LICENSED ARCHITECT

Association of Licensed Architects

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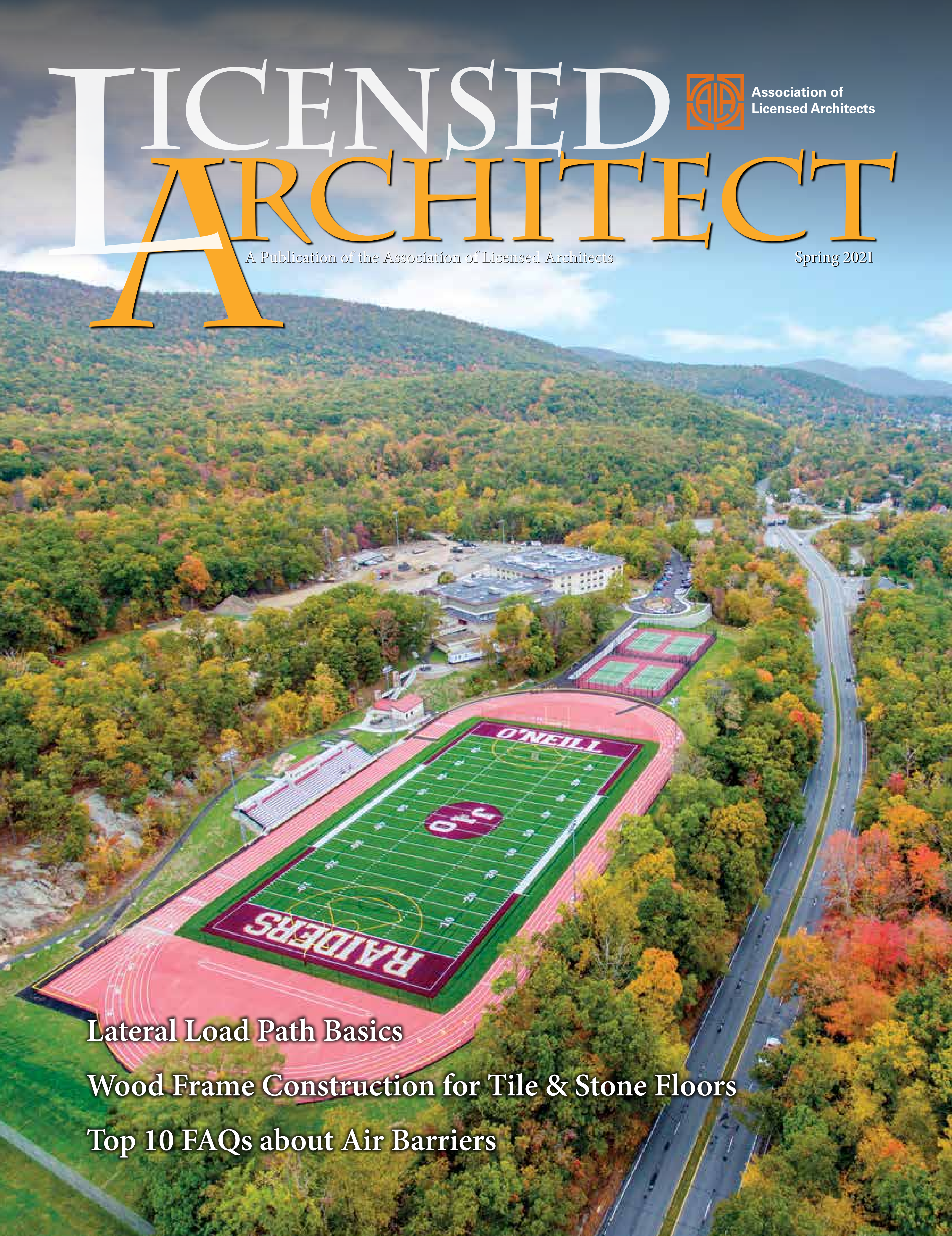
Spring 2021



Lateral Load Path Basics

Wood Frame Construction for Tile & Stone Floors

Top 10 FAQs about Air Barriers

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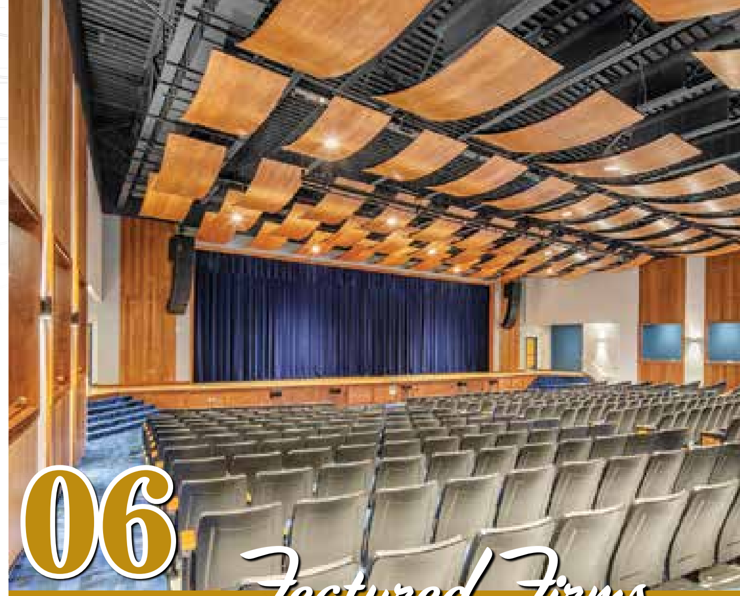

Departments

Cover Credits: Highland Falls-Fort Montgomery CSD - K-12 Educational Facility, BCA Architects & Engineers

Growing optimism as we emerge from the Pandemic and start to return to normalcy!

Welcome to *Licensed Architect Magazine*. Our Spring issue brings with it optimism and a look toward a return to normalcy and bright future for our profession.

As architects, we play a vital role in building welcoming and safe environments that foster well-being, productivity and creativity, particularly as we return to in-person activities and gatherings.

Our Programs Committee has scheduled several exciting programs for the next few months that we hope will ignite the passion for architecture that we all share. Our first in-person seminar, "Emerging Construction Technologies: New Thoughts on the Way to Design Better Projects," is scheduled for summer at the Chicago Regional Council of Carpenters. The ALA Design Awards Intent to Participate also opens in June.

We'll also be adding special events and workshops for the balance of the year and we're looking to our members for recommendations. If you have a program that you would like to offer, know of a program that would benefit our members and guests, or want to call our attention to a topic of interest, please call the office or email ala@alatoday.org.

Please consider assisting with our 2021 initiatives by volunteering to help us recruit new members, head up committees or communities, develop continuing education programs and generate new ideas.

What is important to our members? In addition to professional credentials, continuing education and contracts, our members most often cite ALA's collegial and collaborative atmosphere and the opportunity to build relationships as meaningful benefits. What are some of the other benefits of being an ALA member? Are there other programs and benefits you would like ALA to add? We will be sending out a brief survey in the coming weeks to get your thoughts about ALA, our mission and programs.

Save the date for the ALA Annual Architecture Conference, which is once again virtual. It will be held over three afternoons, October 20-22, and you'll be able to earn 6 credits, most HSW. Please plan to attend the conference.

LICENSED ARCHITECT

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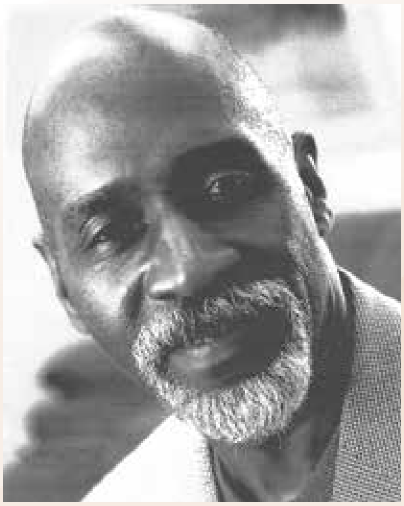

William H. Watkins Jr., FALA, 76, Principal, Watkins Building Group and President of the Association of Licensed Architects Missouri Chapter, passed away in February, 2021 after a long illness. Known for his kindness and support of fellow architects, Watkins was secretary of the ALA Missouri Chapter and then stepped up to take on the role of President for the past 10 years.

Watkins obtained his Associate of Arts degree in Engineering from Florissant Valley Community College and a Master of Architecture Degree from Washington University, St. Louis. A licensed architect in Illinois and Missouri, Watkins became project manager for the St. Louis Housing Authority, and then moved on to the position of coordinator for engineering projects at the University of Missouri, St. Louis. He founded his architectural firm, Watkins Building Group, LLC, in 1995. He also enlisted in the US Army Reserve for six years, where he received an honorable discharge.

Watkins was a member of the West Side Missionary Baptist Church, St. Louis, where he served in the Deacon Ministry. He was also active in Stepping into the Light Ministry, Employment Connections and Community Women Against Hardship. He is survived by his wife, Marla Watkins and her four children, Roy, Bradley, Jocelyn and Amelia.

Douglas A. Gallus, FALA

Douglas Gallus, FALA, Principal, Gallus Architects, Milwaukee, and founder of the ALA Wisconsin Chapter, passed away earlier this year at 78. Gallus, who obtained his B.A. in Architecture from the University of Houston in 1970, founded Gallus Architects in 1974, serving clients in Southeast Illinois and Northeast Wisconsin for more than 40 years. He specialized in residential design, including new homes, renovations and additions. He also worked on small to mid-sized commercial projects, such as mixed-use developments, office buildings, retail centers, churches and medical facilities.

A mentor and selfless promoter of the profession of architecture, Gallus founded the Wisconsin Chapter of ALA in 2009 and served as president for more than 10 years. He was also a member of many other professional organizations, including American Institute of Architects, Construction Specifications Institute, Metropolitan Builders Association, Milwaukee NAHB, National Association for the Remodeling Industry, Wisconsin Green Building Alliance and the West Suburban Chamber of Commerce.

ALA members fondly remember his annual summer barbecue, which he hosted at the South Shore Yacht Club in Milwaukee. A licensed U. S. Coast Guard Merchant Marine Captain, Gallus often sailed MOUSEKATEER 2, his 34-foot cutter rigged yawl sailing vessel, on Lake Michigan. He was long-time member and the architect of the Lord of Life Church in Oconomowoc.

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BCA primarily works in the institutional markets including state and local governments, public and higher education, non-profits, and healthcare. Our projects include colleges, public schools, courthouses, county offices, hospitals, clinics, museums, airports, and water/wastewater facilities.

River Hospital New Medical Office Building - Healthcare - Alexandria Bay, NY

River Hospital is a private, not-for-profit Critical Access Hospital located in Alexandria Bay, Thousand Islands region. BCA designed the River Comprehensive Wellness Center II Project, the focal point for all patient care activities at the Hospital. The Medical Office Building houses Primary Care, Behavioral Health, and Physical Therapy.

Highland Falls-Fort Montgomery CSD - K-12 Educational Facility - Highland Falls, NY

Located adjacent to the West Point Military Academy along the scenic Hudson River Valley in New York, this project included two new synthetic turf fields, seating for 600, a press box, new tennis courts, new exterior LED lighting, new traffic circulation and parking, as well as infrastructure improvements.

Warrensburg CSD - K-12 Educational Facility - Warrensburg, NY

BCA designed an affordable, state-of-the-art 460 seat performance venue to better accommodate school productions and outside theatrical groups at this junior/senior school.

It was necessary to relocate the cafeteria to make room for the new auditorium. Three adjoining classrooms were combined and renovated into a colorful "café style" hangout space.

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Kimpton's Hotel Monaco - Chicago, IL

This design drew inspiration from the bright vibrancy of the City of Chicago and the Great Lake that lies beyond. Utilizing a crisp color palette of cool tones in contrast with dramatic pops of color and unconventional furniture, the result is an elegant design that provides upscale function.

Fisk & Co. - Chicago, IL

This restaurant concept blends the vibe of Belgium's lively bistros with the spirit of Chicago's historic restaurant industry. Drawing from the mussel and beer focused menu, the combined team created a modern industrial space that puts a unique spin on nautical design.

Hilton Chicago Oak Brook Hills Resort - Oak Brook, IL

OKK drew inspiration from the golden age of leisure, the mid-20th century. The resort was transformed into a timeless light and airy environment with a feel of casual elegance.

National Instruments - Austin, TX

OKK brought new modern aesthetic to the food and beverage spaces. The result was a modern, fun, and Austin-inspired oasis that takes full advantage of both the exterior and interior spaces.

Dane County Regional Airport - Madison, WI

Tackling the renovation of the Food Retail Spaces at Dane County Regional Airport, The OKK design team was tasked with creating distinct dining experiences for Ancora Artisan Coffee and Tea, Metcalfe's Local To-Go, Madtown Gastropub, and Vinoteca Wine and Tapas.

Deciem Cosmetics - Chicago, IL

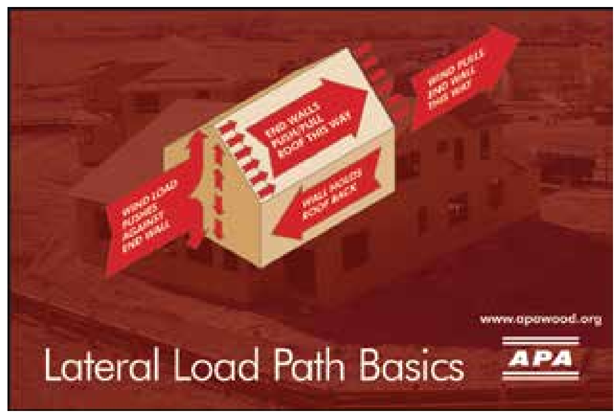
In collaboration with Deciem, OKK implemented the first Midwest location to the Wicker Park neighborhood of Chicago. Situated within a century old building, the raw urban design creates a unique, sophisticated experience, embracing the tension of past and present.

Lateral Load Path Basics: Tracing a Wind Load through a Wood-Frame Structure

BY: CATHY SCARINCE, P.E., APA – THE ENGINEERED WOOD ASSOCIATION

Buildings overturned. Roofs lifted. Structures separated from the foundation. The aftermath of a major storm is a sobering sight. The good news is that these events are statistically rare. In fact, roughly 95 percent of tornadoes are weak enough for a well-built structure to withstand. As tornado and hurricane season approaches, wind-resistant construction is a timely topic for designers.

Understanding how lateral loads affect the structural integrity of a building is critical for wind-resistant design. APA – The Engineered Wood Association provides an overview of the complete lateral load path, the importance of a complete load path for resilient construction and common framing errors to avoid.



Types of Structural Loads

When designing a structure, it is important to assess all structural loads and create a load path for each. Every connection between structural elements must be designed so that each element transfers the applied load from one to the next until they reach the foundation and exit the structure. This transfer of force through the structure is called the **load path**.

There are two kinds of load paths—vertical and lateral. For a structure to be properly designed, both paths must be complete.

The **vertical load path** takes loads acting on the structure in the "up and down" direction. These loads include the weight of the building itself, the weight of everything inside the building and variable loads such as those from snow.

The **lateral load path** takes loads that act in a direction parallel to the ground. The two major contributors to lateral loads are high winds and seismic forces.

When wind blows against a structure, the side initially receiving the wind load is the windward side (see Figure 1).

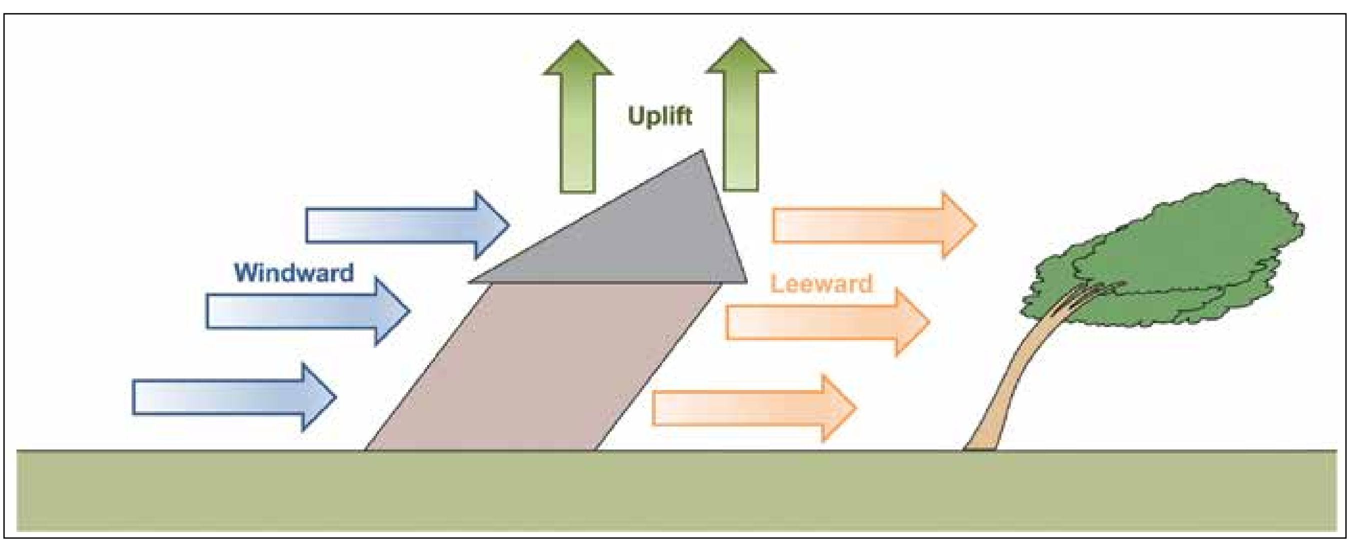


Figure 1. Additional forces acting upon a structure created by wind load

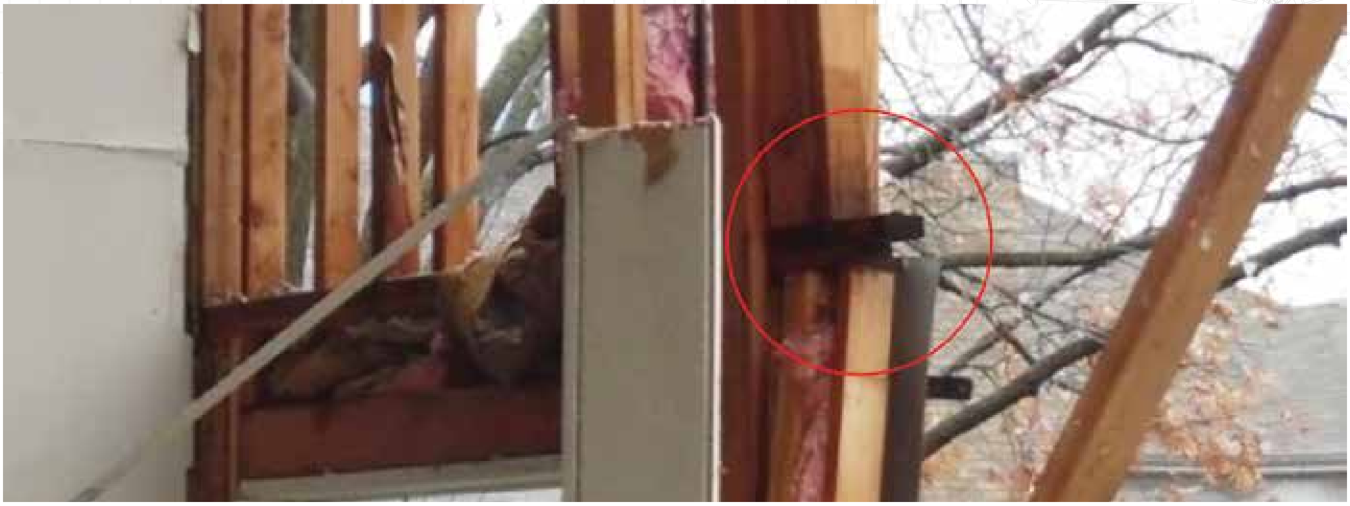


Figure 2. A hinged connection failure resulting from a lack of bracing

As wind blows against the windward side, it creates two additional loads—a horizontal suction force that occurs on the leeward side (the side opposite windward) and a vertical suction force (uplift load) that occurs on the roof.

Bracing for Lateral Loads and Uplift

A major part of the lateral load path is the bracing system. A stud wall with no bracing, such as wood structural panels, has very little stiffness. When a load is applied to a wall without bracing, the nailed joints between the studs and top and bottom plates act like hinges (see Figure 2). These connections are called "hinged connections," as they easily bend.

When a panel product is attached to wall framing, the panel's strength is imparted into the wall assembly—which is why building professionals often use wood structural panels for bracing. The panel's strength and durability resist acting forces and maintains its shape. A panel's ability to resist loads depends on the physical properties of the panel. The more panels added to a wall line and the more rigid each one is, the more resistance and strength the wall gains.

Bracing makes hinged connections rigid and transfers the lateral load through the panel to the foundation. The panel becomes part of the lateral load path. Other types of bracing, such as let-in bracing or portal frames, work similarly by creating a rigid connection and a path for the lateral load to exit the structure.

Fasteners used to attach a panel to the framing will also affect lateral resistance of the wall. Closer fastener spacing and larger fastener size improves wall strength and resistance.

How Lateral Loads Move Through a Structure

When wind blows against a structure, it blows against the cladding (see Figure 3). Wind load is transferred from the cladding to the wall assembly, which spans from floor to floor or floor to roof. The wind load is then delivered to the nearest roof or floor sheathing. The lower half of the wall assembly on the first floor transfers wind load to the

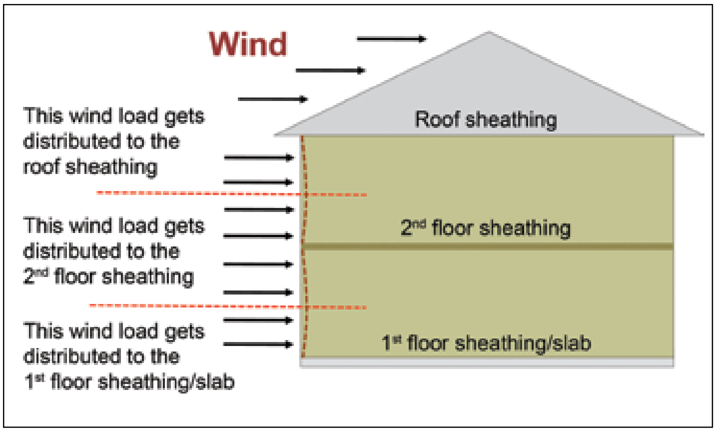


Figure 3. Shows how a multi-story structure distributes wind load

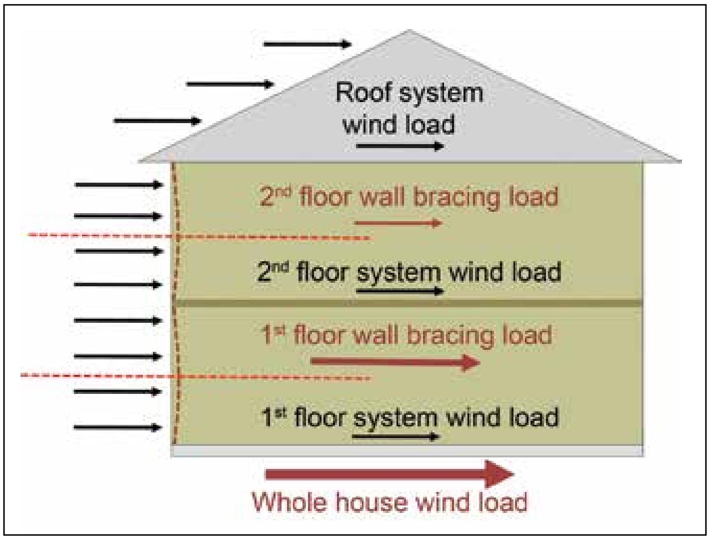


Figure 4. Shows accumulation of wind load as it moves through a structure

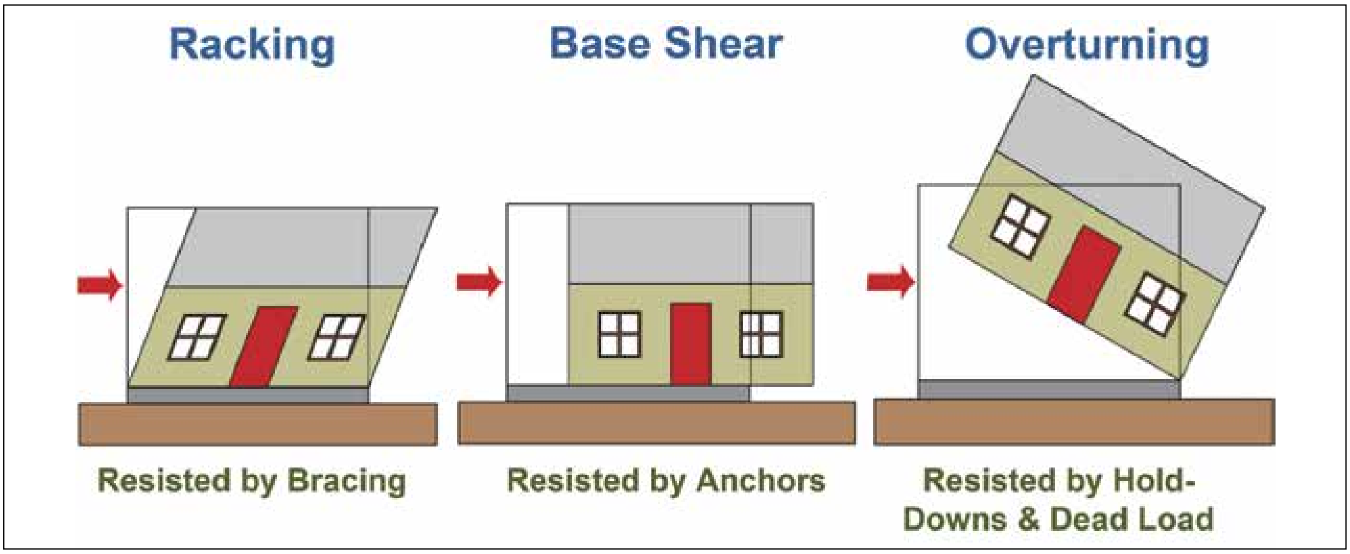


Figure 5. Shows whole house failures resulting from an incomplete load path

first-floor sheathing or slab. The upper half of the wall assembly on the first floor and the lower half of the wall assembly on the second floor transfers wind load to the second-floor sheathing. The upper half of the wall assembly on the second floor then transfers the wind load to the roof sheathing, which carries the wind load on the roof.

The wind load in the roof system is picked up by the second-floor wall bracing and is moved down to the second floor (see Figure 4). Here, it meets up with the wind load from the second-floor system. The roof system wind load and the second-floor system wind load combine and are picked up by the first-floor wall bracing, which moves this combined load to the first floor.

At the first floor, the combined wind loads meet up with the wind load from the first-floor system. This combined load now includes the wind load from the entire house. At this point, it transfers the entire wind load into the foundation of the house and the load path is complete.

It is important to remember that the wind load carried by the lateral load path increases at each level until it is at its maximum at the first floor. The lateral load path at the top floor of a 3-story home has far less wind load than at the first floor.

Load Path Failures

There are three types of whole house failures that can result from an incomplete or weak lateral load path (see Figure 5).

The first failure that can occur is racking. Racking occurs when the wall bracing of a structure is not strong enough to carry a lateral load from the upper part of the building to the foundation. The bracing fails and the shape of the structure shifts.

The second type of failure is base shear. This occurs when a building is not sufficiently anchored to the foundation. As the lateral load attempts to move from the framing members to the foundation, the connection between the building and the foundation fails and the structure slides off the foundation.

The third type of failure is overturning. Overturning results when the building is not sufficiently anchored to the foundation with hold-down devices. When a shear wall is bolted soundly to the foundation with base shear anchors (and thus prevented from sliding), the force acting on the shear wall at the roof level and second-floor level act to overturn the shear wall. Hold-downs resist overturning and prevent the wall from tipping.

Common Framing Errors to Avoid

Wind loads do not just produce lateral loads; they also produce uplift loads, which produce a vertical uplift, or suction, on the roof. Buildings must be designed to transfer these uplift loads to the foundation as well.

Roof sheathing is a critical part of the lateral load path. Losing roof sheathing during a high wind event puts the house and its occupants at greater risk. It can allow water, wind and projectiles to enter the house and cause more damage. It also removes the support provided to the studs that are attempting to transfer the lateral wind load to the roof system so that wind loads can move from the walls to the foundation. Without roof sheathing in place, the load path is incomplete, and the wind load cannot exit the structure.

Figure 6. A failed toe-nailed connection

A common error that results in loss of roof sheathing is incorrect fastener spacing. ***Always consult the International Residential Code (IRC) for proper fastener spacing guidelines***. Another common reason is installing staples with the legs perpendicular to the framing member, making it difficult to ensure that both legs engage the framing.

A third common error that results in a weak load path is a connection that depends on the strength of nails in withdrawal, such as toe-nailed connections. If you have ever pulled a nail out of a board, you know this is fairly easy. Even if the uplift load under the wind speed specified by the IRC allows for a connection to be toe-nailed, a high wind event can easily exceed this load and cause a failure at this connection (see Figure 6).

A common example of this is when the second-floor wall sheathing stops at the base of the bottom plate, while the first-floor sheathing stops just below that. In other words, the two pieces of sheathing do not attach to a common framing member. When the wind load moves through this connection, it goes through the nails attaching the bottom plate to the second floor, before moving into the first-floor sheathing. The connection of the bottom plate to the second floor is face nailed. This means the connection depends on the strength of the nails in withdrawal, resulting in a weak connection, a weak load path and a location for potential failure. Using simple metal connectors instead offers a more secure option.

Want to learn more? **APA's Lateral Load Path Basics: Tracing a wind load through a wood-frame structure** webinar provides additional information and visual examples and answers some commonly asked lateral load path questions. The webinar has been approved by AIA and ICC for continuing education credits and is available for on-demand viewing at apawood.com/webinars Linked to: https://bit.ly/3kyyKrn

CE Test Questions
Lateral Load Path Basics

1. Which of the following is a type of load path?
   a. Longitudinal Load Path
   b. Lateral Load Path
   c. Vertical Load Path
   d. Both B and C

2. A connection that has no rigidity and bends easily is called a _______________.
   a. Moment connection
   b. Semi-rigid connection
   c. Hinged connection
   d. Flexible connection

3. The purpose of a load path is to:
   a. Prevent water intrusion
   b. Provide a path for loads to move down to the foundation of a structure
   c. Identify the most appropriate cladding material
   d. Determine the best site location for a structure

4. Which of the following could create a weak or incomplete load path?
   a. A connection that depends on the strength of nails in withdrawal
   b. Wall sheathing that is not attached to a common framing member
   c. Improper orientation of staples attaching sheathing to framing members
   d. All of the above

5. Which of the following is NOT a whole house effect of a lateral load path failure?
   a. Unhinging
   b. Overturning
   c. Racking
   d. Base shear

6. What is the purpose of hold-downs?
   a. To prevent filing cabinets from blowing over
   b. To allow for the use of powder actuated fasteners to attach the exterior wall sill plates
   c. A replacement for anchor bolts
   d. To prevent overturning of a structure

7. Where is a wind load at its maximum in the load path of a three-story house?
   a. First floor
   b. Second floor
   c. Third floor
   d. Roof

8. What type of failure is commonly caused by uplift loads?
   a. Base shear
   b. Hinge failure
   c. Loss of roof sheathing
   d. All of the above

9. Which of the following can be the result of a loss of roof sheathing?
   a. A weakening of the lateral system of the structure
   b. Water and wind damage to the interior of the structure
   c. Increased occupant exposure to projectiles
   d. All of the above

10. A wind load on a house creates:
    a. An uplift load on the roof
    b. A suction load on the opposite side of the house
    c. Both A and B
    d. None of the above

ALA/CEP Credit: This article qualifies for 1.0 LU/HSW of State Required Learning Units and may qualify for other LU requirements. Valid through June 2023.

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Wood Frame Construction Recommendations for Tile and Stone Floors

Building design guidelines and additional measures to accommodate sustained concentrated loads

BY: DR. FRANK WOESTE, P.E., PROFESSOR EMERITUS, VIRGINIA TECH

This article was derived from an article by Dr. Frank Woeste, P.E., Professor Emeritus at Virginia Tech and a wood construction consultant, and Peter Nielsen, cofounder of MGNT Products Group, LLC, a consulting and product design company for the tile and construction industries. This version of the information was generated by NTCA to provide a brief overview of their wood framing recommendations for hard surface flooring. The full article is available at: https://componentadvertiser.com/Portals/0/EasyDNNnews/Uploads/72/AllThingsWood%201806.pdf or https://bit.ly/2TRkT0S.

Reprinted Courtesy: **TileLetter, February 2019, pp60-68**

Two kinds of designers are involved in construction: design professionals responsible for performance and structural integrity and interior-focused designers responsible for the final appearance. Although they have very different roles, some of their decisions should be coordinated. For example, they should join forces when hard surface flooring – like tile and stone – is selected since these materials are on the heavier end of the spectrum, requiring more robust structures to support their weight. Hard surface floors are also more susceptible to problems than flexible floor types are when the weight of a concentrated load, like a dreamy kitchen island, is not adequately designed for. This article provides guidelines to design professionals for specifying adequately supportive structures for tile and stone floors in new construction wood frame buildings.

Designing for dead load

A key factor is "dead load," which is the cumulative weight of everything that a structure needs to support continually, including the flooring. When the actual dead load in a wood frame structure exceeds what was designed for, it over stresses the wood framing and over time can result in excessive "creep deflection," a permanent bowing of the structure. An easy way to envision creep deflection is to picture an overloaded bookcase. The shelves will bow over time – and permanently – under the weight of the books.

Similarly, a home or building can be overloaded, for example by being structurally designed for luxury vinyl planks (LVP) flooring rather than the interior designer's vision for ceramic planks. Some creep deflection is inherent and expected in wood frame construction, and not an issue for tile and stone floors. Overloading is what causes excessive creep deflection, possibly beyond what a tile or stone floor can withstand. Potential for and severity of a tile flooring issue because of excessive creep is tied to the amount of overloading and passage of time.

Sagging book shelves illustrate the concept of creep deflection; over time, shelves that are not strong enough for the weight they are loaded up with will bow.

Weighty design features, like large kitchen islands with solid surface tops, and heavier-than-usual appliances, such as a Sub-Zero refrigerator, are examples of concentrated dead loads that additionally need to be designed for, structurally. This is true regardless of flooring type, but something to be especially aware of when the floor will be ceramic or stone tile. That's because rigid, hard surface flooring materials are where concentrated overloading of a wood frame structure might become visually apparent, in the form of cracks, due to their inability to bend.

Baseline weights to factor into dead load

To facilitate adequate structural design for tile and stone floors, the *TCNA Handbook for Ceramic, Glass and Stone Tile Installation* provides the approximate per square foot weight of tile, stone, and installation materials, individually by material type (i.e., 1/2" thick cement board weighs 4 lbs. per square foot) as well as cumulatively by installation method (i.e., Method F144 weighs 8 or 10 lbs. per square foot, depending on whether 1/4" or 1/2" cement board is used). Using this information, located in Appendix B, building designers can arrive at accurate dead loads.

Accurate dead load is important because dead load influences the maximum span (length) of wood joist that can be used, per International Residential Code (IRC) guidelines. These guidelines provide maximum allowable joist span separately for an assumed dead load of 10 psf and 20 psf. Remember though, dead load is not just the flooring. So, while the separate span tables may be generally used according to flooring type (e.g., follow guidelines for 10 psf dead load when lighter floorings like carpet will be installed, and guidelines for 20 psf dead load for tile and stone), one should not assume they apply in all situations. Additional dead load could be present from other elements, causing total dead load to exceed 10 psf where a lighter floor finish will be installed or exceeding 20 psf where ceramic or stone tile will be installed. Not to mention, some tile and stone installation methods on their own exceed 20 psf, which demonstrates that IRC span tables aren't always enough.

Research indicates that an even more important consideration for tile and stone floors in wood frame construction is the thickness/stiffness of the subfloor, although not necessarily because of system-creep-inducing overload. Rather, the subfloor sheathing could simply deflect (bend) between joists under an applied load more than a hard surface tile can withstand, even if the sheathing is otherwise adequate within the full design scheme to support the expected loads.

This industry-specific consideration, not addressed in IRC, is addressed in the *TCNA Handbook* through more stringent deflection limits. Specifically, the *TCNA Handbook* limits deflection under concentrated loads, whereas IRC deflection limits are for uniform loads. What this means for building designers is that the minimum subfloor thickness/stiffness required by code for strength may not be enough. A thicker/stiffer subfloor may be needed to limit subfloor bending between joists. More robust framing may also be needed, again to go beyond the strength consideration to further limit bending related to concentrated loads. The heavier and more concentrated the load, the greater the need to beef up the floor framing to limit bending.

Table 5: Backer Board and Wood Underlayment Panel Methods

Method	Backer Board or Wood Underlayment	Weight (lbs. per sq. ft.)								
		Mortar Under Board	Plywood Underlayment	Backer Board	Radiant System Mortar	Tile Bond Coat	Ceramic Tile	Stone	Total Assembly* (Tile)	Total Assembly* (Stone)
RH130	15/32" Plywood		1½		1¾	1¼	4		7	
RH130	19/32" Plywood		1¾		1¾	1¼	4		7	
RH135	¼" CBU	1		2	1¾	1¼	4		10	
RH135	½" CBU	1		4	1¾	1¼	4		12	
RH135	¼" Cementitious-Coated Foam	1		½	1¾	1¼	4		8	
RH135	½" Cementitious-Coated Foam	1		½	1¾	1¼	4		8	
RH135	¼" Coated-Glass Mat Gypsum	1		1½	1¾	1¼	4		9	
RH135	½" Coated-Glass Mat Gypsum	1		2	1¾	1¼	4		10	
RH135	¼" Fiber-Cement	1		2	1¾	1¼	4		10	
RH135	7/16" Fiber-Cement	1		2½	1¾	1¼	4		10	
RH135	¼" Fiber Gypsum	1		1½	1¾	1¼	4		9	
RH135	⅜" Fiber Gypsum	1		2	1¾	1¼	4		10	
RH135	½" Fiber Gypsum	1		2¾	1¾	1¼	4		11	
F142	19/32" Plywood		1¾			¾	4		7	
F143	15/32" Plywood		1½			1½	4		7	
F143	19/32" Plywood		1¾			1½	4		7	
F150	15/32" Plywood		1½			1¼	4		7	
F150	19/32" Plywood		1¾			1¼	4		7	
F160	⅜" EG/LWP		1½			1¼	4		7	
F144	¼" CBU	1		2		1¼	4		8	
F144	½" CBU	1		4		1¼	4		10	
F144	¼" Fiber-Cement	1		2		1¼	4		8	
F144	7/16" Fiber-Cement	1		2½		1¼	4		9	
F146	¼" Coated-Glass Mat Gypsum	1		1½		1¼	4		8	
F146	½" Coated-Glass Mat Gypsum	1		2		1¼	4		8	
F170	¼" Fiber Gypsum	1		1½		1¼	4		8	
F170	⅜" Fiber Gypsum	1		2		1¼	4		8	
F170	½" Fiber Gypsum	1		2¾		1¼	4		9	
F175	½" Cementitious-Coated Foam	1		½		1¼	4		7	

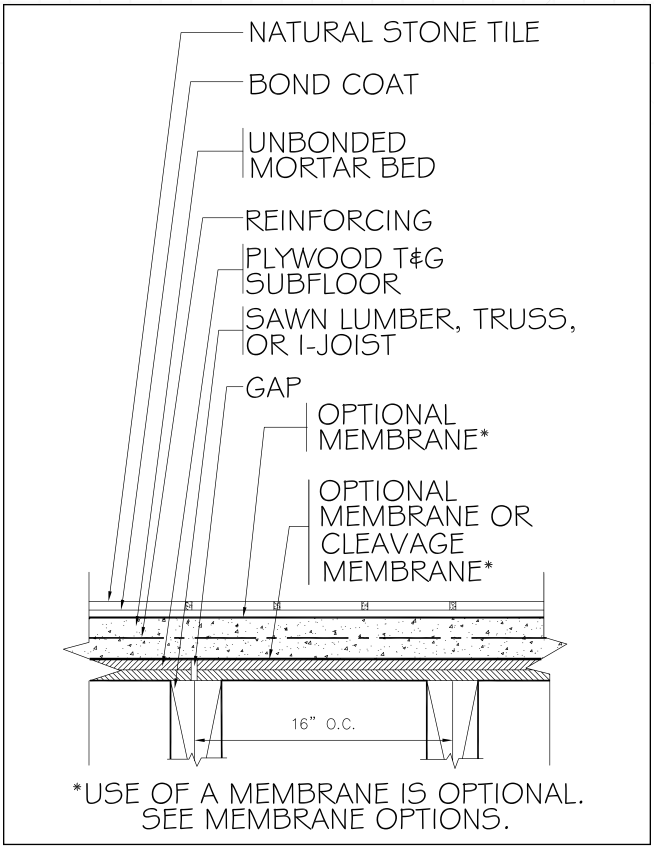
*Note: For presentation purposes, total assembly weights are rounded to the nearest pound, and individual component weights are rounded to the nearest ¼ pound. However, non-rounded values were used for all calculations.

Appendix B of the TCNA Handbook is a compilation of material and system weights.

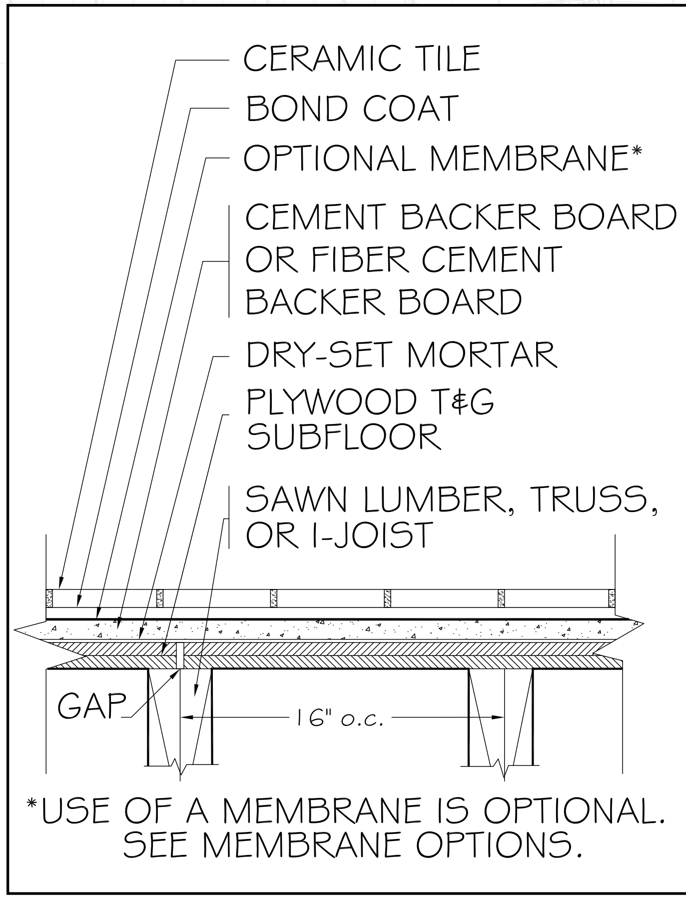
An example: the large kitchen island

As an example, consider the large kitchen island scenario. With 30mm (3cm) thick stone tops and normal contents being stored inside, this popular kitchen feature could present a 40 psf dead load, calculated by using the square footage of the island's footprint as the area. In service, the framing and subflooring directly below and around the island is subjected to a substantial sustained load that produces creep deflection, but only in that area. As such, for hard surface floors, building design should incorporate more stringent framing requirements in areas where concentrated dead loads are expected, with kitchen islands a particular focus because of their widespread use.

It's not practical, though, to expect a customized calculation and specification for every kitchen island. A more practical approach would be to follow general guidelines that are widely effective and easily incorporated into documents and processes.



Method F141 Stone weighs 23pounds/square foot with a 1-1/4-inch mortar bed.



In Method F144, the wood subfloor can be 19/32 inches thick or 23/32 inches thick and relates to whether the installation methods falls under the residential or light commercial service rating.

Since large kitchen islands are frequently paired with ceramic or stone flooring, it makes sense to have the following structural design parameters specifically attached to them:

- For solid-sawn and I-joists: joist spacing beneath kitchen islands shall be reduced by one-half and indicated on the joist framing plan.
- For floor trusses: floor trusses beneath kitchen islands shall be doubled.

Designing for hard surfaces checklist

These suggestions are in addition to the following recommendations, some of which were provided earlier in the article but are restated here in the interest of supplying a complete “designing for hard surfaces checklist”:

➢ Prepare construction documents that contain:
  - the *TCNA Handbook* installation method
  - the weight of the installation method (from *TCNA Handbook* Appendix B)
  - the footprint of the kitchen island (and other heavy equipment)
  - a specification that joists shall be doubled, or spacing reduced by half, beneath an island

➢ Require floor system designs based on a “total load” that includes the actual weight of the installation method

➢ Upgrade subfloor thickness (above what is given in the *TCNA Handbook* method being used)

➢ Require strongback bracing for floor trusses to minimize differential deflection of joists

➢ Offer customers (homebuyers, owners) floor framing and subfloor “upgrades” for added protection against the likelihood of tile and grout cracks and annoying floor vibrations

The generalized “overbuilding” that some of these recommendations suggest may not seem an easy ask in an industry that prizes value engineering. But they do have enormous value – not in material cost savings – but from having effective boilerplate solutions to a common design challenge that are also practical with respect to implementation. Tile and stone professionals would be well served if these guidelines were better known and understood by building designers.

Top 10 Frequently Asked Questions about Air Barriers

BY: AIR BARRIER ASSOCIATION OF AMERICA (ABAA)

Building Enclosures require proactive actions by each member of the Design and Construction Teams to deliver a building that meets stated performance requirements. Air Barriers are a critical component to meeting those requirements. This document addresses ten of the most Frequently Asked Questions (FAQs) that Architects, Engineers and Construction Managers/General Contractors ask with respect to air barriers. The answers that follow provide insight for these team players to minimize building enclosure risks and provide assurance that their projects are proactive in meeting the performance requirements.

1) How do the Design, Bidding, Pre-construction and Construction processes impact air barrier performance?

Design is critical to the specification of the air barrier material to match up with the project location, occupancy, schedule for installation, and integration of the project specifications to assure that the continuity of the air barrier is maintained from design thru construction. The project specification would include the performance field testing requirements per the ABAA Quality Assurance Program (QAP).

Bidding is critical to the selection of a CM, GC and air barrier installer that have the collective experience and knowledge to plan and implement a successful air barrier installation on the specific project pursuant to the specified ABAA QAP.

Preconstruction is critical to the air barrier to provide the submittals, shop drawings, mock up, first work, and coordination scheduling for all trades and the training/demonstration during the mockup performed by the air barrier installation crew to assure proper transitions and terminations.

Construction is critical to the air barrier for scheduling, work sequence, weather protection, protection from other trades, and maintaining continuity of the air barrier including at the interfaces of the waterproofing, fenestration, penetrations, parapets, and roofs.

Each of these processes are equilaterally important to the performance of the air barrier and the attainment of the stated objective for the building. The design should be established, critiqued with input from related trades, and executed with a verification plan to ensure that the end product meets the owner's performance requirements.

2) Do building envelope specifications need to be integrated with the air barrier specification?

Yes, all specification sections for work that interface with the air barrier system must be integrated to establish and maintain the integrity and continuity of the whole building air barrier strategy. For example, cladding and insulation manufacturers/subcontractors need to know about air barrier manufacturer requirements for penetration treatments, adhesive compatibilities, etc. Lack of an integrated specification to assist in contractor coordination may lead to inadequate substrate installation, incompatibilities in product selection, or inadequacies in the installation, all of which affect the final performance of the air barrier.

3) What strategies can be implemented in the project specification to facilitate the CM/GC's ability to enforce specified installation instructions and to ensure compliance with the specified performance criteria before covering the air barrier with an exterior cladding?

Assurance that the air barrier system will meet the required field performance starts with a quality set of details and coordinated technical specifications, including the ABAA Quality Assurance Program, to help place the general contractor in the best position to provide a successful installation. However, a number of strategies can also be employed in the "Quality Requirements" specification (Section 014000) to ensure coordination and verification of the required field performance of the air barrier. These strategies include the following:

1. Listings of responsibilities for each member of the construction team (Owner, Architect, CM, GC, CxA, Subcontractors, Manufacturers, Independent testing Agencies, etc.)

2. Require the CM/GC to run a building enclosure coordination preconstruction meeting attended by the Architect, third-party consultant, air barrier manufacturer, installer, and onsite representatives of trades that will interface with the air barrier material.

3. State the requirements for stand-alone or in-place approved mock-ups to demonstrate acceptable installations of the air barrier that can be referenced throughout the project for comparison.

4. State what testing of mock-ups and in-place work will be employed with clear references to industry standard test procedures and acceptance criteria.

4) Who is responsible for the air barrier submittals and shop drawings? Should the submittals and shop drawings be composed solely of manufacturer standard details?

The general contractor and sub-contractors are responsible for providing project specific shop drawings that include manufacturer input. All details relevant to the project should be provided including, but not limited to, intersections with other envelope assemblies, details showing how gaps in the construction will be bridged, inside and outside corner transitions, how claddings are secured with the air-tightness maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed. The shop drawings need to be reviewed and coordinated with related trades and reflect the sequencing of construction.

Manufacturer standard details can be used as shop drawings when they mimic the jobsite conditions. However, when the manufacturer standard details do not mimic the jobsite conditions, they are to be modified by the contractor with input by the manufacturer, to replicate project-specific conditions.

5) Do pre-construction meetings for the air barrier have value? When should an air barrier pre-construction meeting be scheduled? What should the agenda be for the pre-construction meeting?

Yes, preconstruction meetings have value. They set the expectations for each participant and are an opportunity to raise questions and concerns. Having discussions up front, before the project is underway, is invaluable in heading off sequencing and compatibility issues that might otherwise become a later non-compliant issue.

The meeting should take place between 2-4 weeks prior to installation start-up.

The pre-construction meeting's agenda should be outlined in the specification and include a discussion of the substrate acceptability, material installation limitations, communication of special project site considerations, discussion of installation sequencing and logistics, interface detailing review, discussion of constructability issues, response to questions provided by the subcontractors, and how non-compliant conditions can cause an interruption of the work (and so should include a procedure for restarting the work after corrections have been made).

6) Why should site constructed mock-ups be required in project specifications?

It is necessary to establish that the assembly is a repeatable representation of the site specific work that meets the specified performance requirements, demonstrates material installation, and addresses work sequencing and workmanship.

7) Who is responsible for the coordination necessary for the successful installation of the air barrier? How is coordination implemented?

The CM/GC is responsible for the air barrier installation coordination. Implement the coordination effort by stating in the Division 1 specifications that the CM/GC is required to provide a specific coordinator responsible for sequencing the air barrier/building enclosure interfaces that involve multiple subcontractors and manufacturers.

8) Who should be responsible for verifying the continuity of the air barrier installation and for field performance testing?

The specifications should state that the CM/GC shall be responsible for the QC/QA of the air barrier installation and for creating and implementing a strict documentation program which includes a reporting system to inspect and track non-conforming installations. Repairs to the air barrier should be conducted in accordance with manufacturer requirements and become part of the documentation.

9) Who is to provide the performance verification of the air barrier installation?

Pursuant to the performance verification provisions of the ABAA QAP, verification and documentation of the air barrier installation information rests with the Installer. Within that responsibility, the Installer is to provide daily site observations, and adhesion, thickness, and density testing, as applicable, of the installed product. Information from these daily activities is to be recorded in daily logs by the Installer and is to be accessible to all members of the team. The role of the ABAA auditor is to examine the Installer's records, verify the installer testing and conformance to the manufacturer's installation requirements, and perform independent testing.

The CM/GC is responsible to assure that the applicator follows the ABAA QAP, for coordination of trades and their work sequences, and protection of the installation.

If the ABAA QAP is not specified, the responsibility of verifying air barrier performance falls to the Designer who will specify performance criteria and testing standards, and who will conduct periodic site observations to verify that the air barrier installation is per manufacturer's recommendations and project specifications. The Designer's specification should note that the owner will contract with a third party entity for the independent inspection and testing.

10) Are through-wall flashings part of the air barrier system?

Through-wall flashings (TWFs) and air barriers are integral parts of a successful water management system. Where TWFs are required to interface with the air barrier to provide continuity of the water management system, they must also be integrated in such a way as to maintain continuity of the air barrier. Selection of appropriate flashing materials and their related installation sequencing is crucial to their successful integration with the air barrier holding continuity and chemical/adhesive compatibility in mind.

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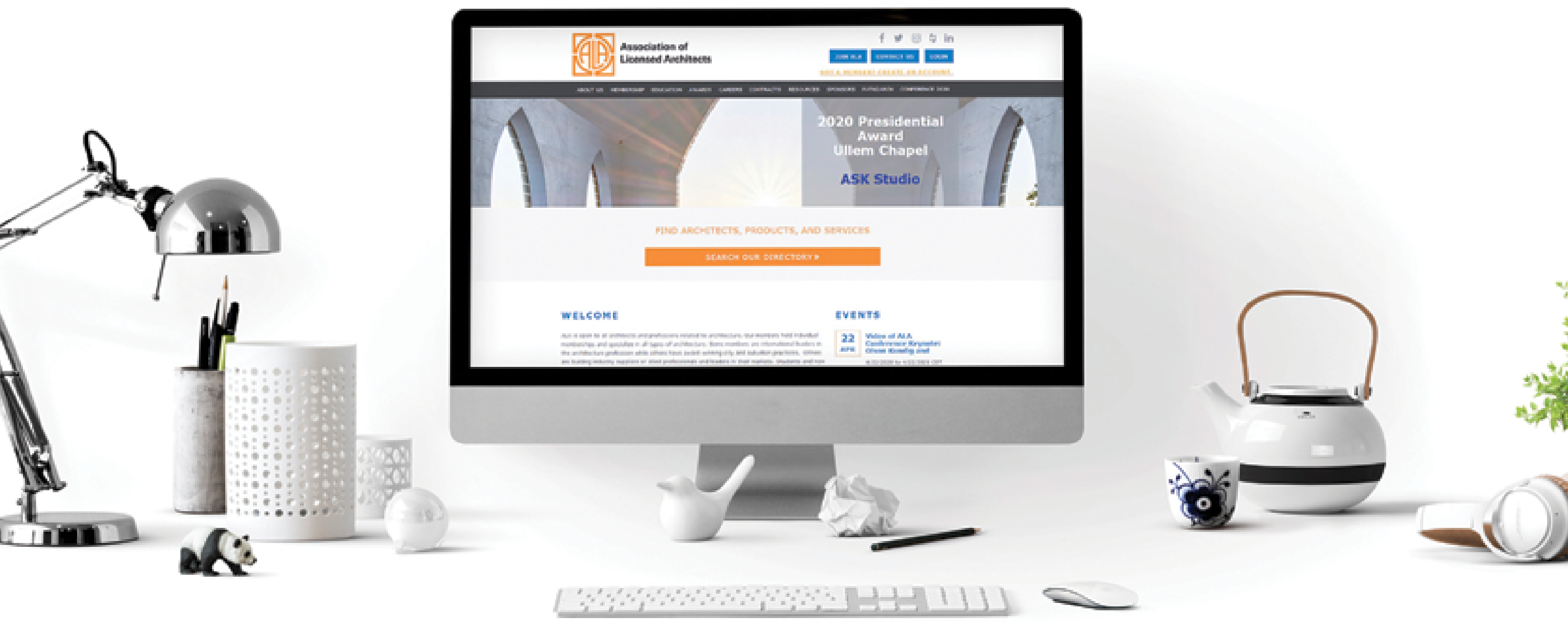

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