop three or four operational improvement goals for the year. These may include creating standard elements and processes, understanding roles


and responsibilities on projects, or improving quality review procedures. For operational improvement to be effective, it is critical to have a champion who manages each improvement goal and creates a plan and timeline for implementation. Look to staff members to lead some of these efforts.

Cultural change and improvement are more complex. Usually they involve self-reflection by firm leadership and a willingness to develop and empower staff. Assistance by a consultant or leadership coach can be helpful in this process.

Execute and Check the Plan

All architecture firms conduct business in an unpredictable environment. For that reason, progress toward annual goals must be tracked regularly and adjusted as needed. Financial metrics should be reviewed quarterly and budgets

should be viewed monthly to compare actual results to budget revenue and expenses. Progress toward business development goals should also be noted and the effectiveness of various tactics evaluated frequently. Mid-course corrections should be expected.

Despite the unpredictability inherent in architectural practice, having clearly articulated annual goals makes reaching them more likely. All architects know that taking time to understand project goals is key to success in building design. Why not apply this kind of design thinking to your business? 

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6 Ways Cities are Reclaiming Public Space for the People

PROVIDED BY: GENSLEER RESEARCH INSTITUTE

Rapid urbanization, demographic change, and the maturing digital age continue to challenge the spatial distribution of people and resources across our cities and the globe.

Successful design creates places that are rooted in local culture while acting as a catalyst for socially sustainable urban transformation.

Here are six ways planners and designers will be transforming cities in the coming years.

1. Urban Centers Will Foment New Life

As urban migration changes the dynamics of cities, many will face challenges in meeting the needs of their growing populations, including for housing, transportation, energy, and infrastructure. That's causing city leaders to examine how they can redevelop existing assets for new uses and people. Whether it's at block or district scales, a focus on providing smart, transit-rich density can unlock opportunity for new and longtime residents alike.

Amtrak Philadelphia 30th Street Station – Philadelphia. The redesign of an underground corridor creates a nexus of travel and convenience with a connection to a street-level restaurant and the addition of underground shopping and a water feature.



2. Creating Healthy Cities Will Be a Major Focus in the Coming Year

Health has become a major factor in urban and community planning, as research and public awareness about the link between them grows. As air quality, access to healthy food, and safe spaces for exercise become increasingly important to urban dwellers, cities are looking for ways to integrate these features into every environment. Design will focus on human experience, with a process guided by understanding and engagement to result in better health outcomes and increased levels of happiness.

Southbridge Redevelopment Plan – Chicago. Redevelopment plans take an existing park and a proposed recreation field and merges both into a single open space.



3. Sidewalk Culture and Multimodal Connections Are Critical Components for the 21st Century City

We live our lives in motion, so for cities to really work, they must connect people with the places where they live, work, and learn. Diversifying transit options and enhancing their interface with the streetscape will be a major catalyst for that change. Railway and bus stations across the world will undergo major upgrades – updating transportation infrastructure and improving the user experience.

Metro Design Studies – Los Angeles. With the expansion of rail service in LA, this project explores an innovative approach to above-ground rail which elevates the passenger experience, reconnects communities, and creates the opportunity for transit-integrated development.



"Smart cities have the potential to solve major problems and drive innovation, bringing people together to create thriving ecosystems."

— Diane Hoskins, Co-CEO, Gensler

4. Suburbia Will Get Urban Too

Millennials are increasingly moving to the suburbs, and urbanizing them as a result. Companies that once chose suburban locations are considering preferences for convenient, mixed-use, walkable places. Suburban office parks are becoming satellite downtowns, integrating work with other uses to generate urban character.

New Carrollton Transit-Oriented Development – New Carrollton, Maryland.
A public-private partnership looks to turn an under-performing transit-adjacent site into a vibrant transit-oriented hub.



5. Placemaking Will Create Community

Formerly in the realm of grassroots groups, placemaking is now being embraced by business-improvement districts, developers, and local governments. Placemaking combines built interventions and programming, and involves working with the community to tailor solutions to local needs and character.

Wuhan Waterfront – Wuhan, China. *This project will reconnect the city of Wuhan with the Yangtze River as part of a plan to spark the revitalization of the city's two most important areas.*



6. Streets Will Become Increasingly Pedestrian Friendly

Walkability is one of the most sought-after amenities, and alternative transit options make streets pedestrian friendly, while spurring development at the human scale. If reliance on cars diminishes – as is projected – narrowing roadways will give designers the space to create sidewalk cafes, parklets, bike lanes, larger drop-off locations, and pedestrian-focused spaces with wider sidewalks or places for the community to gather.

Roadways will be reclaimed for people in the form of pedestrian zones, bike lanes, community spaces, outdoor cafes, and parklets.



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Utility Companies, Your Allies for Efficiency

BY: CHRIS BAKER, THE WEIDT GROUP, A WILLDAN COMPANY

From Buildings, commercial or residential, new or renovated, will endure for generations to come. Their energy performance matters more now than ever. Over the last ten years, building energy codes have become increasingly stringent, meanwhile owner budgets have struggled to keep up with construction cost inflation, and more clients are asking for higher-performing buildings. Your client's utility company may be waiting for you to help bridge that gap.

Utility companies in 44 states provide their customers with energy efficiency programs (Demand Side Management or "DSM" in their parlance). These programs can range from educational workshops to cold hard cash (well, perhaps oversized checks) for owners of buildings that are more efficient than the energy code. Moving beyond energy efficiency, some utilities are also working with building owners to encourage buildings to supply energy to the grid via solar PV and help manage the grid peaks with energy storage.

These programs allow utility companies to avoid building new power plants and transmission lines, which results in a lower total cost for all utility customers. In some states, the utility companies are also provided an increased rate of return for their investments if they meet their energy efficiency goals.

There are four key ways utilities are an ally in efficiency

- **Educational workshops** cover topics like daylighting and controls, specifications for air-sealing, integrated design, and advanced HVAC systems. These workshops are intended to influence your decisions as the architect, as well as those of other design team members. The workshops can teach you about emerging technologies, integrated design practices, and local examples of where technologies or approaches to reduce energy consumption have worked.

- **Equipment rebates** are provided for specific pieces of equipment, such as LED lighting, high-efficiency HVAC equipment, or variable frequency drives on motors that aren't required by code. Rebates typically require an application, which may need to be submitted before the equipment is purchased so the utility can demonstrate they had some influence on the decision. These rebates are intended to help your owner defray any incremental cost to install efficiency. Because the rebates often need to be applied before the decisions are made, reach out to your client's utility provider early to see what is available.

- **Custom incentives** are based on the anticipated performance of a building, usually predicted by energy modeling or engineering

calculations. These incentives may be based on the reduction in peak energy consumption (kilowatts), the reduction in annual energy consumption (kilowatt-hours), or achieving a specific criteria such as LEED® certification or complying with beyond-code requirements published by the utility company. Again, talk to the utility early to see what type of support they can provide.

- **Design Assistance programs** are a subset of custom incentive programs. With Design Assistance programs, the utility company provides an energy consultant to work with you and your engineers and owner to explore the energy impacts of the design options and base an incentive on the anticipated energy savings. These programs can



provide detailed analysis specific to your project to show you which strategies and approaches have the biggest impact for your design and which ones may be better suited for other buildings.

What about renewable energy and storage?

Most utilities handle renewable energy and energy storage separately from energy efficiency. Renewable energy may be encouraged by a utility with rebates to reduce the first cost of the equipment or with net-metering policies, where the utility will purchase the power from the system at the retail rate that they sell electricity to that customer. Energy storage is an emerging technology, so programs supporting energy storage are not as common as efficiency and solar. With increased interest and falling prices for storage, we will likely see more utilities offering commercial building programs to encourage energy storage. In the coming years, we may see shifts in the way utility companies think about buildings – viewing them as consumers and

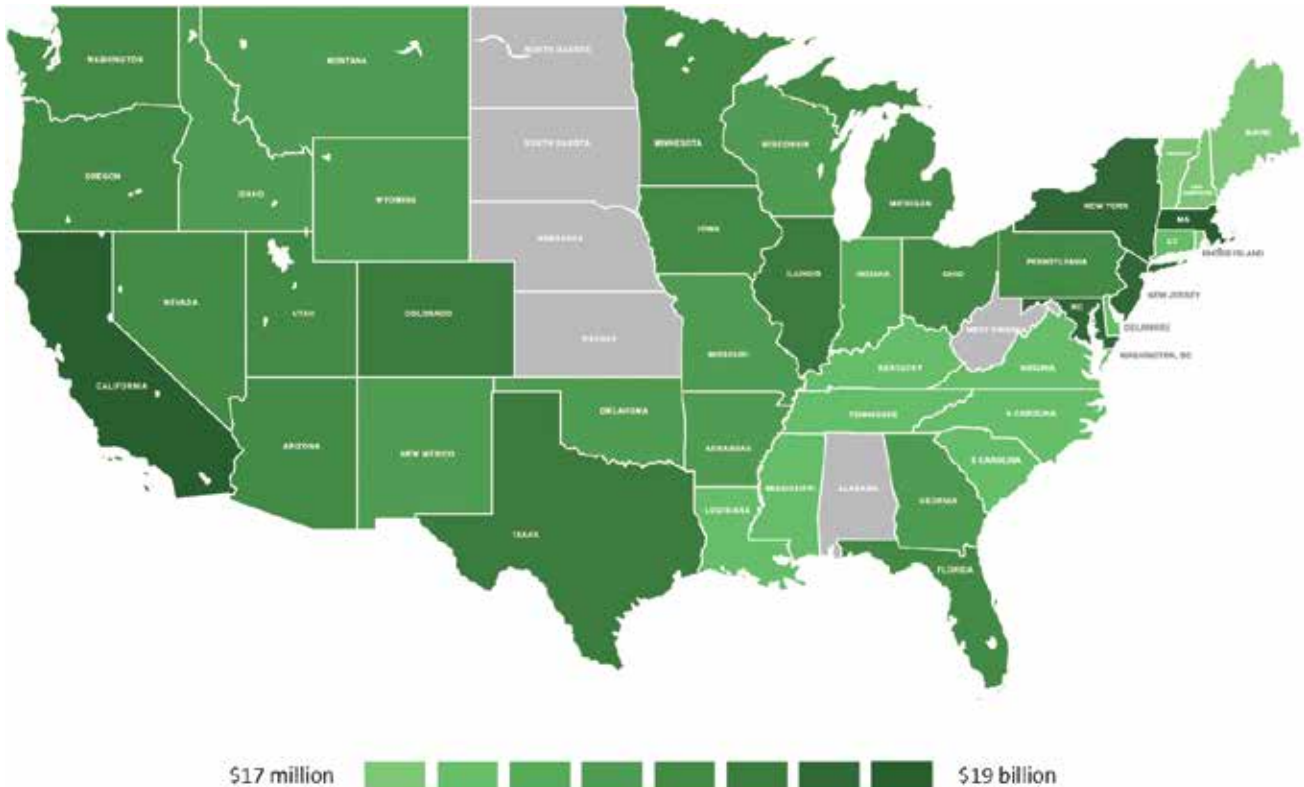
virtual power plants, playing a more active role in the energy grid as opposed to energy consumers.

Energy storage is increasingly important on the grid because it is a less expensive than peaking power plants that may be used only a few dozen hours per year to balance the peak energy demand with supply. The energy grid needs to be perfectly balanced between energy supplied and energy used. Too much or too little can cause damage to equipment or even cause grid instability and blackouts. Historically, grid operators have done that by adjusting energy generation at power plants, but renewable energy sources like wind or solar may not be available at the exact moment needed. Renewable energy generation can be curtailed if there is overgeneration, but it can't do much for moments of under generation. Right now utility companies use "dispatchable" power (coal, natural gas, or hydro) to meet those needs, but in the future it may be more cost-effective to use buildings to respond as virtual

power plants, by relaxing setpoints 1/2 degree F, having more thermal storage, imperceptibly dimming the lights, or precooling a space when renewable energy can allow buildings to contribute to the balancing of the grid. This approach may allow more renewable energy use at lower costs. Using energy at the right time is becoming increasingly as important as the amount of energy used. Future utility rebates may be based more on buildings being "grid-friendly" and interactive rather than purely efficient.

Whether through educational resources, incentives, or project-specific consulting, utility resources can help your next building design be more energy-efficient. Before you begin your next project, go to your local utility company's website and see what they have to offer for energy efficiency. For a nationwide database of DSM programs, visit www.dsireusa.org. 

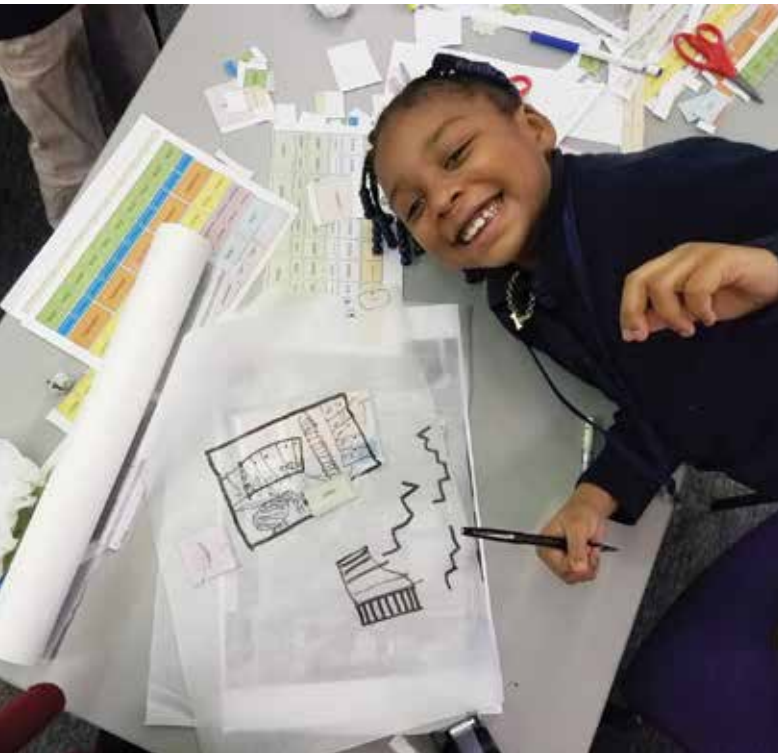
Data source:
ACEEE 2018 State Energy
Efficiency Scorecard



Learning Through Architecture: Engaging Youth in the Profession

BY: KELLY S. LYONS, CURATOR OF EDUCATION, CRANBROOK ART MUSEUM

In the profession, most of us think of our college experience when we say “studying architecture.” Some may also think about pre-college programs for high school students. But how many architects think about elementary students building models of what they want to see in their community? Teaching architecture is no longer something targeted to those who are planning to enter the profession. Educators, practitioners, and community advocates are reaching far and wide to engage with younger and more diverse audiences. Across the country, scores of programs are engaging youth in architecture programs. These programs are happening in schools, after school, as summer camps, at museums, in the community, in partnership with professionals, and as a part of firm activities.



The process-based nature of architectural education is inextricably connected to current trends in K-12 education. With the advent of the digital revolution, priorities have moved away from rote memorization and toward collaboration, communication, critical thinking, and creativity. These four “C’s” are at the core of 21st century learning, a movement in education that promotes deep knowledge and understanding of problem solving with others. These concepts are embedded in a variety of educational initiatives, including project-based learning, inquiry-based instruction, cooperative learning, and design thinking.

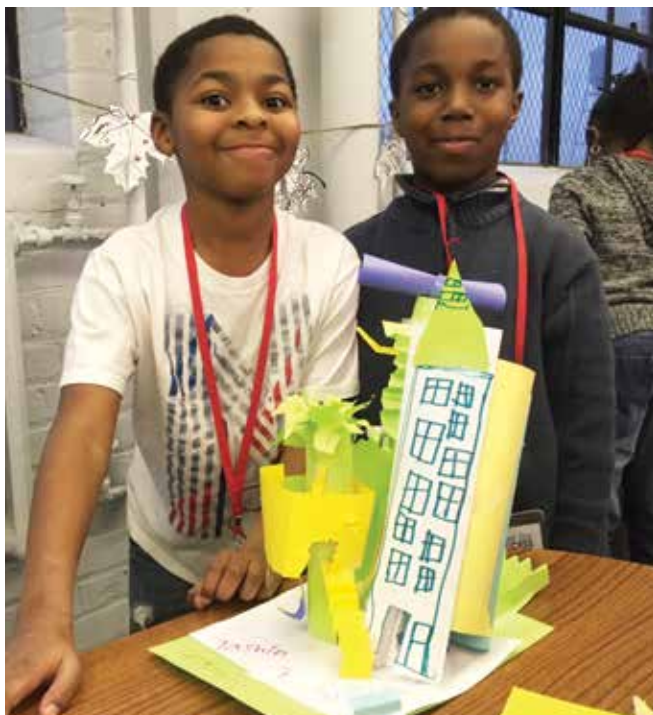
Beyond educational initiatives, there is a bigger movement to ensure consistency and quality in our nation’s K-12 schools. Academic standards are the purview of state and local governments, historically resulting in disparate educational goals across states. Ten years ago, officials from 48 states, two territories, and the District of Columbia launched the Common Core State Standards (CCSS). The CCSS contain standards for English language arts and mathematics and have been adopted in all but five states (Alaska, Nebraska, Texas, and Minnesota (only adopted English)). Likewise, the development of the Next Generation Science Standards (NGSS) was a multi-state initiative. NGSS has been adopted by 19 states, and 21 other states have developed their own standards based on the same framework.

These trends in education, especially the standards movement, has impact on all K-12 programming, including architecture and design programs. When programs align with academic standards, the value proposition is higher for teachers, schools, and school districts. An example of clear alignment between standards and architecture education can be found in the NGSS. The NGSS include Engineering Design, stating that “students are expected to be able to define problems – situations that people wish to change – by specifying criteria and constraints for acceptable solutions; generating and evaluating multiple solutions; building and testing prototypes; and optimizing a solution.” It is easy for us to see how architecture is an option for teaching NGSS Engineering Design standards.

Even within K-12 schools, there is great diversity to how architecture is being taught: individual teachers initiating lessons, partnership programs, and special schools. John Martoni, a public school teacher in California, created a city design project for his students, which evolved into a



resource for teachers: *Metropolis: A Green City of Your Own!* published by the American Planning Association. Other lessons for teachers include *Schoolyards to Skylines: Teaching with Chicago's Amazing Architecture* by the Chicago Architecture Center and *10 Buildings that Changed America*, a compendium to the one-hour special produced by WTTW, Chicago's public television station. Partnership programs may be with a local organization or an architecture school. The *Denver Architectural Foundation* trains and schedules volunteers for eight-week classroom-based programs in Denver Public Schools. *Michigan Architecture Prep* is a partnership between the Taubman College at the University of Michigan and Detroit Public Schools Community District, providing a college-



level architecture course to high school students. Magnet and charter schools cater to students who are interested in architecture, including CHAD, the Charter High School for Architecture and Design, in Philadelphia and DASH, the Design and Architecture Senior High, in Miami.

According to the 2017 Equity, Diversity, and Inclusion K-12 Architecture and Design Education Scan by the American Institute of Architects, more than 60% of architecture programs for K-12 students happen out-of-school. Thousands of K-12 students participate annually in architecture programs, including summer camps and after school programs. Many of these programs are offered by architecture centers and universities. Many of these organizations engage professional architects as volunteers and advocates of their programs, including the Seattle Architecture Foundation, Boston Society of Architects, Center for Architecture in New York, Center for Architectural Explorations at Carnegie Mellon, and Cranbrook Art Museum. These organizations are members of the Association of Architecture Organizations (AAO), an international network dedicated to enhancing public dialogue about architecture and design. These organizations convene annually, bringing together K-12 architecture and design educators to network, learn, and share with one another.

At AAO's most recent Design Matters conference in Seattle, attendees assessed the goals of their architecture and design programs. Six goals were identified, and each attendee ranked their top three. The aggregated data ranked the goals as follows: 1) create an informed public, 2) engage community, 3) teach architecture/design 4) address social equity, 5) use architecture/design as a tool for core subjects, and 6) support career development. It is important to note that even if a goal is ranked lower, it still may be the highest priority of one of the programs. All programs address multiple goals, but it was interesting to see the emphasis on consumers of architecture – the public and the community included in the highest ranked goals.

Considering the two highest ranked goals focus on our society, the demographic differences between licensed



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architects and the population is stark. The percentage of African American registered architects has remained stagnant since 1968, when Whitney Young, Jr., the Executive Director of the National Urban League, delivered the keynote address at the 1968 AIA National Convention. At that time, African Americans comprised – and still do – less than two percent of licensed architects. A range of K-12 programs seek to reach audiences that are underrepresented in the profession. *Hip Hop Architecture* uses hip-hop culture as a catalyst to introduce underrepresented youth to architecture, urban planning and design. Project Pipeline, a K-12 initiative by the National Organization of Minority Architects, has a similar goal. In Pittsburgh and Detroit, Architecture Building Communities has connected youth in urban communities with current city planning efforts – presenting children’s visions for the future of their neighborhoods to city officials.

Many architecture firms connect with communities during the design process. Landon Bone Baker (LBB) in Chicago not only connects with the community, but also includes an in-depth learning experience for high school students. In 2010, LBB established LBBA Labs, a summer employment program for high school students with an interest in architecture, design, and planning. During the six-week workshop, participants study building design and initiate change in their neighborhood through environmental assessment studies and community asset mapping. Firm-based programs provide opportunities for youth and a deeper connection between designers and community members.

Support for K-12 architecture programs comes from organizations and firms, but many rely on funding from grants as well. The National Endowment for the Arts is an ardent supporter of these programs, with a category dedicated to design. In 2017, the American Institute of Architects launched small granting program to support K-8 programs to components around the country. Local and family foundations also contribute significant support.

Policy issues also have impact on program support. Last year, a small news story had big impact on funding to support K-12 architecture education. The federal reauthorization of the Carl D. Perkins Career and Technical Education Act included architecture as a STEM field for the first time. Congress appropriates more than one billion dollars annually to support the Perkins Act, and states’ Departments of Education will be able to use funds for architecture programs.

As there is diversity of priorities and practice in architecture firms, there is great variation in opportunities for K-12 students to explore architecture. Within these varied programs, there is consistency of purpose. Individual programs may prioritize public engagement social equity, but all K-12 architecture programs provide knowledge to children and youth, supporting the future of our communities and cities. Small or large, these programs can have great impact on children and youth – and shape the next generation of architects. 

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Limitation of Liability Provisions in Design Contracts

BY: WERNER SABO, BRYCE DOWNEY & LENKOV LLC

Design professionals are exposed to huge risks if something goes wrong. There is not much you can do to avoid this if the damages come from a personal injury, such as when a visitor to one of your projects trips over the carpet and breaks a leg. Your insurance will cover this up to the limits of your liability policy, while you would be responsible for any excess. If, as is more likely, the damage is to the project itself, it is the owner who will look to you – and your insurance – to cover any losses. Such losses can arise if the project is delayed and the owner loses a tenant, or if the roof leaks because of a bad design. These types of damages can be addressed in the contract with the owner. The contract should allocate the risks between the parties in a fair and equitable way. The owner will try to pass on any risk to other parties, such as the architect and the general contractor.

Standard industry contracts already include some risk allocation provisions. For instance, the AIA documents include waivers of subrogation, such as this provision from AIA Document B101-2017:

8.1.2 To the extent damages are covered by property insurance, the Owner and Architect waive all rights against each other and against the contractors, consultants, agents, and employees of the other for damages, except such rights as they may have to the proceeds of such insurance as set forth in AIA Document A201-2017, General Conditions of the Contract for Construction. The Owner or the Architect, as appropriate, shall require of the contractors, consultants, agents, and employees of any of them, similar waivers in favor of the other parties enumerated herein.

This waiver of subrogation is intended to place risk on the insurance carriers and not on the parties. Again, though, this waiver does not apply to third parties, such as visitors to the project, but only to the project participants.

The AIA documents also include indemnification provisions which are generally intended to shift risks to the party at fault. Essentially,



“indemnification” simply means that one party will pay the costs of another party related to a loss or claim of a third party. Thus, under the indemnification found in the AIA General Conditions, the contractor will indemnify the owner if someone is injured due to the fault of the contractor or one of its subcontractors and the injured party sues the owner. Owners will often insert much more onerous indemnification provisions in their contract so that substantially all risks are passed on to the architect and contractors, even if these parties were not at fault. Most states,

including Illinois, now void attempts to indemnify parties for their own negligence, so that if an owner overreaches with such a provision, he may not wind up with any indemnification at all.

Another type of risk allocation in contracts is a “Limitation of Liability” clause. ALA is one of the few associations that publishes form contracts with such a provision. Here is one from OA4-2016:

10.0 LIMITATION OF LIABILITY.

The Owner agrees, to the fullest extent permitted by law, to limit the

liability of the Architect to the Owner for any and all claims, losses, costs, expenses, or damages of any nature whatsoever, including attorney's and expert-witness fees and costs, from any cause or causes, so that the total aggregate liability of the Architect to the Owner shall not exceed the Architect's total fee received for services rendered on this project. It is intended that this limitation apply to any and all liability or causes of action, however alleged or arising, unless otherwise specifically prohibited by law.

This provision of the ALA contract means that the architect will not face liability to the owner (but not others) in an amount that exceeds the total fee that the architect has received for that project. Owners may well push back on such a limitation, but it never hurts to try.


Courts have generally upheld limitation of liability provisions. For instance, in *US Nitrogen, LLC v. Weatherly, Inc.*, 2018 WL 4576053 (USDC N.D. GA, Atlanta Div., Sept. 24, 2018), the contract stated that "Weatherly's total aggregate liability to [USN], except with respect of Weatherly's cost of performing the Work under the Contract, for all causes including defects, Weatherly defaults, default of any warranties, or guarantees, patent infringement or otherwise, shall not exceed fifteen percent (15%) of the Price." Weatherly was hired to provide engineering services for an ammonium nitrate solution plant. After construction was completed, the owner discovered cracks in the foundations of compressors used in the production of the ammonium nitrate solution. It was alleged that Weatherly's design could not support the dynamic motion of the compressors during production. Other problems with the design were also alleged. The owner sued Weatherly, seeking more than \$30 million. Weatherly then sought partial summary judgment to limit its

damages to \$2,203,800, representing 15% of the Price listed in the contract. The owner opposed the motion on several grounds. It argued that, under state law, indemnification provisions were not enforceable. The court held that this provision was not an "indemnification" or "hold harmless" provision. Sophisticated business entities may limit their liability for such acts arising out of performance of the contract. The owner also argued that the term "price" should be the entire contract, as there were significant extras on this project that increased the final cost by more than \$5 million. This was rejected by the court, as the contract assigned a specific value to the term "price."

The full effect of a limitation of liability provision can be found in *SAMS Hotel Grp., LLC v. Environs, Inc.*, 716 F.3d 432 (7th Cir. 2013). In that case out of Indiana, the architect hired by the owner for a hotel project also acted as structural engineer. The architect was not a licensed structural engineer but had taken a variety of structural engineering courses. The project required that a lateral shear wall system be designed. The architect believed that this system would be designed by the steel fabrication subcontractor. The architect's drawings did not indicate the extent to which poor soil needed to be removed and filled with compacted fill. After construction started, cracks were observed in the concrete. The building department then issued a notice of condemnation, and the entire project was ultimately demolished. It was found that the project did not include enough shear wall support, and had the incorrect type of footing. When sued by the owner, the architect argued that it was not responsible for the design of the structural system, as that was to be engineered by the contractors. The court rejected this contention, because the architect had an obligation to provide a proper design on its' plans. By submitting

design drawings to the contractor and the building authorities that were both incomplete and inconsistent, the architect failed to provide plans that were suitable for the purposes for which they were prepared. Thus, according to the court, the architect had been negligent, and the owner was entitled to an award of damages.

As a result of the demolition, the owner suffered losses of some \$4.2 million. This would normally be the amount that the owner was entitled to recover from the architect. The architect's fee was just \$70,000. The contract contained this limitation of liability provision: "The Owner agrees that to the fullest extent permitted by law, Environs Architects/Planners, Inc. total liability to the Owner shall not exceed the amount of the total lump sum fee due to negligence, errors, omissions, strict liability, breach of contract or breach of warranty." The appellate court upheld the trial court's holding that the provision was valid and enforceable. The owner's recovery in this case was miniscule in relation to the total damages suffered. However, because of the limitation of liability provision, the architect did not suffer a serious setback that could have put it out of business if it had insurance that contained limits of \$1 million, as is often the case.

The SAMS court also discussed whether such a provision was enforceable. There, the parties were sophisticated entities that understood the import of such language. The situation might well be different if the owner were an unsophisticated owner of a home or small business. In drafting such agreements, the architect needs to take this into account, otherwise a critical clause might be stricken by a court. Therefore, it is highly advisable to obtain counsel in advance from an attorney knowledgeable in construction law, pertaining to the state in which the project is located. 

Whole-House Ventilation Systems

Providing Healthy, Comfortable, and Energy-Efficient Indoor Solutions

BY: LAWRENCE V. PONZIANO, ZEHNDER AMERICA

In the last several decades, buildings have become progressively airtight due to energy efficiency and cost concerns. While air infiltration and exfiltration rates have been significantly reduced, the need for an efficient ventilation system has become extremely important. Without proper ventilation, tight, energy-efficient construction risks mold, mildew, and indoor air quality issues. A high-performance heat recovery ventilation system ensures fresh, filtered air and a significant reduction of heating/cooling loads.

The goal of this article is to guide the participant to:

- Understand the advantages and weaknesses of supply-only, exhaust-only, and balanced ventilation systems.
- Learn how heat recovery ventilation enables a comfortable and healthy environment.
- Understand HRV/ERV's role in building an energy efficient home.
- Learn how to evaluate and choose the most effective HRV/ERV system.

Building Codes and Standards

2012 ICC Residential Building Code

N1102.4.1.2 (R402.4.1.2) Testing - The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in zones 1 & 2, and 3 air changes per hour in zones 3 to 8. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals).

- Energy Star Qualified Homes – Version 3 (2012)
- 6 ACH50 in Climate Zones 1,2
- 5 ACH50 in Climate Zones 3,4
- 4 ACH50 in Climate Zones 5,6,7
- 3 ACH50 in Climate Zone 8

Balanced Ventilation with heat recovery was once viewed as a luxury for high performance buildings. In today's new homes, Balanced

Ventilation with heat recovery should be considered a necessity.

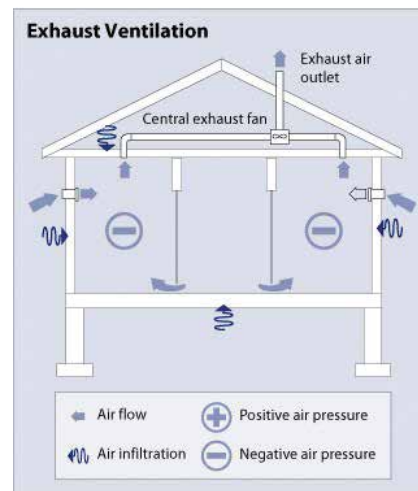
Why Has Mechanical Ventilation Become So Important?

As a result of higher building standards and code requirements, homes have become increasingly tight in the last 20 years due to energy cost concerns:

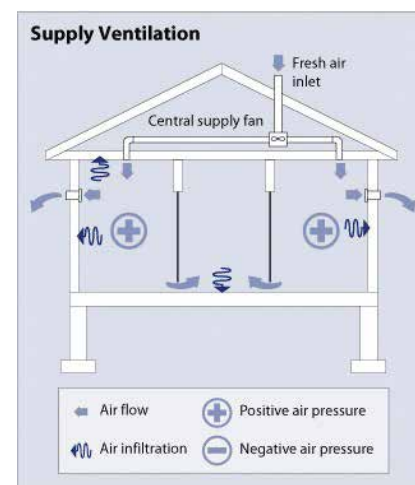
- Previous air infiltration and exfiltration rates have been significantly reduced
- Thousands of chemicals enter the home through building materials, cleaners, furniture, carpets, and other products
- Need for better ventilation in conjunction with increasingly energy efficient construction.

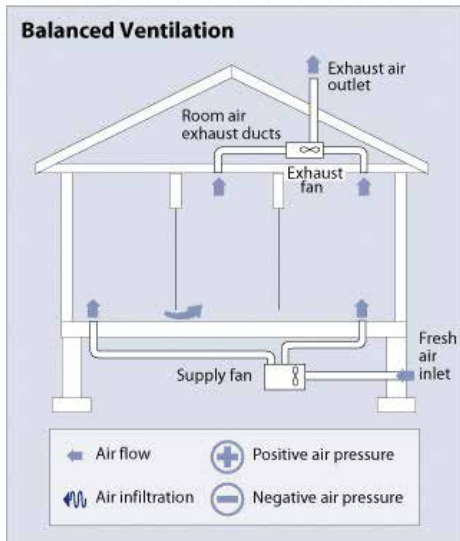
Understanding the advantages and weaknesses of supply, exhaust, and balanced systems

Exhaust-only ventilation has been the mainstay of residential ventilation for the past 60 years. In an exhaust-only system, stale air exhausted from kitchen and bathroom and outdoor air enters through random leaks in the building envelope. In an exhaust-only ventilation strategy intermittent use of bath and kitchen fans require relatively high velocity airflows with the unfiltered and unconditioned air entering the building in an uncontrolled fashion. Moisture,



pollen, and mold are forced into wall and roof assemblies with long term negative health affects for both the occupants and the building. Bath and kitchen exhaust fans are often loud and annoying devices.





Supply-only ventilation has not been as popular, however, it is often used as a remedy for poorly ventilated spaces. It satisfies the need for fresh air but rarely uses any filtration on makeup air and will lead to high humidity levels being forced into building insulation cavities. In a supply-only system, outside air pulled into the home and stale air exits the home through random leaks in the building envelope.

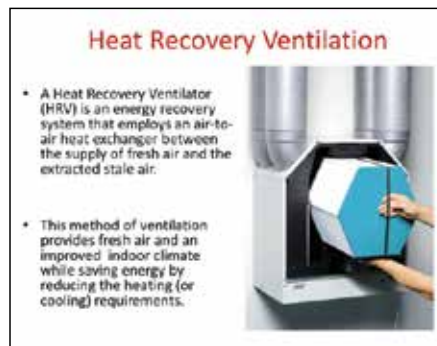
Balanced ventilation is a more desirable ventilation strategy, however, it often uses the existing heating and cooling ductwork. This method rarely uses any advanced filtration and wastes precious energy in both heating and cooling seasons. In a well-designed balanced ventilation system, stale air should be exhausted from the kitchen and bathroom and fresh air is supplied to bedrooms and living spaces.

A modern solution that increases comfort, indoor air quality, and energy efficiency

Heat Recovery and Enthalpy Recovery Ventilation enable a comfortable and healthy environment. In a well-planned heat recovery ventilation or enthalpy recovery ventilation strategy, balanced ventilation is employed with an independent, free standing air distribution system.

Stale air is exhausted from kitchen, bathrooms and laundry areas where moisture, odors and chemicals are created in the home.

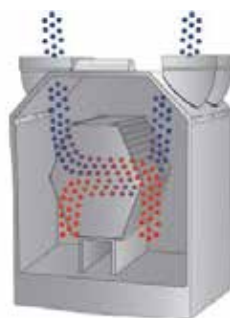
Fresh-filtered air is replaced in living spaces like bedrooms, home office, living and family rooms. Premium systems can recover as much as 95% of the heating and cooling energy. This energy would normally be lost to the outside in a traditional ventilation system.



- A Heat Recovery Ventilator (HRV) is an energy recovery system that employs an air-to-air heat exchanger between the supply of fresh air and the extracted stale air.
- This method of ventilation provides fresh air and an improved indoor climate while saving energy by reducing the heating (or cooling) requirement.
- A properly sized ventilation system should be designed to run continuously at 60% power so there is boost capacity for odor or moisture events (burning bacon or taking a shower) as well as electrical efficiency.

Enthalpy Recovery Ventilation

- Enthalpy recovery ventilation (ERV) is a heat recovery ventilation system that also passes moisture (water vapor) between the two air streams.



- This method of ventilation can help to control humidity levels and reduce latent cooling loads.
- Both ERV and HRV methods of ventilation can help to control humidity levels and reduce excess CO₂, VOC's, Allergens and latent cooling loads.

Additional Benefits of Balance Heat Recovery Ventilation

- Increased comfort with a ventilation system with heat recovery.
- Room-to-room temperature variations are greatly reduced and often eliminated with the continuous air movements of the HRV/ERV system.

A premium HRV and ERV should be certified by the independent testing of an official professional organization like The Passive House Institute (PHI) in Germany. Noise levels, cross-flow leakage, heat recovery efficiency and energy use are all consideration in testing.

Efficient mold protection: Fresh air is provided and excess humidity is removed automatically.



With tighter building envelopes, better windows and doors and higher insulation levels, mold has become a genuine health concern. HRV/ERV systems provide the continuous air movement, moisture management and filtration necessary to reduce the conditions that contribute to mold growth.

Efficient noise barrier and protection against dust: Preheated and filtered air is provided draft-free allowing windows to stay closed in heating and cooling seasons.

Enthalpy Recovery Ventilator (ERV) vs Heat Recovery Ventilator (HRV)

A high quality HRV unit generally provides the highest thermal recovery rates (as high as 95%). HRV systems will not pass the humidity from each air stream and often will result in dry indoor climates in the heating season and higher humidity in the cooling season.

A premium ERV unit is typically about 84% thermally efficient, however, can significantly reduce

the energy needed of latent cooling that increased interior moisture demands. While not all moisture is rejected from the outside to the interior, moisture transfer can be as high as 71%. Interior and exterior temperature and relative humidity values, as well as air flow rates can all effect the performance of the ERV system.


Proper design, the number of occupants and type of occupancy, climate, unit efficiency as well as the buildings cooling systems dehumidification capacity will all factor into the choice of an ERV or HRV system.

Typically, those in severe cold climates and high mountain desert climates often choose an HRV

system. High humidity climates often use the ERV system. There is no one size fits all solution and good engineering practices with number of occupants, climate extremes, building HVAC loads and system loads will ultimately determine which system is best suited.

Summary: Health and Comfort

HRV/ERV Recovery Ventilators

- Removal of pollutants such as odors, smoke, VOCs, Formaldehyde.
- Avoidance of humidity problems and protection of the building structure.
- Protection of the inhabitants with regard to mold.
- Filtration of the outside air as protection against pollen (allergies).
- Generally provide more uniform distribution of fresh air. 

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Test Questions

Whole House Ventilation Systems

1. In a residential home, which type of mechanical ventilation is possible?
 - a. Supply ventilation
 - b. Exhaust ventilation
 - c. Balanced ventilation
 - d. All of the above
 - e. B & C only
2. Heat recovery means that energy is transferred between stale, exhaust air and fresh, intake air with the result of the incoming air temperature being close to the same temperature as the exhaust air.
 - a. True
 - b. False
3. Which type of ventilation system uses bath fans and range hoods to expel air from wet spaces, while make-up air occurs through passive trickle vents or leaks in the building envelope?
 - a. Supply ventilation
 - b. Exhaust ventilation
 - c. Balanced ventilation
 - d. Circulation ventilation
4. Where can HRV systems be installed?
 - a. Single-unit homes
 - b. Multi-unit homes
 - c. Small commercial applications
 - d. All of the above
 - e. A & C only
5. The ventilation device in an HRV system recovers how much of the energy from the extracted air before returning it to the fresh air?
 - a. Less than 50%
 - b. 50% to 60%
 - c. 75%
 - d. Up to 95%
6. Locations in the hot, humid South will usually use an ERV.
 - a. True
 - b. False
7. Which of the following is a benefit of HRV systems?
 - a. They balance air temperatures throughout the home.
 - b. They filter outside air and prevent pollen and insects from entering the interior environment.
 - c. They provide a continuous supply of fresh air.
 - d. All of the above
8. Which of the following functions can an ERV perform?
 - a. Retain humidity in winter and cold environments
 - b. Reject humidity in warm climates
 - c. Transfer heat in cold climates
 - d. All of the above
 - e. None of the above
9. The Passive House Institute (PHI) in Germany tests and certifies HRVs and ERVs. What features of a unit do they test?
 - a. Noise levels
 - b. Cross-flow leakage
 - c. Heat recovery efficiency and energy use
 - d. All of the above
 - e. B & C only
10. When selecting the right size device to meet the desired air changes for a specific application, one should plan for a continuous ventilation rate of a maximum of _____ of the HRV/ERV device capacity.
 - a. 40%
 - b. 52%
 - c. 60%
 - d. 72%

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Tall Wood Buildings in the 2021 IBC

Up to 18 Stories of Mass Timber

BY: SCOTT BRENNEMAN, PHD, SE, WOODWORKS – WOOD PRODUCTS COUNCIL
MATT TIMMERS, SE, JOHN A. MARTIN & ASSOCIATES
DENNIS RICHARDSON, PE, CBO, CASP, AMERICAN WOOD COUNCIL

In January 2019, the International Code Council (ICC) approved a set of proposals to allow tall wood buildings as part of the 2021 International Building Code (IBC). Based on these proposals, the 2021 IBC will include three new construction types—Type IV-A, IV-B and IV-C—allowing the use of mass timber or non-combustible materials. These new types are based on the previous Heavy Timber construction type (renamed Type IV-HT) but with additional fire-resistance ratings and levels of required non-combustible protection. The code will include provisions for up to 18 stories of Type IV-A construction for Business and Residential Occupancies.

This article is excerpted from a paper summarizing the proposals, including their background, technical research that supported their adoption, resulting changes to the IBC, and product-specific standards.

IBC Definition of Mass Timber

A relatively new category of wood products, mass timber can encompass well-known and widely-used products such as glue-laminated timber (glulam) framing as well as newer panelized products such as cross-laminated timber (CLT). The definition of mass timber adopted for the 2021 IBC is:

“Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross section dimensions of Type IV construction.”

In practice, mass timber as defined in the IBC has been an umbrella term that includes heavy timber elements, with heavy timber materials and sizes serving as the prerequisites to be considered mass timber. A subtle difference is that most mass timber utilized in Types IV-A, B, and C have a minimum required fire-resistance rating in addition to the intrinsic fire resistance due to the minimum



*Carbon12 Portland,
OR Kaiser Group/Path Architecture,
Munzig Structural Engineering*

PHOTO CREDIT: ANDREW POGUE

prescriptive size requirements found in Type IV-HT.

Care should be taken to be clear when the minimum wood member size and detailing requirements of Type IV construction apply. When mass timber is used as one of the many current exceptions found in other construction types for “heavy timber” or “Type IV” construction, then the heavy timber size and detailing requirements found in Section 2304.11 (IBC 2015 602.4) are applicable. Large format panelized wood products made from solid sawn laminations

include: CLT, nail-laminated timber (NLT), dowel-laminated timber (DLT), and glue-laminated timber (GLT). Panelized products made from structural composite lumber include: LVL panels and a proprietary mass plywood panel (MPP) made from laminated plywood. While such products are sometimes called “mass timber,” they will only meet the 2021 IBC definition of mass timber when they meet the specific size and detailing requirements. When such products are used in Type III or Type V construction, as “any material permitted by this code” in Sections 602.4 and 602.5, the Type IV dimension and detailing requirements do not automatically apply.

Allowable Building Sizes

As the ICC Tall Wood Building Ad Hoc Committee developed and tested requirements for the new construction types, the allowable heights and areas were developed with the following performance objectives as the basis:

- No collapse under reasonable scenarios of complete burnout of fuel without automatic sprinkler protection being considered
- No unusually high radiation exposure from the subject building to adjoining properties to present

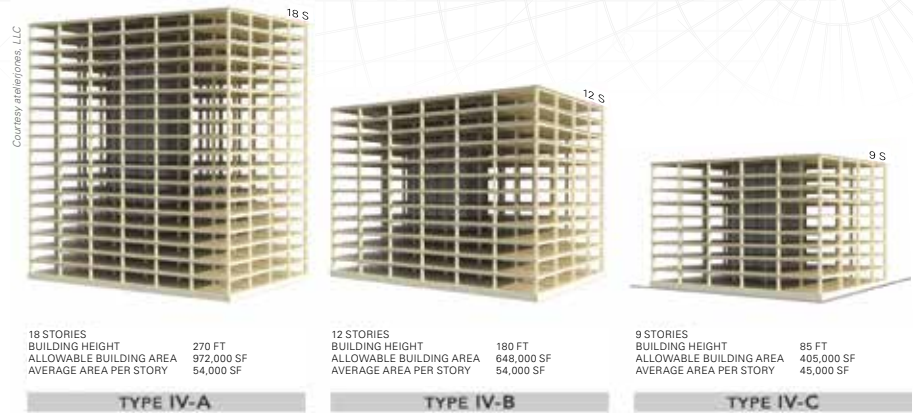
a risk of ignition under reasonably severe fire scenarios

- No unusual response from typical radiation exposure from adjacent properties to present a risk of ignition of the subject building under reasonably severe fire scenarios
- No unusual fire department access issues
- Egress systems designed to protect building occupants during the design escape time, plus a factor of safety
- Highly reliable fire suppression systems to reduce the risk of failure during reasonably expected fire scenarios; the degree of reliability should be proportional to evacuation time (building height) and risk of collapse

The comprehensive package of approved changes met these objectives, and allowable heights and areas for select occupancies in the 2021 IBC are shown in the table below.

To help visualize the building size associated with these tabular limits, the figure at the top of the page shows representative buildings of equal area per floor with the maximum building sizes for a Business occupancy. As Business occupancies have the largest allowable areas and share the tallest height limits with other occupancies, these are the largest building sizes permitted by the new construction types, excluding minor additional area increases allowed by the frontage increase of IBC 506.3.

Representative Building Sizes, Business Occupancy




Note that in the current IBC, the use of NFPA 13 sprinklers is mandatory for all high-rise buildings defined with an occupied floor more than 75 feet above the lowest level of fire department access. For existing construction types, the use of NFPA 13 sprinklers typically provides for a one-story and 20-foot increase in the allowable building height but a substantial increase in allowable area. However, the new construction types are highly conservative when allowable area is compared with common A, B and R occupancy groups where unlimited area is allowed for existing Type I buildings.

Conclusion

The proposals from the ICC Tall Wood Building Ad Hoc Committee led to a comprehensive set of code changes developed using a rational performance-based approach to establish new size allowances for mass timber buildings in the IBC. The three new construction types have

been crafted to support a variety of exposed and protected mass timber design systems which have been validated through fire testing.

The American Wood Council's 2018 National Design Specification (NDS) for Wood Construction and Technical Report 10 have been published and together include updated provisions for structural fire-resistance calculations and protection of connections, as well as a summary of prior and recent fire testing providing substantiation for the design criteria.

For more information, including a summary of the proposals, requirements for the new construction types, fire protection features, results of fire testing and other research, and an update to the CLT product standard, the complete paper can be found at www.woodworks.org/wp-content/uploads/wood_solution_paper-TALL-WOOD.pdf. 

Select Height and Area Limits by Construction Type

		I-A	I-B	IV-A	IV-B	IV-C	IV-HT
Occupancies	Value	Allowable Building Height above Grade Plane, Feet (IBC Table 504.3)					
A, B, R	S	Unlimited	180	<u>270</u>	<u>180</u>	<u>85</u>	85
		Allowable Number of Stories above Grade Plane (IBC Table 505.4)					
A-2, A-3, A-4	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>6</u>	4
B	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>9</u>	6
R-2	S	Unlimited	12	<u>18</u>	<u>12</u>	<u>8</u>	5
		Allowable Area Factor (A _f), Feet ² (IBC Table 506.2)					
A-2, A-3, A-4	SM	Unlimited	Unlimited	<u>135,000</u>	<u>90,000</u>	<u>56,250</u>	45,000
B	SM	Unlimited	Unlimited	<u>324,000</u>	<u>216,000</u>	<u>135,000</u>	108,000
R-2	SM	Unlimited	Unlimited	<u>184,500</u>	<u>123,000</u>	<u>76,875</u>	61,500

S is sprinklered with NFPA 13 sprinklers. SM is the multi-story allowable area factor. Underlined entries are the new additions.

WoodWorks—Wood Products Council provides free project support as well as education and resources related to the code-compliant design of commercial and multi-family wood buildings. For assistance with a project, visit www.woodworks.org/project-assistance or email help@woodworks.org.

Assisted Toileting and Bathing Options

BY: KIMBERLY PAARLBERG, RA, SENIOR ARCHITECT ICC

Assisted is defined as help given or made available to another person. Assisted living facilities provide a much-needed service to senior citizens who may have difficulty with, or concerns about living on their own. Such facilities offer a safe place to live along with 24-hour assistance, healthcare services, and activities that interest the residents. As the population of the US ages, the need for these types of facilities is increasing greatly.

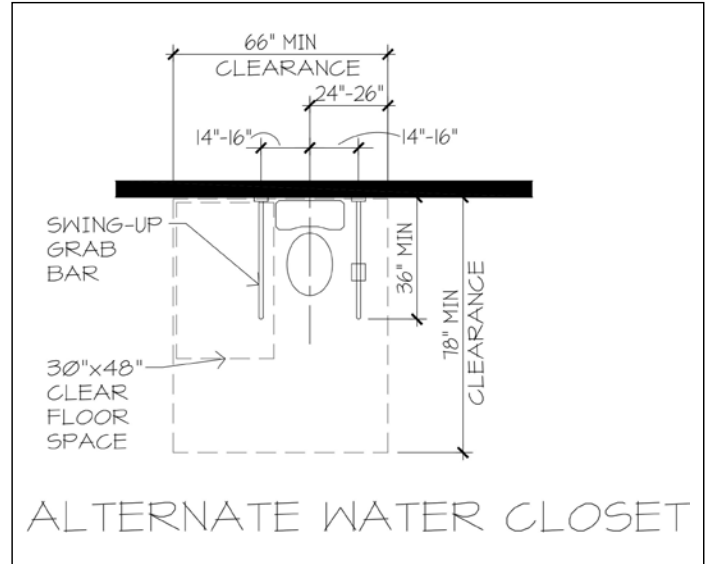
The International Building Code (IBC) specifies that a percentage of assisted living, nursing homes, and rehabilitation facilities offer fully accessible units for a percentage of the rooms. This percentage increases based on the anticipated need. This percentage is 4% or 10% in the different types of assisted living (Group I-1, Condition 1 and 2; IBC Section 1107.5.1.1); 50% in nursing homes and 100% in rehabilitation facilities (Group I-2, Condition 1; IBC Sections 1107.5.2.1 and 1107.5.4). The technical standard referenced for the “how to” is the ICC A117.1 Accessible and Usable Buildings and Facilities (ICC A117.1; Section 1002). However, the main purpose for the ICC A117.1 states “The intent of these sections is to allow for a person with a physical disability to independently get to, enter and use a site, facility, building or element.” While allowing for individuals to maintain their independence is very important, many of the elderly residents in assisted living and nursing facilities no longer have the physical strength or stability for these options to safely work for them.

The Mayer-Rothschild Foundation has completed research that has recommendations for the ideal dimensions for grab bars and toilet spacing for assisted toileting. To allow for staff to be on either or both sides of the resident for assistance in standing, sitting or transferring, the toilet must be farther from the wall than what is required in the ICC A117.1. This research shows that lifting from the sides is safer both for the staff and the resident. This same concern for staff to be able to get to all sides of the resident also spurred different configurations for roll-in showers.

The ICC Committee on Healthcare Committee (CHC) used this research to develop successful proposals for the 2021 IBC. Code changes (E123-18, E124-18, E125-18) have allowed for bathrooms that offer assisted toilet and bathing facilities in a portion of the patient rooms required to be accessible units. For assisted living facilities, the allowance will be that half of the accessible rooms can have the configurations for assisted toileting and/or

bathing. For nursing homes and hospitals, 90% of the accessible rooms can use this option.

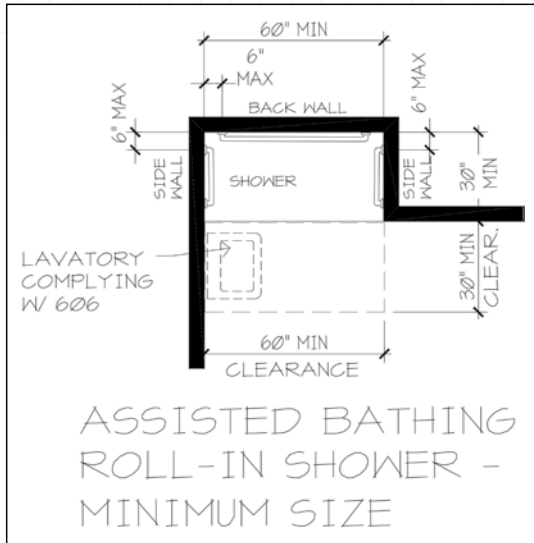
The CHC also requested that the technical provisions for assisted toileting and bathing be added to the 2021 IBC (E128-19 and E129-19). While the CHC would have liked to propose these technical criteria to the ICC A117.1 committee, the research was not completed for consideration during the development of the 2017 edition of the ICC A117.1. The CHC does plan to propose this to the A117.1 in their next development cycle. However, it was felt that the industry needs this critical information now,



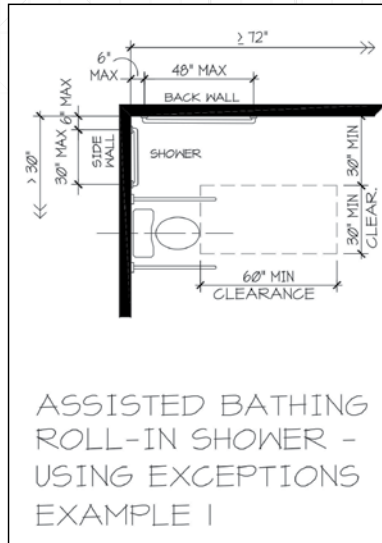
Alternate Water Closet

and cannot wait until the next edition of the ICC A117.1 is completed.

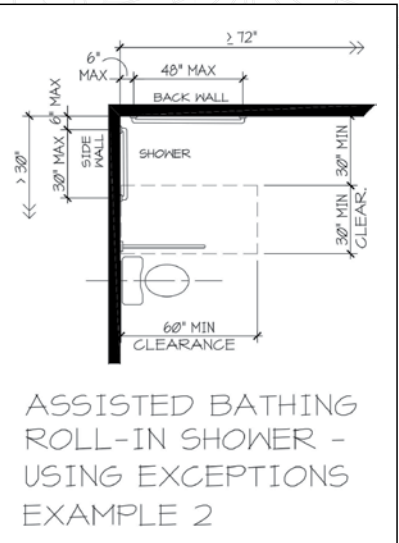
The intent of the assisted toileting provisions are to allow space for a side transfer from a wheelchair. However, the water closet is farther from the adjacent wall. Since a wall-mounted grab bar would now be out of reach, two fold-down grab bars are required. Research has proven



Assisted Bathing Roll-In Shower (Minimum Size)



Assisted Bathing Roll-In Showers Using Exceptions



that the use of fold-down grab bars on both sides of the toilet is safer and easier for older adults who transfer independently. In addition, residents in care settings who need staff assistance to transfer on/off the toilet need more space between the toilet and the wall to enable a staff person (or two) to fully assist a person without risk of injury to the resident or caregiver. The additional space at the toilet would also allow for better access with many types of lifting devices.

The key part of the assisted bathing option is to remove the requirement for permanently installed folding or fixed seats from a roll-in shower configuration and have grab bars on three walls. No fixed seat also allows more options for locations of the water controls. These wall-mounted seats do not work well when residents are being assisted with showering. The wall-mounted seats make it challenging for care-givers to access the back and one side of the resident they are bathing. Most often, if residents cannot stand for bathing, a portable, rolling chair is used and the folding seat stays folded up (but takes up space). This new configuration allows the care-giver greater access to all sides of the resident. In addition, the rolling chair is often easier to transfer to for older adults, than a wall mounted seat. This proposal also recognized alternate shower configurations that provide equal, if not better accessibility. For example, many nursing homes provide a “European” shower where two sides are open to the bathroom. This provides greater access for both resident with mobility issues as well as the care-giver. Water can be managed with shower curtains, either on a curtain track or an “L-shaped” curtain rod, however usually the entire room is designed to be a “wet room.”

It is the opinion of the CHC and others that have reviewed these new options, that this will be viewed as designs that are specific to the needs of the population they serve, and therefore meet or exceed the intent of the Accessible unit options in the ICC A117.1 and the 2010 ADA Standard for Accessible Design.

There is not a concern for the assisted toilet and bathing facilities to be in conflict with the Type B units required in these facilities (IBC Section 1107.5.1.2, 1107.5.2.2), because the provisions addressed in this new option would be permitted under the current requirements for Type B units (ICC A117.1 Section 1004). These provisions provide a higher level of accessibility than required in the Fair Housing Guidelines.

With a little assistance, we will all get by with a little help from our friends.

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Lee, S.J., Sanford, J., Calkins, M. Meglen, S., Endicott, S. & Phillips, A. (2017) Beyond ADA accessibility: Meeting seniors' needs for toilet transfers. HERD. DOI: 10.1177/1937586717730338

Information on the CHC can be found at www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare.

To view the code change proposals for 2019 go to www.iccsafe.org/wp-content/uploads/2018-REPORT-OF-THE-COMMITTEE-ACTION-HEARING.pdf and look for the code changes in Group A, Proposed Changes to the I-Codes and the Report of the Committee Action Hearing.

Wood Serviceability and the Unexpected

BY: TIMOTHY CROWE, RA, SE

Wood assemblies have survived for centuries when properly designed, detailed, and maintained. Examples are found throughout the world, such as temples and shrines in Japan and China dating as early as the 8th century, as well as numerous structures within the United States, including churches, barns, and bridges. Wood is a fibrous anisotropic material with strength and behavior properties that vary based on orientation to the wood grain, and which need to be accommodated in design. Although wood is susceptible to decay or fire, design approaches are available to address these hazards. In general, if kept dry (below 20% moisture content) or completely saturated (submerged in water without access to oxygen) wood may last indefinitely. Fire resistance can be achieved in heavy timber assemblies. As exposed timber chars during fire events, an insulating layer is formed that protects the underlying wood from damage. This has been demonstrated in construction techniques for over 100 years, such as in mill buildings. At present, wood systems are gaining greater code approvals with cross-laminated timber (CLT) construction for acknowledged fire resistance. As anticipated, mass-timber building height allowances of up to 18 stories tall with CLT is forecasted for the 2021 International Building Code.



Figure 1. Parson Capen house from Topsfield, Massachusetts built in 1683.



Figure 2. Attic framing from 1860s church in Chicago, Illinois.

Previous *Second Chances* articles have discussed investigation and repair methods to address wood and timber structures. In this article, we are going to review dubious treatments of wood structures as a cautionary tale and reminder that maintaining a critical perspective is essential when examining existing structures. Though unintentional, one would believe, remediation efforts may occasionally adversely affect

wood serviceability and even weaken the structures that they are intending to repair.

Community Center

In the first example, we have a community center located in central Indiana. This 1960s building has load-bearing masonry walls, a wood-trussed roof, and was finished in the interior with plaster and lath ceilings and walls. The

roof trusses – fabricated with dimension lumber and steel splitting connectors – were spaced 2 feet on center, and spanned the 60-foot building width. The owners expressed concerns regarding ceiling deflections of several inches in the social hall that they attributed to snow loads. Although this was not an unreasonable hypothesis, a closer look identified other contributing factors.



Figure 3. Steel cable reinforcing introduced at roof trusses from Indiana community center.



Figure 4. Fractured roof truss members at split-ring connectors attributed to high perpendicular-to-grain loading of members.

Our investigation discovered modifications to the community center that incorporated moveable partitions within the social hall suspended from the roof structure. There was no significant cracking present in the plaster ceiling, however deflections as much as 5 inches existed, indicating that some deflections likely existed when the ceiling had last been refinished. The suspended partitions added loads to the roof trusses for which they were not designed. Strengthening efforts employed the addition of steel

cables that engaged the top chords and bottom chords of adjacent trusses. This reinforcing approach to enhance the load-carrying ability of the truss bottom chords applied perpendicular-to-grain tensile stresses on the top chord members at the split-ring connectors. Wood does not provide any appreciable strength perpendicular to grain. The National Design Specification for Wood Construction (NDS) specifically states that designs that induce tension stresses perpendicular to grain shall be avoided, unless mechanical

reinforcement to members is provided to resist all such stresses. In this case, no mechanical reinforcement was provided and, consequently, the cable provided to reinforce this roof structure actually pulled the top chord member connections apart over time. This resulted in multiple connection failures of the roof trusses leading to the corresponding deflections.

Administration Building

The second example brings us to an administration building located in a Chicago suburb. This building,



Figure 5. Partial view of lattice truss within the roof structure above the administration building.



Figure 6. Partial view of lattice truss within the roof structure above the administration building.

constructed circa 1910, is a single story brick masonry structure that is rectangular in plan, measuring approximately 50 feet by 150 feet. The roof structure has lattice trusses spaced 12 to 18 feet apart that span the width of the building, bearing on the exterior masonry walls.

The building, formerly a retail occupancy, was remodeled and code upgrades necessitated by the change of occupancy affected the structure and building enclosure. The remodel design team recognized that strengthening the roof structure was needed to address the potential of drifting snow loads, as significantly taller structures had been erected along the side of the building since its original construction. Building codes around 1910 did not generally recognize the need to design for drifting snow. In addition to the snow loads, dead load associated

with added insulation needed to be considered if International Energy Conservation Code requirements were to be addressed. Though the weight of insulation is usually not that significant, on buildings such as this, which were typically uninsulated through time, it is particularly worth examining more closely. Added insulation in colder climates prevents the melting of snow, and can increase the likelihood of snow accumulation that may not have previously been experienced at the building.

Excessive truss deflections and localized crushing at the tops of interior partitions were observed by the owner within a year after the remodeling work had been performed. It was apparent that the crushing at the top of the interior partitions was attributed to inadequate accommodations of differential movement of the

roof structure, as the partitions were built tight to the bottom of the trusses. Roof structure deflections will fluctuate over time with changes of loads and temperatures. With wooden trusses, deflections can further fluctuate with changes in relative humidity resulting in moisture content changes in the chord members. Generally, framing practices accommodate this differential movement. Our investigation revealed that another significant factor related to these deflections had to do with the truss modifications implemented during the remodeling project. In particular, supplemental 2x10s were added to the lattice truss bottom chords in an apparent attempt to strengthen them. However, this reinforcing was not continuous along the truss length and the specified bolted attachment of the reinforcement actually created holes, reducing the net cross section of the original bottom chord. The

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Figure 7. Partial view of corner entrance added to the 1890s church in central Illinois.




Figure 8. Partial view of framing above corner entrance added to the 1890s church in central Illinois. Note that the wall studs and corner framing was cut away without provision of any supplemental support.

reduced section resulted in increased tensile stresses in the bottom chords under gravity loads. Under sustained loads, these stresses can result in an increase in deflection. Other connections of this bottom chord reinforcing included welding of new steel components to existing bolts at the ends of these trusses, raising additional questions regarding the appropriateness of these repairs. Thus, this reinforcing approach actually weakened the roof structure.

Historic Church

The third example is a historic church located in central Illinois that was constructed circa 1890. This modest, balloon-framed structure is set on a masonry foundation, is rectangular in plan, and measures approximately 31 feet by 50 feet. In the early 1900s, a new building entrance was created at the corner of the original church. Building damage at the entrance attributed to a more recent motor vehicle impact initiated an assessment of the structure.

This assessment revealed that framing modifications performed to accommodate the corner entrance simply cut out the wall stud framing at the building corner without providing any support for the framing above the opening. As peculiar as this sounds, this framing seemed to perform without incident, as the horizontal plank sheathing and interior plaster finishes on the balloon-framed assembly provided the support of the building construction above it. Interior and exterior finishes had also been added to these walls, masking any distress and movement within the framing such that minor settlement of these unsupported elements would have gone unnoticed. Longer-term repair recommendations included incorporating a resolved support and load paths for the framing around the repaired entrance. But these conditions again demonstrate the unpredictable nature of prior remediation work on these structures. You don't always know what you are working with until you perform a proper assessment.

It is necessary to recognize that not all prior repairs and previous building structure interventions are properly implemented; they should not be taken for granted. Rather, it is essential to retain qualified architects and/or engineers familiar with the materials and assemblies to critically examine the structures to ensure that the repairs selected and implemented are appropriate and compatible with the structure, and provide the best and most enduring serviceable life of the structure into the future. 


Timothy Crowe, ALA, SE, PE, an Associate Principal with WJE in Northbrook, Illinois, is Co-chair of the Association for Preservation Technology International (APT) Preservation Engineering Technical Committee and specializes in the investigation, and repair of archaic and contemporary structures. He can be reached at tcrowe@wje.com.

URBANWORKS



PHOTO CREDIT - AUSTIN FASSINO © GAFFER PHOTOGRAPHY

UrbanWorks Architecture is an award-winning architecture and interior design firm in Minneapolis, specializing in mixed use, multifamily, office, and other urban infill projects. With a talented staff of over 20 architects and designers, UrbanWorks has become known for their innovative approach to projects that combine complex uses in new ways – particularly those with services involving mental illness, disabilities, affordable housing, and ending homelessness.

They endeavor to create beautiful spaces that meet or exceed goals of sustainability, constructability, and financial responsibility – while cultivating a process that is fun for staff, stakeholders, and clients. 

MPS Center for Adult Learning

Minneapolis Public Schools commissioned a new, welcoming learning center specifically for adults in two of its programs: Adult Education and Transition Plus. The project provides space that is both flexible and specialized for students with educational disabilities while fostering an active and inclusive sense of community in the district.



Artspace Hastings River Lofts

Developed on a former industrial site, Artspace Hastings River Lofts offers affordable live/work units for artists in a broad range of creative industries. An art gallery and gathering space open onto an amphitheater style courtyard, serving as an amenity for residents and the community of Hastings, MN.

PHOTO CREDIT - BRANDON STENGEL © WWW.FARMKIDSTUDIOS.COM



Ray

This project brings the "tiny home" concept to multifamily housing with modern apartments ranging from 372-505 square feet. A communal living room, library, and professional chef's dining space become an extension of residents' units, while custom compact kitchens and smart storage solutions provide a quality lifestyle at an affordable price.



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North Loop Parking

Located in the trendy North Loop neighborhood of Minneapolis, this mixed-use parking structure has an innovative ventilation screen consisting of a wedge-shaped perforated aluminum panel that is rotated and repeated to create a dynamic façade.



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Youthlink and Downtown View

New, long-term housing for young people experiencing homelessness was built alongside a complete renovation and addition to Youthlink's headquarters. Developed by a nonprofit partnership with Project for Pride and Living, the project provides apartments for 46 youth and a host of welcoming amenities and services.

TABBERTSON *architects*



Tabberson Architects has established themselves as a leader in the design of mass timber and digitally fabricated timber structures. The firm has incorporated these timber frame techniques into residential and commercial projects. Based in Indiana, Tabberson Architects maintains ongoing projects throughout the United States and Canada.

Tabberson Architects work to incorporate client's dreams into a design solution that will enhance the natural site and integrate environmental and sustainable concepts. The philosophical platform of Tabberson Architects is to create timeless environments using sustainable materials, in this way forming spatial experiences that are forever a part of our memory. 



Four Mile Canyon Mountain Home – Boulder, CO.

Nestled into the side of a mountain, Four Mile Canyon is a single-family home with a unique blend of styles. Inspired by the forms of mining structures, the house has an industrial ambiance mixed with refined contemporary elements.

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- ARCADEA ARCHITECTURE (BOULDER, CO) WAS ALSO INVOLVED IN THIS PROJECT.



Caribou Ridge and Silo Neighborhood
– Nederland, CO and Lafayette, CO.

The state of Colorado is at the forefront in promoting sustainable residential developments. Tabberson Architects is proud to have produced a range of site-specific home designs for multiple Colorado developments, all with an emphasis on environmental design.



Timber Retreat
– Indianapolis, IN.

On the exterior, this recreational building resembles a barn. On the interior, it is better summarized as a timber frame cathedral. Designed for fun and leisure, the 30' timber groin vault highlights the center of activity complete with a skylight above and a glass floor to the bar area below.



Traders Point Clearing
– Indianapolis, IN.

Traders Point Clearing adeptly unites form and function in this innovative home design. Twin building wings separate bedroom and living programs and are eloquently linked to create an exterior bridge and courtyard. The contemporary timber frame bents introduce a grid motif that is present in other material elements.

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