News of Interest for and from the Connecticut Association of Home Inspectors, Inc.

CAHI MONTHLY NEWS

May 2017 Volume 10, Issue 5

Presidents Corner

On Tuesday May 9th, board members Al Dingfelder and Scott Monforte and I attended the Rally for Connecticut sponsored by the CT Realtors Association. It was attended by approximately 2500 people, mostly Realtors. Several politicians were also in attendance, from both sides of the isle. The purpose of the rally was to inform our lawmakers that we will work as a team to demand that they work together as a team to make Connecticut a place where people and business want to stay, and a place where new people and business will want to come.

CT Realtors Association president Michael Barbero kicked the day off talking about requesting bipartisan cooperation from our lawmakers to work with CT citizens and businesses to make CT the place to live and do business. He made it perfectly clear…if they do not cooperate, we will replace them.

The keynote speaker was UConn women's basketball coach Geno Auriemma. Unusual choice for a rally of this type? Not really. Geno told the story of how he got the job at UConn. He said the campus and facilities were so run down and in such poor condition, no one else wanted the job. He had nothing to sell to his recruits so he sold himself and his staff. And through persistence and hard work he built his legacy which made UConn, Geno and UConn women's basketball to what they are today…iconic!

His theme was teamwork. Old UConn was present day Connecticut. And he alluded to several levels of teamwork being needed to get Connecticut on track, to be a place where people want to come, live work and prosper. Connecticut citizens, business, business associations

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MONTHLY MEETINGS – Details & Info

CAHI's regular monthly meetings are held at the Best Western located at 201 Washington Ave (RT 5), North Haven. Meetings are free to members. Most meetings are on the fourth Wednesday of the month from 7-9pm. Guests are always welcome! Guests may attend 2 free monthly meetings to experience our presentations, meet our members, and receive a CE attendance certificate.

Joining CAHI may be done at anytime of the year through our Membership Page

INSIDE THIS ISSUE

Next Meeting!

May 24, 2017

Topic is

"Attic Ventilation"

presented by

GAF Roofing

(Rescheduled)

etc must team up. Politicians need to team up with them. If he was able to take a rundown state college and put it on the map, we could do the same with our state.

While I was there as a concerned citizen, our organization was present and represented. Mike Barbero was aware that we were there and expressed his gratitude for our attendance. I will be speaking with Mike in the future about many things, and will offer CAHIs assistance in making CT stronger. A stronger CT means more economic opportunities and more business opportunities for everyone.

I would like to thank Scott and Al for representing our organization at the Rally. They can always be counted on to go the extra mile for CAHI.

When asked what makes UConn women's basketball so successful in a TV interview…Geno said "other teams practice until they get in right…we practice until we can't get it wrong".

Stan

Not the Same Old Energy Audit!

We all remember the early energy audit where a grumpy old man like me showed up at your house and told you how badly insulated your home was. After 45 minutes he would give you a small box of light bulbs and be gone to collect a $50 to $75 fee from a utility company. Pretty much a waste of time and no real work done.

In recent months, I have gotten advertising with my utility bills that offered low or no cost energy improvement assistance. Straight to the recycle bin; not worth my time. Last month my son arranged to have CMC Energy Services look at my home. They did not look; they started fixing several issues I knew about and others I had not even thought about. You know the mechanics car is the last one to get the oil changed.

Three well equipped men were positively engaged for SIX hours on a house that is only 20 years old. They were in the attic, basement and all levels in between. They briefed me on every step they were taking and answered all my questions. They sealed, insulated, weather stripped, replaced and more. At the end they provided documentation for more utility subsidized energy improvements. The cost to me was absolutely ZERO DOLLARS! Wallingford Electric paid for everything with the monthly fees charged to me and a lot of neighbors over many months. MY guess is that the cost was well over $1000 and the utility company paid it!.

A CMC Energy Services advertisement for the same service is provided below. There is a modest "copay" for customers of other utility companies. This service would be great for a new home owner or one getting ready to list their property.

Anxious about your new home?

Should I add more insulation? Is my house drafty? Will my house be cold in the winter and hot in the summer? Will I be able to afford my heating and cooling bills? Will my family be comfortable in this home? A new homeowner may have a plethora of questions, but at the end of the day their main concern is quality of life.

CMC Energy Services™

This is where we come in

As a participating contractor in the Connecticut Home Energy Solutions Program, we provide a service that will answer and address all the above questions. Plus, our technicians are trained to provide on the spot fixes for drafts, LED lighting, and water saving measures. Your house will be more comfortable and on average our customers save $300 or more on their energy bills annually.

Our service

Two trained and BPI (Building Performance Institute) certified technicians spend 4 to 6 hours increasing the efficiency of your home. By performing various diagnostic tests the technicians can identify problematic areas. They will stop drafts and air seal the home, install up to 25 LED's, water saving measures, and provide customer education and access to rebates for further energy efficient upgrades all for ONLY $124!

We can help! Call us or visit our website to learn more about our services and the Connecticut Home Energy Solutions Program.

888-403-3500
www.cmcenergy.com/CT
CMC Energy Services, Inc.
60 Church Street, Suite 3D, Yalesville, CT 06492

10 Quick Tips to Grow Your Home Inspection Business

By Chris Chirafisi, Product Manager at AHIT

Home inspection marketing is one of the most significant factors in the success of a home inspection business. Unfortunately, it can also be one of the most complicated. Putting effort into marketing will help ensure that your home inspection business grows. It takes effort and knowhow. Here are 10 quick tips.

1. Marketing: A successful home inspector is a business owner who utilizes proven marketing tools and methods to promote the services they offer to potential clients and referral sources.

Understanding your competition and finding your niche in your market will help ensure your success.

2. Roadmap: Few people get to their desired destination without a plan.

Make a business/home inspection marketing plan and stick to it! A good marketing plan is a document that brings together your market research. This helps you figure out exactly where your business needs to go and how it is going to get there.

Your plan should include objectives, details of the current market, a clear-eyed analysis of your strengths and weaknesses, opportunities and challenges and, last but not least, your step-by-step plan for achieving your objectives. This plan should be flexible and adaptable enough to meet the changing conditions in the market. A good marketing plan will save you money in the long run by cutting out unnecessary expenses, while at the same time, presenting you with new opportunities. If you don't have a good marketing plan you may not be able to arrive at the destination you set out for.

3. Face-to-Face Marketing: Research shows that face to face marketing is one of the cheapest and most efficient ways to get your name out in the market.

Face to face marketing is cost-effective for reaching large numbers of people in a short time. Any activity must grab the prospective client's attention quickly, as the window for interaction is short. Grab their attention and try to maintain it long enough for them to engage in the message you are delivering. Continue getting out in front of people when money gets tight, as this is a low cost and effective way to market yourself. Opportunities are out there, you just need to find them.

4. Website Presence: A website is an essential and cost-effective way for potential clients to learn more about you and your company 24/7.

Consider a website that has video capability. It is much more dynamic and consumer friendly. Last but not least, social media such as Facebook and LinkedIn groups is another great way to get your name out there.

5. Manage Your Time: good time management allows you to take some measure of control over your marketing.

Pre-planning your marketing activities will help order your days. Set a goal as to what you want to achieve daily and get at it. This will help you control your destiny. Time management also helps with productivity and confidence and it can make your daily tasks more fun. As the saying goes- your tomorrows depend on what you do today. Most importantly, time management gives you the ability to meet your goals. It is nearly impossible to meet marketing goals when you fail to properly manage your time. If you let it, something will always come up or you will spend too much time on tasks that are more fun or less significant, eating away at time that could go toward meeting your goals. Remember if you fail to plan, you plan to fail.

6. Stay Organized: keep your list of prospects, clients, and contacts organized.

The most efficient way of organizing these days is through the use of computerized software. Set up reminders for follow up calls, meetings, letters, appointments, or anything important you may have out there. Use this software to track which sources, ads and letters are producing the most productive leads. Take note of how much it's costing you to find a lead in your market, and how many leads it takes you to find a customer. Keep your database clean and accurate. Become disciplined about keeping it organized and up to date. Try Googling programs that offer "drip marketing," or an automated and usually turnkey way to reach out and follow up to prospects on a regular basis.

7. Know Your Market: knowing your local market will help you determine your pricing, competition and your niche.

Get to know the Realtors in your area. Collect flyers and brochures of other inspectors in your market. Check the Internet, professional home inspector association websites and ask the agents/ Realtors for a list of preferred inspectors in your area. Know and evaluate your competition. What report format are they using? Are they using computerized reports or paper? Are they delivering their reports onsite or one-two days later? Are they using digital photos to give the client a visual description on what they are buying? Does your competition have all the insurance that you do, such as E&O insurance with Realtor/agent indemnification and general liability coverage? Are they as professional as you? Did they go through a formal training program prior to becoming a home inspector? Is their pricing fair? When pricing your services focus on trust and professionalism. The quality of your service counts. Remember to verbalize that quality to your client. Add value to your inspections versus reducing the price. People buy when they are comfortable with what they are purchasing regardless of price.

8. Word of Mouth Marketing: It Works!

Word of mouth marketing is the best way to get your name out there. When performing an inspection go above and beyond from start to finish. Create a positive experience that exceeds the customer's expectations and that will cause them to say "Wow!" Make your company worthy of referrals. Decide what it is that you want people to say about your service, provide a quality service and most of all treat people with respect. Give people something to talk about and ask them to spread the word. Word of mouth marketing fuels success.

9. Kick Butt! Successful marketing can take up to 20-30 hours out of your week if you want to be a full time inspector (five to seven hours if you are part time).

Be aggressive! Meet with as many Realtors as possible. Give out five to 10 business cards per day. Join Realtor associations or boards. Go to business luncheons, and provide breakfast or lunch to targeted real estate offices. Stop in at five to 10 open houses per week.

10. Stay positive! It is very important to stay positive through any and all obstacles that you may encounter through your life and career.

Seek help and support from family and friends and you will reach your business goals before you know it!

About the Author

Chris Chirafisi, a licensed home inspector in three states, has built two home inspection companies and has performed more than 4,000 inspections. Chirafisi is currently a senior trainer and product manager at AHIT, the largest home inspection training company in North America, with over 70 training facilities. AHIT also offers InspectIT, an industry leading reporting software.

Avoiding the Most Common Construction Defects

Here's what to look for and how to prevent problems

BY CHARLES WARDELL

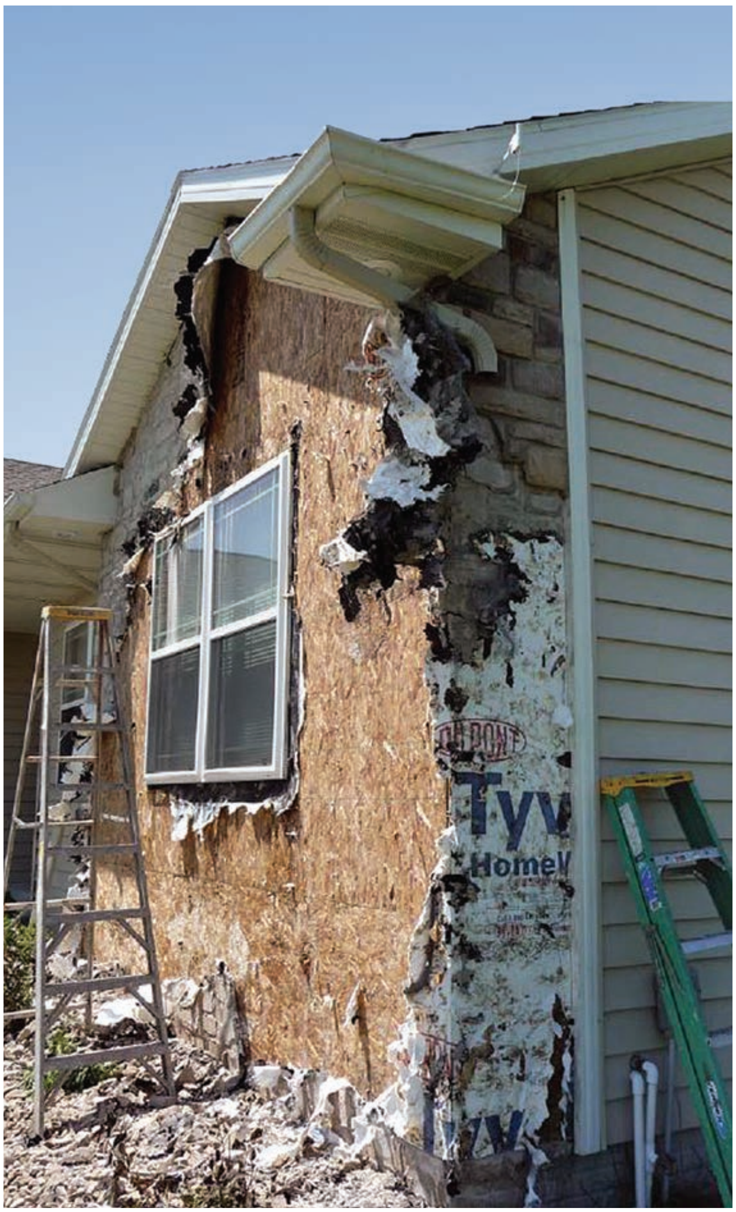

Photo: Mark Parlee

Callbacks and construction defects have made the national news again. A November 16, 2016, *Nightline* segment detailed shoddy construction in production homes around the country. The program, replete with teary homeowners, searched out only the most dramatic errors, including one home with melted siding and another with more than 800 drywall nail pops. The intended message was clear: Builders are doing shoddy work.

Smart builders will use such reports as an opportunity to differentiate themselves. Problems like the ones *Nightline* exposed are rare among pros who are serious about great work and great service. But even among serious builders, problems do occur. Which ones are most common? *JLC* asked industry pros—contractors, engineers, consultants, and home inspectors—around the U.S. to describe the most common callbacks and defects they see in their markets. Their responses ranged from visible, often minor issues to serious problems that can remain hidden for years before leading to catastrophic failure. What follow are the most-cited problems.

Poor detailing and missing flashings led to catastrophic failure of the cladding on this Iowa home (see "Rescuing a Manufactured-Stone Wall," by Mark Parlee, Dec/08). Big problems often result from small details that would have added minor costs initially, but require thousands of dollars to remediate.

AESTHETIC ISSUES

Not surprisingly, most everyone mentioned drywall cracks and nail pops. "These are cosmetic issues but some people come unglued over them," Skip Walker, a builder in San Bruno, Calif., says. The best way to avoid them is by paying for good work. "We tried a less expensive drywaller on a few jobs, but those jobs had problems," he says, adding that the bargain drywaller took shortcuts like skipping coats and not leaving sufficient drying time between coats (mud needs about three days to dry in his area in winter).

Drying the framing helps with a range of cosmetic issues—not only drywall pops, but also cracks in drywall around window heads, squeaks in floors and stairs, interior trim joints that open up, and caulking that pulls and cracks.

Fast construction schedules accelerate those problems, because the house framing barely has any time to dry on its own before the next stage of construction begins. Such "short cycle" houses are notorious for having a large number of drywall cracks and other cosmetic defects after a year of heating and cooling by the occupants.

The problems are commonly attributed to "settling," but builder Matt Risinger, of Austin, Texas, says the more likely cause is wood movement produced by the frame drying. Before hanging drywall, he lowers the framing's moisture content to 12% or so (checking with a moisture meter), using fans (see "Drying Wet Framing," by Matt Risinger, Jun/13).

After the drywall is taped, Risinger employs a series of industrial dehumidifiers to absorb moisture from the curing mud (as well as from the slab and other materials used in the house) before installing woodwork. On some projects, he has also taken to setting up a full-size space conditioning system outside the building and running duct indoors to condition the home during the final stages of construction.

ANNOYING SQUEAKS

"Subflooring can be a big source of callbacks," Risinger says. He adds that the use of commodity OSB makes squeaks inevitable and suggests upgrading to 1 1/8 subfloor AdvanTech or Sturd-I-Floor. He says that in some 10 years of using engineered subflooring, he has had no callbacks due to floor squeaks.

Risinger also says that it's crucial to use a high-quality polyurethane subfloor adhesive. "Old school glues don't stick to the newer subfloor panel products," he says. Risinger prefers DAP Smartbond, or Huber's AdvanTech subfloor adhesive. Both are a foam that collapses to an ultra-sticky gel, which bonds well to any type of OSB or plywood.

Many problems like open woodwork joints and drywall cracking can be attributed to framing moving as it dries and woodwork absorbing moisture during construction. To prevent these problems, Matt Risinger checks the moisture content of wood framing, not closing it up until it's near 12% MC, and using fans to get it there **(1)**. Curing drywall mud and slab foundations can also pump moisture into an enclosed interior. Risinger reduces this moisture by using industrial dehumidifiers **(2)** or by installing a temporary HVAC system during construction **(3)**.

Photos: Risinger & Co.


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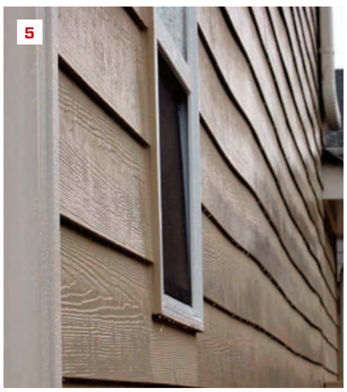
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Photos: 4–6, Steve Easley; 7, Greg Burnet

Wet sheathing may swell or buckle, telegraphing through roofing **(4)** and siding **(5)**. To prevent this, sheets must be installed with a 1/8-inch gap—the width of a framing nail **(6)**. Fiber-cement and some engineered-wood sidings can swell at butt joints. Follow manufacturer instructions, as installation procedures vary by siding brand. Some may want butt joints caulked, while others may prefer use of joint flashing **(7)**.

SAGGING FLOORS

"I see a lot of framing errors that lead to uneven floors," says Atlanta structural engineer Chris DeBlois. The problem has to do with the way today's homes are designed. "In an older colonial," he says, "you know the rooms will be stacked with a central bearing wall. No more."

DeBlois says that with today's open floor plans, some designers forget to account for the loads the floor will bear. For instance, he was called to look at a large kitchen with an 8x12 island topped with granite, but with no bearing wall under the joists (there was a media room directly below). He says, "Whoever did the framing layout didn't take the weight of that granite into account, so the kitchen floor ended up settling and sloping toward the island, like a little bowl." The builder had to go back, jack the floor up, and triple the joists. DeBlois has also seen settling in rooms with thickset tile or stone floors.

ROOF AND SIDEWALL RIPPLES

Another common problem is sheathing that swells and buckles, telegraphing waves through the cladding or roofing. The fix is simple: Leave a 1/8-inch gap between panels. The shank of a 10d common will make the proper space over rafters and studs, though you may want to use H-clips over rafter bays. But some framers seem unaware of this advice. "I hired two guys to help me frame an addition and neither one had heard of gapping sheathing panels," notes Leavenworth, Kansas-based builder and remodeler Chip Kiper. He says he now inspects the sheathing before it's covered: "If any sheets aren't gapped, I use a saw to make a kerf between them."

Swelling can also be a problem with fiber-cement siding, where joints between horizontal runs may need to be gapped and filled with sealant. Be sure to check the manufacturer's installation instructions, as the requirements vary. Those that require caulking at joints do so for good reason. "If you ignore this advice, the board will soak up water and swell at the edges," says Bill Robinson of train2build.com.

DAMP BASEMENTS

"A leaky foundation is the worst callback because it costs so much money to fix," says Risinger. He says many homes in his market have water seepage at the slab-to-wall connection. Even without visible water, a damp basement or crawlspace can turn into a mold generator.

He advises against using fluid-applied foundation waterproofing systems because they depend on near-perfect application. "They have to be installed at the right thickness with the right number of coats, and you need to make sure all the conditions for proper adhesion have been met." Instead, he uses a peel-and-stick waterproofing membrane, such as Cosella-Dorken's Delta-Thene.

This product requires a primer that helps bond the adhesive backing to the concrete. "Essentially you're sticking an adhesive to an adhesive, which creates a very durable bond," he says. Regardless of the waterproofing used, the most important ingredient is a gap between the foundation wall and the surrounding soil to relieve hydrostatic pressure. Without a gap, hydrostatic pressure can force an enormous amount of water through even the smallest penetrations in the wall. Risinger typically relies on a dimple mat covered by a geotechnical fabric to create this gap and allow free drainage to the footing perimeter drains.

On sites without a high water table, Kiper gets by with rigid foam insulation against the concrete, covering it with fiberglass resin panels to protect the foam from damage. He caps the assembly with sheet metal to keep termites out of the house.

Kiper also points out that the basement is more likely to stay dry with a sound structure. "Even a hairline crack can let moisture into the wall," he says. He recommends wide footings with plenty of steel reinforcing over thoroughly compacted soil.

STUCCO FAILURES

Getting stucco right seems to be a challenge on a lot of jobs. "It's the most common problem we see," Richard Baker, Builder Solutions Program Manager at IBACOS, says. Baker and his team perform regular quality-control assessments on product jobsites around the country. One cause of stucco problems is the same one behind a lot of the other problems mentioned here: The industry has lost its best craftsmen. He says, "We don't see the skilled labor that we used to."

Stucco errors fall into three categories.

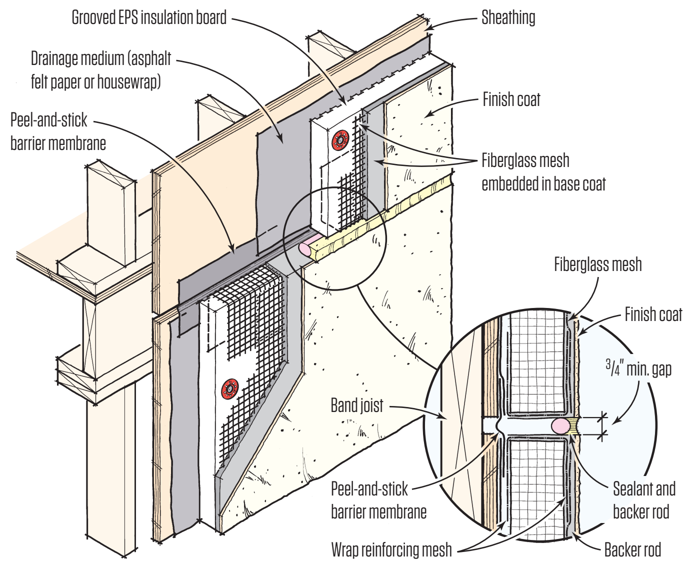
Missing joints. The ASTM standards that govern stucco specify control joints every 144 square feet. They often get left out, however, because of ambiguity in how some stucco systems implement these standards, and because some builders don't like the look of control joints. Some installers also forget to put a flexible sealant where the stucco meets another material, such as around a window. The result is the same in both cases: When the stucco expands or contracts, it cracks, letting water into the structure.

Wrong mix. Too much sand can make the mix weak and prone to cracking. Too little sand leaves it brittle, so cracking tends to be dramatic. When brittle stucco cracks, "it can sound like a gunshot," Baker says. He has even seen it shear the metal lath beneath the stucco. The solution to both problems is to use premixed stucco.

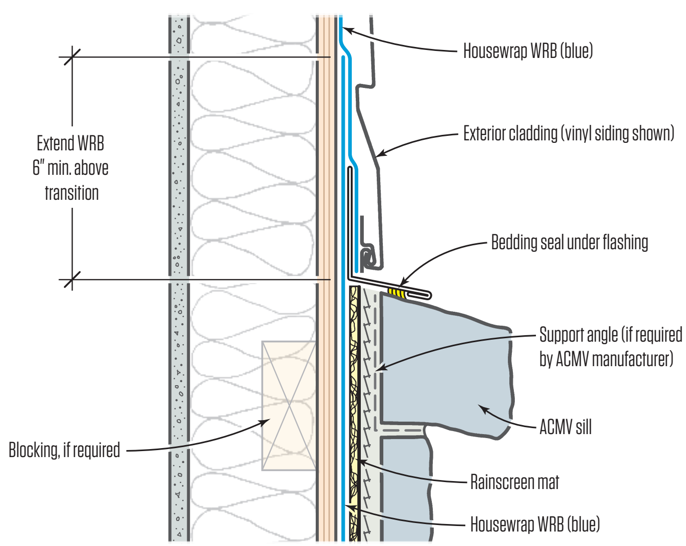
An effective way to keep basements dry is to provide a gap between the ground soil and the foundation wall. A dimple mat covered by a filter fabric **(8)** is one good way to create this space. If stucco is brought tight to window and doors, it will crack **(9)**. The stucco bead should be installed to provide a gap that can be filled with backer rod **(10)**, followed by caulk **(11)**.

Photos: 8, Risinger & Co.; 9–11, Dave Haines

EIFS Movement Joint



Cladding Transition



Illustrations by Tim Healey

The EPS board in an EIFS system can buckle when floor framing shrinks, causing cracks in the surface, unless a movement joint is located at or above the midline of the band joist (top). There should be a sealed, 3/4-inch gap between the sheathing and EPS board. The transition between dissimilar claddings (above) is often not detailed correctly, leading to water intruding into walls.

Poor hydration. Stucco needs to be kept hydrated for a few days after it's applied. Some installers skip this step, causing the pH to stay too high and making the stucco less able to hold paint. "Some builders compensate by using pH-resistant paints, but this is not a silver bullet," Baker says. "They really need to hydrate the stucco."

Mistakes that are common with stucco frequently occur with adhered masonry products, as well. "The adhered masonry veneer on every house I see is wrong," says home inspector Bruce Barker, in Cary, N.C. "The biggest problems have to do with transitions: missing backer rod or sealant around window jambs, missing flashing at the transitions between dissimilar siding products, and missing weep screeds."

The solution? As a first step, builders need to take care when hiring siding subs. They also need to write tighter specs and make sure the job super or lead carpenter is on site. "We advise more site supervision on the days stucco is being installed," Richard Baker says.

LEAKY TRANSITIONS

With exterior flashings, the most problematic spots are where brick or stone veneer meets another type of siding and where a roof dies into a sidewall.

"At least in my market, a lot of them don't understand how their trade relates to the other trades," Jim Schneider, a custom builder in Norfolk, Va., says. He has responded by providing scopes of work that detail exactly how the flashings have to be done and by making sure his job supervisor is on site to check the work.

Where a roof meets a wall, the roofer will often neglect to install kick-out flashing. The kick out is a bent piece of metal at the base of a step-flashing run that directs water into the gutter. When it's missing, water can run down the wall below the gutter, working its way behind the siding and rotting the sheathing.

Some architects and homeowners don't like the look of kick outs. An alternative (suggested by Bill Rose, author of "Water in Buildings: An Architect's Guide to Moisture and Mold") is to nail a pressure-treated 2x4 at the roof-wall intersection before installing roofing or siding. Then bend the step flashing over the 2-by and down onto the roof. This puts the flashing outboard from the cladding and directs water straight into the gutter.

PENETRATION DETAILING

Installers have gotten better in recent years when it comes to window flashing. The one exception is the sill pan. "All exterior doors and windows need a sill pan but contractors in general aren't using them," Robinson says. "That's fine if everything else is perfect, but it rarely is."

Barker says that aluminum windows especially need a pan because installers can rack them during installation, breaking the seal at the bottom corners. "The IRC doesn't require pan flashing on windows unless the window manufacturer does, and window manufacturers often don't," he says. By the time the homeowner sees a stain on the wall, there is already rot in the structure.

Leaky pipe and vent penetrations are also common. When installers cut a hole for a gas line or dryer vent, they need to flash it to the WRB. But they seldom do. "I see this done incorrectly all the time," says Robinson. He says that the problem won't be fixed until installers start taking wall penetrations as seriously as roof penetrations. He also recommends prefabricated boots like those made by QuickFlash.

He adds that the only caulks and sealants used around penetrations should be those with a high solid content. Silicone or polyurethane typically work best. As caulk cures, it shrinks down to its solid content, and if there's not enough, you get gaps, Robinson explains.

FLAT-ROOF LEAKS

Modern architecture is quite popular in some parts of the country, and modern architecture means flat roofs. "Flat roof problems are common in my market," Risinger says. "We have to go to crazy extremes to make sure they don't leak."

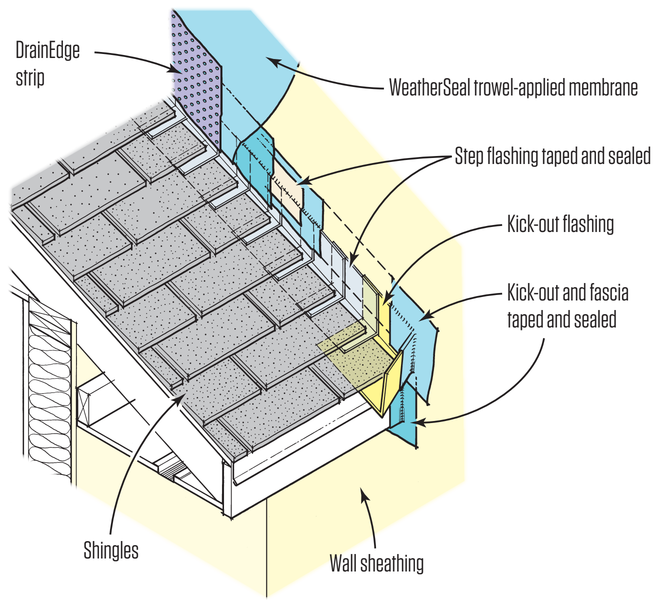
While today's roofing membranes are durable, it can be a challenge to integrate the roof and wall flashings. Even the smallest defect can cause a leak. Risinger learned this the hard way after a scupper in a parapet wall at the edge of a flat roof let water into the structure, causing several thousand dollars in damage. He now uses peel-and-stick or fluid-applied membranes on walls and parapets, and he brings the roofer in early to integrate the membrane with the roof flashing. Since he implemented those strategies, he hasn't had a problem.

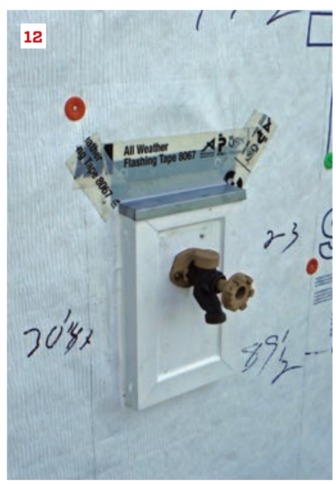
HOT AND COLD SPOTS

Comfort complaints are rampant according to our sources, and the fault often lies with the ductwork. "A lot of residential ducts have excessively high static pressures," says Jose de la Portilla, a technical training manager with HVAC Learning Solutions, in the Dallas-Ft. Worth area. "The mechanical equipment has to run longer and has to start and stop more often, making it more prone to breakdown and premature failure."

The causes behind excessive pressures range from undersized ducts, to excessive bends, to sagging flex duct. Some installers suggest using rigid fittings for elbows and other directional changes, then stretching runs of flex duct taut between them. Many homes also

Kick-Out Flashing





If not detailed correctly, a roof-to-wall intersection can dump a lot of water into a wall. Step flashing should terminate at a kick out that's large enough to direct water away from the wall (see illustration, top). Detail through-wall penetrations with a standoff block **(12)** or with a flashing panel, such as QuickFlash **(13)**.

Illustration by Tim Healey; Photos: 12, Mark Parlee; 13, Risinger & Co.

Photos: 14, Steve Easley; 15, Clayton DeKorne; 16, Doug Horgan; 17, Ted Cushman

A pinched HVAC duct **(14)** creates high static pressures that stress equipment and reduce airflow. To reduce duct leakage, run ductwork inside conditioned space, through ceilings or interior soffits **(15)**. Shower curbs are notorious leak sites **(16)**. Components from Schluter simplify getting the details right **(17)**.

have inadequate return paths that rely on door undercuts, leaving some rooms too hot and others too cold. The best way to avoid these problems is consult with the mechanical contractor during the design phase.

Another comfort killer is ducts that are run in unconditioned spaces without being properly insulated or sealed. An unsealed supply duct in an unconditioned space can waste as much as 500 cubic feet of air per minute, or more than a ton of heating or cooling capacity; leaky return ducts can pull hot or cold outside air into the system.

CUSTOM SHOWERS

Upgraded master baths with custom showers that feature built-in seats and multiple showerheads are a hot option among well-heeled homeowners. They tend to be on the second floor above a living space, so leak-proofing is crucial. But if, as is often the case, the seat is built into a corner, or the shower has an L-shape, the waterproofing membrane can be hard to detail correctly.

Baker is seeing more such installations than ever with pinhole leaks that are hard to detect but that let mold and rot slowly build up in framing cavities. "Complex showers need a higher level of waterproofing," he cautions. For instance, while the membranes beneath most showers aren't sloped, it's worth the effort to slope the underlayment in the shower toward the drain before applying the membrane.

THE SCHEDULED CALLBACK

When it comes to serious issues like waterproofing and framing, getting it right the first time is crucial. When it comes to annoyances, however, the easiest course may be to schedule a callback ahead of time.

When he closes out a job, Mark Scott, a builder and remodeler in Cabin John, Md., schedules two follow-up quality inspections—one in six months and the other in a year. "During the six-month inspection, we look for anything unusual, like abnormal settling, and address those issues within two weeks," he says. At the 12-month inspection, he takes care of all the cosmetic stuff: "We tell the customers that the home needs to go through a heating and cooling cycle in order to reach equilibrium, then we can fix nail pops and such, and they will stay fixed."

Not only has this reduced the number of calls he gets in the interim, he says, but it has also enhanced his company's reputation for customer service: "No one else around here proactively does follow-up quality control inspections, so it really sets us apart."

Charles Wardell is a contributing editor to JLC.

BSD-102: Understanding Attic Ventilation

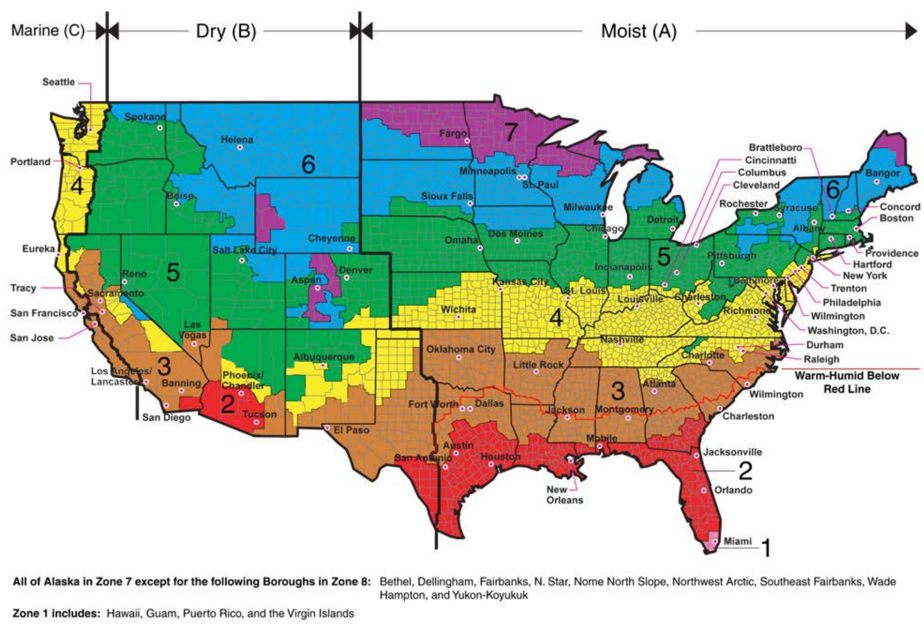
Joseph Lstiburek
OCTOBER 26, 2006

Abstract:
Attics or roofs can be designed and constructed to be either vented or unvented in any hygro-thermal zone (Map 1). The choice of venting or not venting is a design and construction choice not a requirement determined by the physics or by the building code. The model building codes allow both vented and unvented roof assemblies. The applicable physics impacts the design of attic or roof systems as does the applicable building code but neither limit the choice.

Throughout the balance of this digest the terms attic and roof will and can be used interchangeably.

In cold climates, the primary purpose of attic or roof ventilation is to maintain a cold roof temperature to control ice dams created by melting snow, and to vent moisture that moves from the conditioned space to the attic (ventilation acts to bypass the vapour barrier created by most roof membranes). Melted snow, in this case, is caused by heat loss from the conditioned space. The heat loss is typically a combination of air leakage and conductive losses. The air leakage is due to exfiltration from the conditioned space (often because a ceiling air barrier is not present) and from leaky supply ductwork (often because ductwork located in attics is not well sealed) and from penetrations like non-airtight recessed lights. The conductive losses are usually from supply ductwork and equipment located in attic spaces above ceiling insulation (ductwork is typically insulated only to R-6—whereas ceiling insulation levels are above R-30). Conductive losses also occur directly through insulation, or where insulation is missing or thin.

In hot climates, the primary purpose of attic or roof ventilation is to expel solar heated hot air from the attic to lessen the building cooling load. The amount of cooling provided by a well ventilated roof exposed to the sun is very small. Field monitoring of numerous attics has confirmed that the temperature of the roof sheathing of a unvented roof will rise by a few to no more than 10 F more than a well ventilated attic.



Map 1: IECC/IRC Climate Zones

The amount of attic cavity ventilation is specified by numerous ratios of free vent area to insulated ceiling area ranging from 1:150 to 1:600 depending on which building code is consulted, the 1:300 ratio being the most common.

Control of ice dams, moisture accumulation and heat gain can also be successfully addressed by unvented attic or roof design.

Why Two Approaches – Vented and Unvented?

Vented attic and roof construction has a long history of successful performance.
Why change a good thing?

As the complexity of attic and roof assemblies increases, the difficulty to construct vented assemblies also increases. The more complex a roof geometry, the easier it is to construct the assembly in an unvented manner. With complex roof designs, multiple dormers, valleys, hips, skylights combined with cathedral construction with interior soffits, trey ceilings and multiple service penetrations (Photograph 1) it is often not practical to construct a vented roof assembly with an airtight interior air barrier at the ceiling plane.

Photograph 1: Ceiling Penetrations – "Swiss Cheese Services"

Additionally, it is becoming more common to locate mechanical systems and ductwork in attic spaces in all climate zones. When such ductwork is leaky significant problems can occur (Figure 1). There are significant energy advantages and durability advantages to move the thermal boundary and pressure boundary (air barrier) to the underside of the roof deck (Rudd, Lstiburek, & Moyer; 1997) thereby locating these mechanical systems and ductwork within the building conditioned spaces (Figure 2).

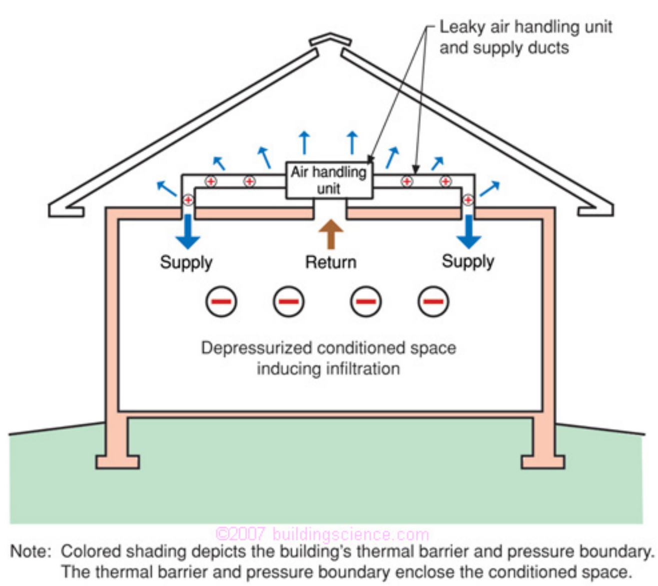
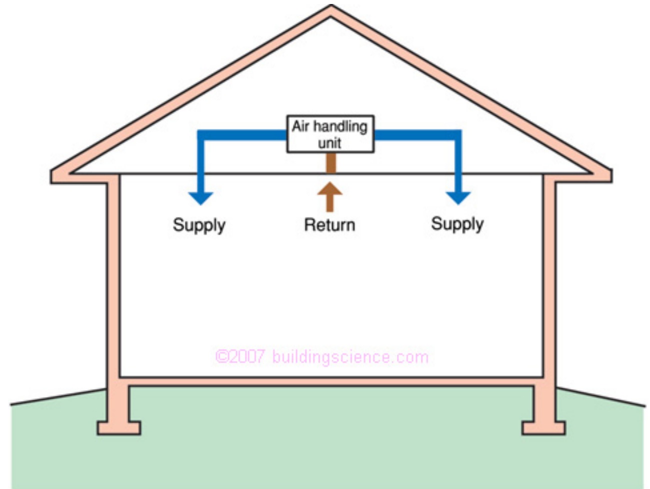


Figure 1: Ductwork Exterior to Thermal and Pressure Boundary

- Supply ductwork and air handler leakage can be more than 20 percent of the flow through the system.

- Leakage out of the supply system into the vented attic results in an equal quantity of infiltration through the enclosure. In cold climates the heat loss can lead to ice dam creation, in hot humid climates the infiltration leads to high latent loads due to infiltration into the conditioned space. In all climates this leads to thermal penalties – increased energy consumption in the order of 20 percent of the total space conditioning load (Rudd and Lstiburek, 1997).



Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

Figure 2: Ductwork Interior to Thermal and Pressure Boundary

- In hot humid climates condensation on ductwork and air handlers located in vented attics is common.

- Duct leakage does not result in infiltration or exfiltration (air change) as ductwork is located within the conditioned space.

- This results in significant energy savings compared to Figure 1.

In high wind regions – particularly in coastal areas, wind driven rain is a problem with vented roof assemblies. Additionally, during high wind events, vented soffit collapse leads to building pressurization and window blowout and roof loss due to increased uplift. Unvented roofs – principally due to the robustness of their soffit construction - outperform vented roofs during hurricanes – they are safer.

In coastal areas salt spray and corrosion are a major concern with steel frames, metal roof trusses and truss plate connectors in vented attics.

Finally, in wildfire zones, unvented roofs and attics have significant benefits in terms of fire safety over vented roof assemblies.

Approach

The main strategy that should be utilized when designing roof or attics to be free from moisture problems and ice dams along with control of heat gain or heat loss regardless of ventilation approach is the elimination of air movement, particularly exfiltrating air in cold climates and infiltrating air in hot and hot humid climates. This can be accomplished by the installation of an air barrier system or by the control of the air pressure difference across the assembly (depressurizing a building enclosure reduces the exfiltration of interior air – pressurizing a roof assembly with exterior air also reduces the exfiltration of interior air).

Air barrier systems are typically the most common approach, with air pressure control approaches limited to remedial work on existing structures (Lstiburek & Carmody, 1994).

Vapor diffusion should be considered a secondary moisture transport mechanism when designing and building attics. Specific vapor retarders are often unnecessary if air movement is controlled or if control of condensing surface temperatures is provided.

Vented Design

Vented attics should not communicate with the conditioned space – they should be coupled to the exterior. Therefore, an air barrier at the ceiling line – such as sealed gypsum board - should be present to isolate the attic space from the conditioned space. Ideally, no services such as HVAC distribution ducts, air handlers, plumbing or fire sprinkler systems should be located external to the air barrier (Figure 3).

- Roof insulation thermal resistance at roof perimeter should be equal or greater to thermal resistance of exterior wall.
- 1:300 ventilation ratio recommended.

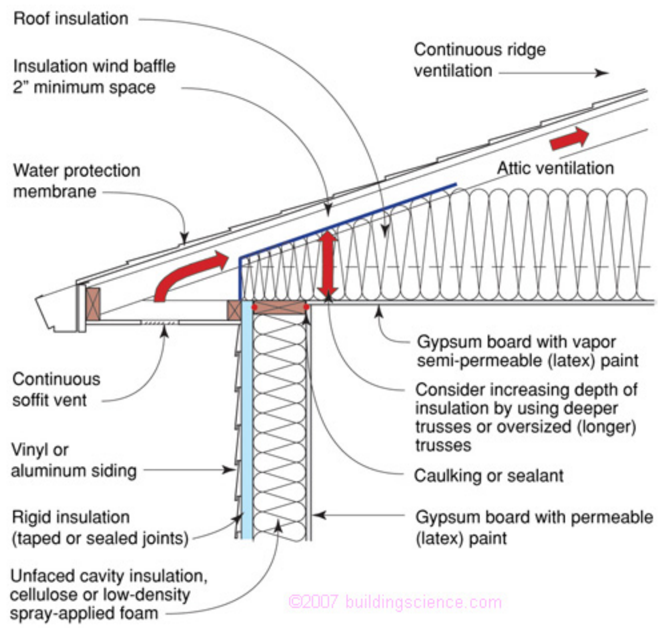


Figure 3: Vented Roof Assembly

The recommended ventilation ratio to provide for vented attic assemblies when an air barrier is present, is the 1:300 ratio (as specified by most building codes). This is based principally on good historical experience and simple psychrometric analysis (Handegord & Giroux, 1984).

In vented cathedral ceiling assemblies a minimum 2-inch clear airspace is recommended between the underside of the roof deck and the top of the cavity insulation. This is not a code requirement but ought to be (only 1-inch is typically specified in the model codes). It is the author's experience that typical installation practices and construction tolerances do not result in an airspace of at least 1 inch and rarely is it "clear." Even when 2" clear space is provided, the rate of ventilation flow will be significantly less than in an open ventilated attic.

In addition to an air barrier at the ceiling line, a Class II vapor retarder (see sidebar) should be installed in Climate Zones 6 or higher (see Map 1).

Class I vapor retarders (i.e. vapor barriers – see sidebar) can be installed in vented attic assemblies in Climate Zones 6 or higher (see Map 1) but should be avoided in other climate zones as top side condensation can occur in summer months during air conditioning periods.

No interior attic assembly side vapor control is required or recommended in climate zones other than Climate Zones 6 or higher (see Map 1) for vented attic assemblies (note the distinction, this is not the case for unvented attic assemblies as will be discussed later). With vented attic assemblies moisture that diffuses into the attic space from the conditioned space is vented to the exterior by attic ventilation.

Unvented Design

Unvented attic design falls into two categories: systems where condensing surface temperatures are not controlled (Figure 4) and systems where condensing surface temperatures are controlled (Figure 5). The two categories essentially are the demarcation between regions where cold weather conditions occur with sufficient frequency and intensity that sufficient moisture accumulation from interior sources can occur on an uninsulated roof deck to risk mold, corrosion and decay problems.

- Potential For Condensation in Phoenix, AZ With Unvented Roof (see also curve).
- No potential for condensation on the underside of the roof sheathing until interior moisture levels exceed 50 percent RH at 70 degrees F.
- Potential For Condensation in Dallas, TX With Unvented Roof And Insulating Sheathing (see also curve).
- Rigid insulation installed above roof deck.
- No potential for condensation on the underside of the roof sheathing until moisture levels exceed 40 percent RH at 70 degrees F. when rigid insulation is not present.
- Rigid insulation is recommended in this roof assembly to raise the condensation potential above 50 percent RH at 70 degrees F.
- Ratio of R-value between rigid insulation and batt insulation is climate-dependent.

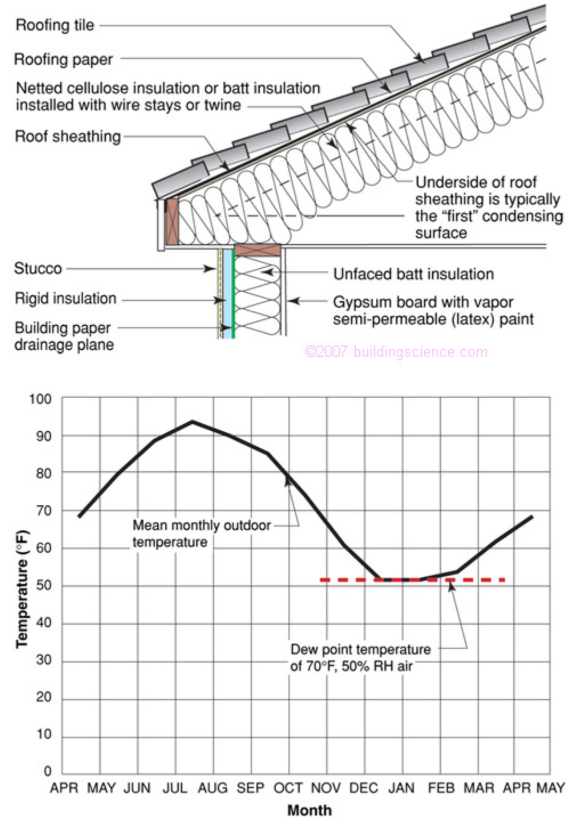


Figure 4: Condensing Surface Temperature ("underside of roof sheathing") Not Controlled

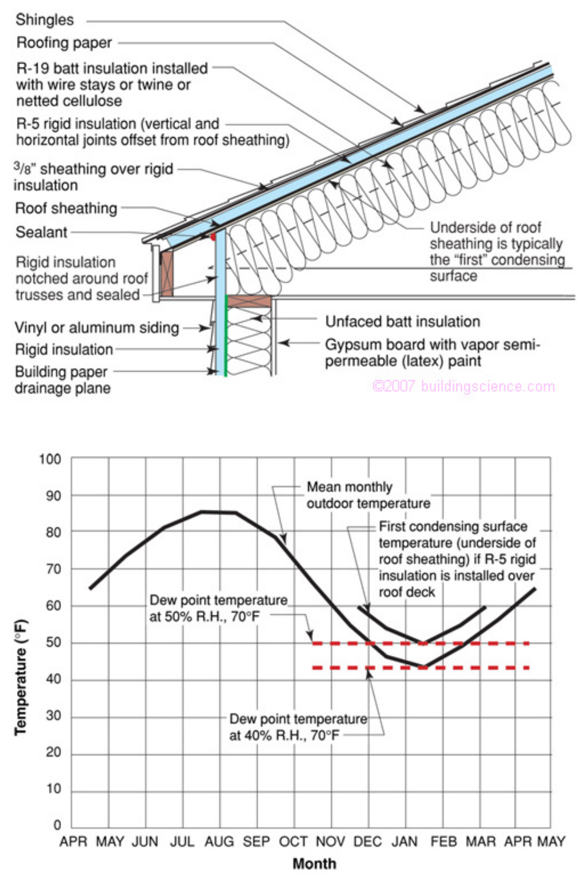


Figure 5: Condensing Surface Temperature Controlled

The key is to keep the roof deck – the principle condensing surface in roof assemblies (Figure 6) – sufficiently warm throughout the year or to prevent interior moisture laden air from accessing the roof deck. This can be accomplished in several ways: the local climate may be such that the roof deck stays warm, or rigid insulation can installed above the roof deck, or air-impermeable insulation (typically spray foam – Photograph 2) is installed under the roof deck in direct contact with it.

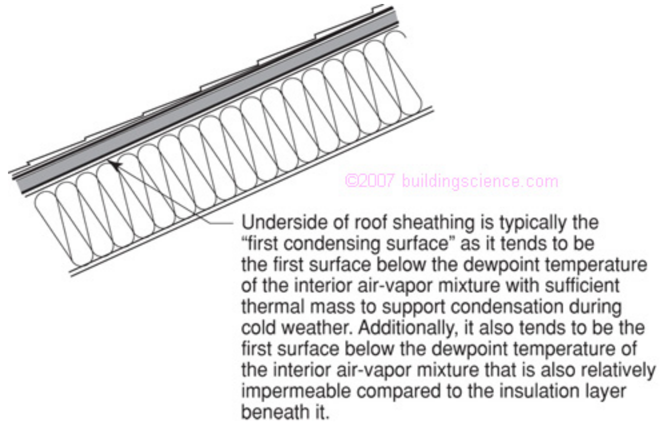


Figure 6: First Condensing Surface

Where rigid insulation is installed above the roof deck, or air impermeable insulation (spray foam) is installed under the roof deck condensing surface temperatures are said to be controlled.

Photograph 2: Spray Foam Insulation

The climate demarcation is a distinction between regions where the monthly average temperature remains above 45 degrees F. throughout the year and where it drops below 45 degrees F. during the year. An additional criteria is also necessary – that of keeping the interior relative humidity below 45 percent during the coldest part of the year.

These criteria were selected for two reasons. First, by keeping the roof deck above 45 degrees F., condensation will not occur unless the dewpoint temperature of the interior air exceeds 45 degrees F. and this air contacts the roof deck. This interior dewpoint temperature is approximately equal to an interior conditioned space temperature of 70 degrees F. at an interior relative humidity of 45 percent. Higher interior moisture conditions can easily be avoided with air change/ventilation or the avoidance of over humidification during the coldest month of the year in the climate zones specified.

Second, a monthly average temperature was selected, rather than a design heating temperature, as it is more representative of building enclosure performance. Short term, intermittent "spikes" in parameters/environmental loads are of significant interest to structural engineers and in the sizing of space-conditioning equipment, but are not typically relevant to moisture induced deterioration. Wood-based roof sheathing typical to residential construction has sufficient hygric buffer capacity to absorb, redistribute and re-release significant quantities of condensed moisture should intermittent condensation occur during cold nights when sheathing temperatures occasionally dip below 45 degrees F. The average monthly temperatures more accurately reflect moisture content in wood-based assemblies.

The temperature criteria was also based on tile roofing systems not membranes and asphalt shingles. Membrane, metal, and shingle roofs can experience night sky cooling that can depress roof deck temperatures significantly below ambient air temperatures, especially in arid and high-altitude locations. When membrane, metal or shingles are used it is typically necessary install rigid insulation above the roof deck or install air impermeable insulation below the roof deck.

The demarcation between regions that require the control of condensing surface temperatures and regions that do not can be obtained by consulting climate information or from Map 1. Note that both hot-humid and hot-dry climate zones meet the 45 degree F. roof deck criteria. However, the high interior relative humidities found in buildings located in hot-humid climate zones during the winter months do not always meet the 45 percent interior relative humidity criteria. Therefore, the only zone that meets both of these requirements is the hot-dry hygro-thermal region. Only hot-dry climates do not require the control of condensing surface temperatures or the use of air impermeable insulation at the underside of the roof deck (Photograph 3). All other regions require some form of control.

Photograph 3: Netted Cellulose – air and vapour permeable insulation in hot-dry climate.

Control of condensing surface temperatures typically involves the installation of insulating sheathing above the roof deck. In residential wood frame construction this involves installing rigid insulation between the roof shingles and the roof plywood or OSB. The installation of the rigid insulation elevates the temperature of the roof deck during cold weather and hence minimizes condensation.

Figure 4 and Figure 5 illustrate the difference between two fundamental systems. Figure 4 shows the potential for condensation of an unvented roof assembly in Phoenix, AZ. Phoenix, AZ is located in a hot-dry climate zone. This roof assembly has no insulating sheathing installed above the roof deck.

Figure 5 shows the potential for condensation of an unvented roof assembly in Dallas, TX. Dallas, TX is located in a mixed-humid climate zone. Note that this roof assembly has rigid insulation installed above the roof deck in order to control the condensation potential. The thermal resistance of the rigid insulation (thickness) necessary to control condensation depends on the severity of the climate. The colder the climate, the greater the resistance of the rigid insulation required.

Figure 7 shows a roof design that is not dependant on controlling interior moisture levels – as the other roof designs previously discussed have been. The absence of cavity insulation in this design yields the highest condensing surface temperature of all of the designs presented. Note that all of the insulation is installed over the top of the roof deck. In this particular design, the condensing surface is the air barrier membrane installed over the wood decking (Photograph 4). The design and configuration of the roof in Figure 7 is consistent with and based on typically constructed flat compact roofs common in commercial construction – it is just that the roof assembly is “tilted” or constructed with a slope (Figure 8). This is the type of roof design most appropriate for swimming pools or other humidified building types in cold climates. It is also one that provides the most durability to the primary components of the structure by keeping these warm and dry.

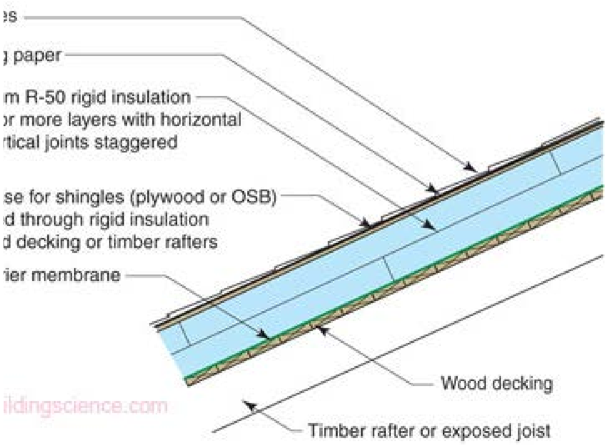


Figure 7: Compact Unvented Roof Assembly

Photograph 4: Compact Roof For Pool Enclosure

- All insulation located above air barrier membrane.
- Optimum roof design for pool and spa enclosures.
- All insulation located above roof deck.
- Structure exposed to interior inside air barrier and thermal barrier.
- Historically successful performance not affected if constructed with a slope
- In extreme snow regions it is necessary to add a vented air space between the roof cladding (shingles) and the rigid insulation to avoid ice damming (see the digest on ice dams for more information). The vented air space is needed to flush heat away trapped by the insulating value of relatively thick snow (the snow becomes an insulating "blanket"). This approach creates a vented-unvented hybrid roof assembly (Figure 9).
- In extreme climates such as high snow load mountain regions a vented space should be provided between the roof cladding and the thermal layer to vent heat.

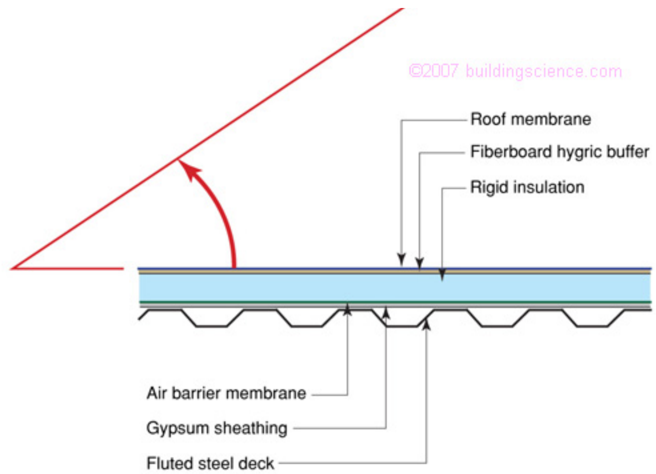


Figure 8: Typical Commercial Compact Unvented Roof Assembly

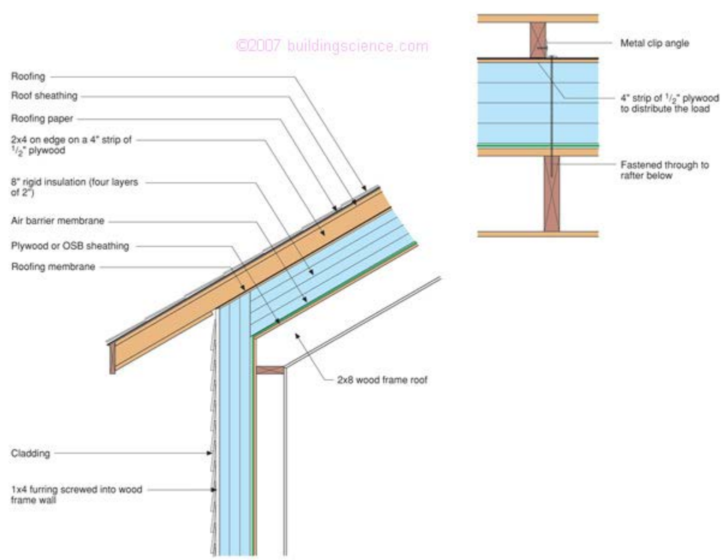


Figure 9: Unvented- Vented Hybrid Roof

Note that in these types of unvented roof assemblies (except Figure 7, Figure 8 and

Figure 9), interior vapor barriers (Class I vapor retarders – see sidebar) are not recommended as these assemblies are expected to be able to “dry” towards the interior.

Instead of installing rigid insulation above the roof deck to control condensing surface temperature, air-impermeable insulation can be installed in direct contact with the underside of the structural roof deck (Figure 10). Air-impermeable insulations are typically low density or high-density spray foams (Photograph 5). Netted or blown cellulose, fiberglass or rockwool insulation are not considered air impermeable.

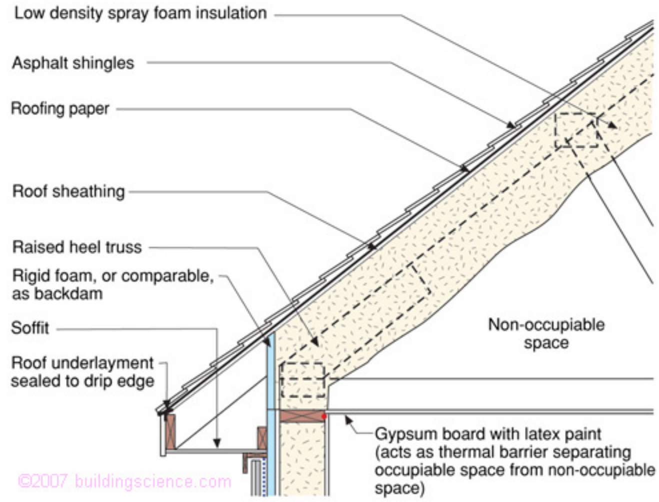


Figure 10: Air Impermeable Spray Foam Insulation

- In Climate Zones 5 or higher a Class II vapor retarder is required on the interior of the spray foam layer.
- If a high density foam is used in this assembly, a Class II vapor retarder is not required in Climate Zones 5 or higher as the high density foam itself qualifies as a Class II vapor retarder.
- A thermal barrier is required to separate spray foams from occupiable spaces due to the fire performance of spray foam insulations.

In Climate Zones 5 or higher (see Map 1) the air-impermeable insulation, including any covering adhered continuously to the bottom side should have a vapor permeance of 1 perm or less (i.e. have the characteristics of a Class II vapor retarder or lower – see sidebar). This can be achieved by applying a vapor retarder paint over the interior surface of the low density spray foam or by installing a material layer in contact with the foam that has a vapor permeance of 1 perm or less.

Photograph 5: Typical low density spray foam

High density spray foam insulation due to its impermeability properties can be installed directly under roof decks in any climate zone without any additional provision for vapor diffusion resistance - including Climate Zones 5 or higher (see Map 1).

High density spray foam insulation – which is considered an “air impermeable insulation (air permeance of not more than 0.02 L/s-m2 at 75 Pa pressure differential tested according to ASTM E 2178 or E 283 – identical to the definition of an air barrier material in the National Building Code of Canada) can be used in combination with other insulation systems that are not “air impermeable” (Figure 11). In this particular instance the high density foam insulation controls the access of interior moisture to the roof deck by air movement and by diffusion. This approach is similar in effect to the approach described in Figure 12 where rigid insulation is placed above the roof deck.

- High density spray foam insulation does not require an interior vapor retarder in any climate
- Membrane, metal, and shingle roofs can experience night sky cooling that can depress roof deck temperatures significantly below ambient air temperatures. When membrane roofs and asphalt shingles are used it is typically necessary install rigid insulation above the roof deck or install air impermeable insulation below the roof deck.
- The thermal resistance (thickness) of the rigid insulation is climate dependent and moisture load dependent.
- The colder the climate the higher the thermal resistance required for the rigid insulation.
- The higher the interior moisture load the higher the thermal resistance required for the rigid insulation.
- Membrane roofs and shingle roofs can experience night sky cooling that can depress roof deck temperatures significantly below ambient air temperatures. When membrane roofs and asphalt shingles are used it is typically necessary install rigid insulation above the roof deck or install air impermeable insulation below the roof deck.

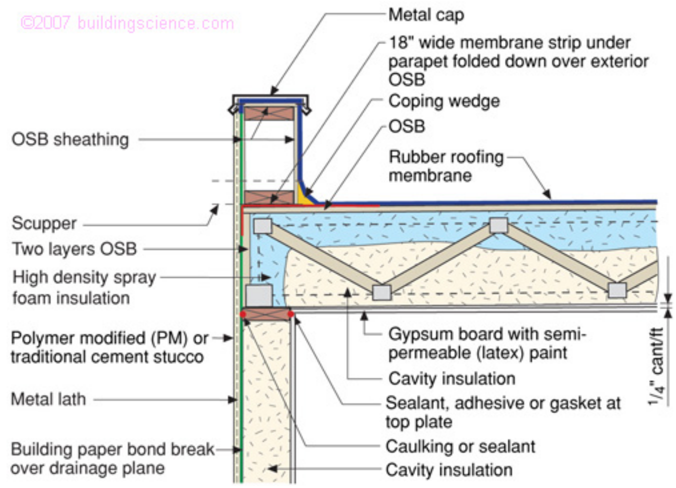


Figure 11: Unvented Flat Roof Assembly – High Density Spray Foam

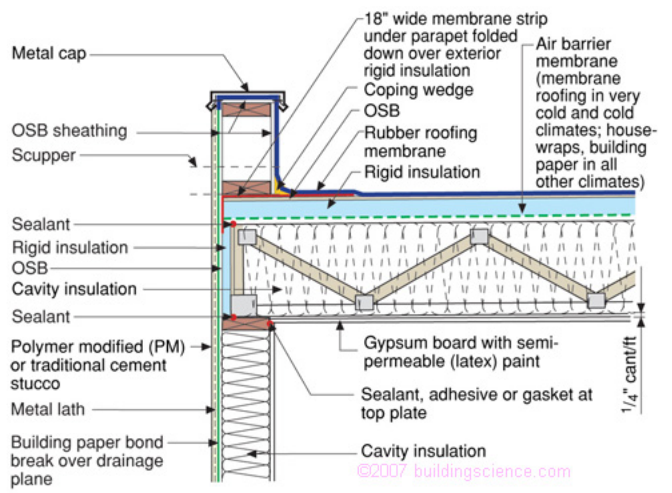


Figure 12: Unvented Flat Roof Assembly – Rigid Insulation

Effect on Shingle Life

In general, shingles installed on unvented attic assemblies operate at a slightly higher temperature. This has impacts on the durability of roof assemblies. A 2 or 3 degree F. rise in average temperature is typical for asphalt shingles and a corresponding 10 degree F. rise in average temperature for sheathing (Parker & Sherwin, 1998; Rudd & Lstiburek, 1998; TenWode & Rose, 1999).

All other things being equal, applying the Arrhenius equation (Cash et.al, 2005), a 10 percent reduction in useful service life should be expected. This is comparable to the effect of the installation of radiant barriers. What is more significant to note is that the color of shingles and roof orientation have a more profound effect on the durability of shingles than the choice of venting or not venting (Rose, 1991) – double or triple the effect of venting/non venting.

Summary

Both vented and unvented attic/roof designs can be used in all hygro-thermal regions. However, the designs need to be climate sensitive.

Control of ice dams, moisture accumulation and heat gain can be successfully addressed by both vented and unvented attic or roof design.

The choice of the venting approach is up to the designer.

Vented attic/roof designs have the advantage of a long, proven historical track-record. However, they work best with airtight ceiling/attic interfaces and where ductwork and air handlers are not located within attic spaces. The increase in the use of complex roof shapes and cathedral ceilings has resulted in problems with vented roofs.

Unvented attic/roof designs have the advantage of providing conditioned spaces for ductwork and air handlers. However, they require different approaches in different climate locations.

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Sealing the Foundation To the Framing

BY MATT RISINGER

Air-sealing during framing is increasingly a fact of life on residential jobsites. From a performance perspective, it can be done most effectively from the outside **(1)**, but sealing on the inside with less-expensive materials **(2)** is still a good option compared with conventional sill sealer—which is not an effective solution.

1


2


Photos by Matt Risinger

When it comes to air-sealing, one of the areas that we rarely see done well is the joint between the foundation and the framing. Most houses in America get foam sill seal laid on top of the foundation. This plastic foam product primarily works as a capillary break between the concrete and the framing. As the weight of the framing crushes the foam slightly, it also (sort of) works as an air-seal, but it is not a perfect seal by any measure, because the top of the concrete is never perfectly smooth.

Beyond ordinary sill sealer, we have taken several approaches to improving air-sealing at this critical juncture.

GOOD INTERIOR OPTIONS

If you're working from the inside, the easiest and least-expensive method is to simply lay a fat bead of caulk in the gap created by the foam sill seal between the foundation and the framing. Anyone can do this on any house under construction. I recommend using an exterior silicone formulation for concrete **(2)** or a high-quality polyurethane sealant. Both will stick well to the wood and the concrete. Acoustical sealant is a better, albeit slightly more expensive, option. Caulk often works best at a slab-wall transition **(3)**.

An even better, but also more expensive, option is to use a high-quality air-sealing tape. Siga makes Wigluv tape **(4)**, which sticks well to concrete. When you are applying it to the protected inside, you don't necessarily need to use primer.

BETTER EXTERIOR OPTIONS

While sealing from the inside will work, sealing from the outside is the better way to go. This way, you are blocking the air before it has a chance to find another path to the inside through the wall cavity. But it is also a little more expensive to do it from the outside.

I've found two tape options that work well here: One is Cosella-Dorken's Multi-Band **(5)**. This tape in the Delta line comes in two widths—60mm (2.36 inches) and 100mm (3.94 inches)—and I have used it frequently with many Delta waterproofing products. Outside, where we have more exposure to the elements, and therefore more intense changes in temperature and humidity, we need to use a primer. With Multi-Band, I use the Delta HF primer. I run a couple of courses of tape to protect the foundation so I'm only coating the first 2 inches of concrete with primer, and I also run the primer up onto the framing. The primer is an adhesive, so you get sticky on sticky when you apply the Multi-Band tape, and it will stick tenaciously.

Caulk works best where walls sit on a foundation slab **(3)**, whereas a high-quality tape, such as Siga's Wigluv, makes an effective seal across a vertical or stepped surface **(4)**. But the most effective place to air-seal is along the outside, blocking the air before it enters the wall cavity, where it can find many pathways to the inside. For this, the author has used Cosella-Dorken's Multi-Band **(5)** or Siga's Fentrim F **(6)**, after applying a primer on the concrete.

Another option for sealing from the outside is Siga's Fentrim F **(6)**. This is a new product that Siga claims will stick even better than its Wigluv tape. I have found the bond to be impressive, but I still want to use a primer outside. The wider Fentrim F tapes (6-, 9- and 12-inch widths) have a split back so you can peel off half to stick it to the concrete and then roll it up onto the framing.

BEST PRACTICE

While using a primer makes for a strong bond on both the concrete and the framing, there are always issues with bonding to concrete. Form oils, wax, concrete additives, and especially moisture can affect the bond, and I always feel reserved about the long-term viability of the adhesive bond. With this in mind, I have begun experimenting with some of the newer fluid-applied air barriers. Recently, we used Prosoco's R-Guard Joint & Seam Filler, which is a moisture-curing compound, so it bonds directly to damp or dry surfaces (with no primer needed) and cures under a variety of weather conditions and even on green concrete. Low temperatures and dry conditions will slow down the drying time, and high temperatures and high humidity or wet conditions will accelerate curing. But the bond will only improve over time, which appeals to me. Another option is PolyWall's Blue Barrier Joint Filler 2200 (see photo 1, page 19). This is a bit thicker than the Prosoco and fills gaps up to 3/4 inch.

The fluid-applied options form a "rubber barrier" at the base of the home, doing an excellent job to stop air flow. They also protect the vulnerable bottom edge of the wood sheathing against splash-back and give you something to shingle your weather barrier over later.

Matt Risinger owns Risinger & Co., in Austin, Texas. He is a frequent contributor to JLC *and jlconline.com, where you can find his companion video to learn more about using fluid-applied flashing.*

Below is an interesting videos provided by Storm Water Solutions. Click to enjoy.

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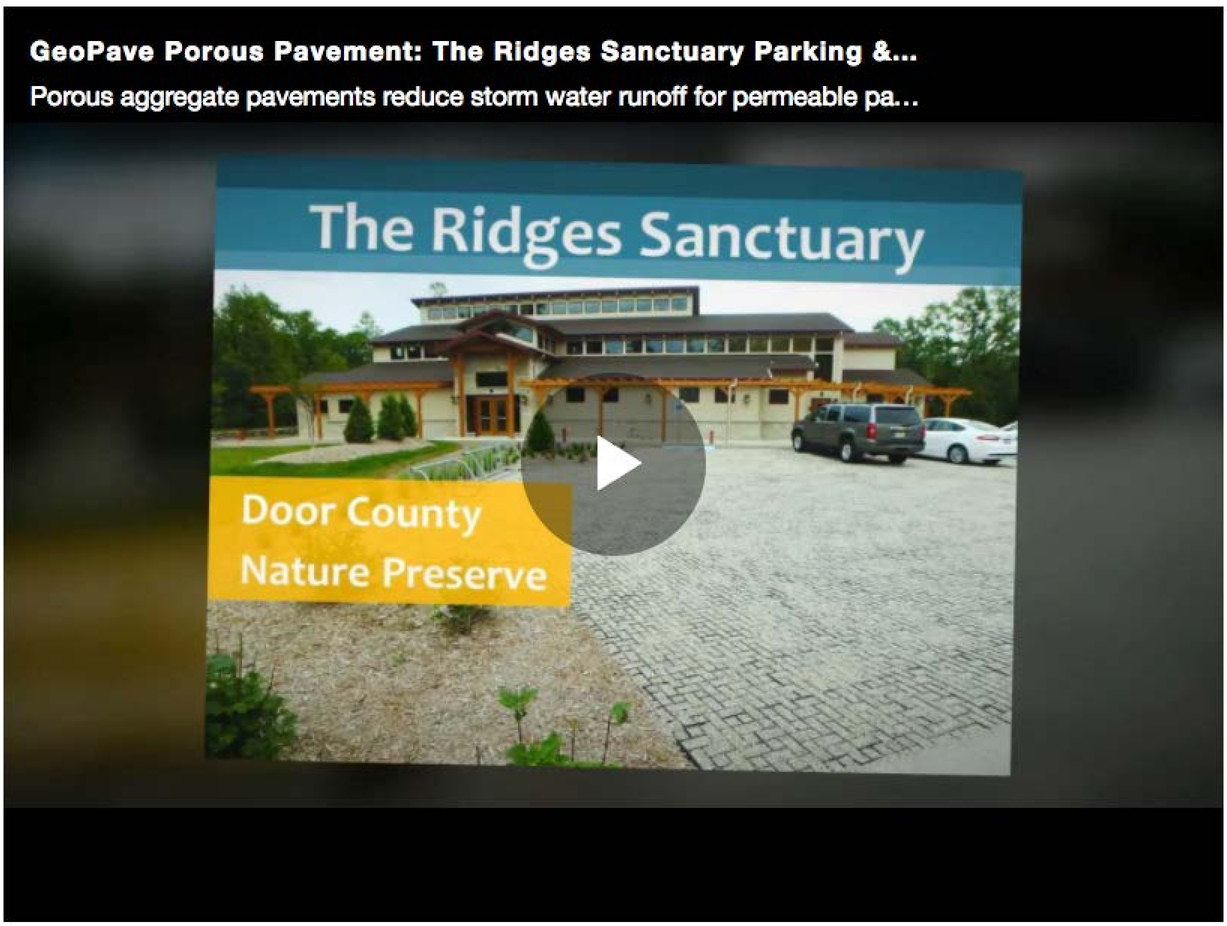

DEBUNKING DEWATERING

BY GREGORY C. GILLES & R. BRITTANY MEROLA
APR 27, 2017

Construction dewatering causes challenges with discharge standards

With the ongoing recovery of the American economy, construction projects are rebounding in the new residential and non-residential sectors. A major hurdle that will quickly, and sometimes permanently, derail new construction is the presence of shallow groundwater, which must be addressed on a temporary and often permanent basis to ensure foundations and building integrity will not be compromised by the shallow groundwater table.

Dewatering is a common practice in construction where groundwater is extracted via a series of well points to lower the groundwater table and provide a dry environment upon which to build foundations. It often is utilized in building projects that are below a perched or shallow water table, such as basements, parking garages and other sub-surface structures. It also can be used with construction foundations in locations with particularly shallow water levels. The dewatering process typically involves intercepting the shallow aquifer surrounding the structure and pumping water continuously from a series of groundwater extraction wells to lower the overall water table and allow the construction area to remain dry. How and where this water is then disposed depends on federal and state regulations, NPDES and construction permits, and the quality of the water.

Because of this, successful dewatering projects must account for myriad variables, including the removal of regulated contaminants in subsurface water; seasonal variations in the water table; and other factors leading to fluctuations in flow, soil composition, weather and permitting considerations. Geotechnical firms often are employed by developers early in the process to evaluate subsurface hydrogeological conditions, obtain water quality levels, and make predictions for sustained pumping rates given the site-specific local subsurface hydrogeology.

Regulatory Requirements

In the past, water from these construction dewatering projects could simply, upon extraction or removal, undergo minimal treatment, such as the removal of suspended solids via filtration with subsequent discharge to a local body of water; however, these days, state regulatory officials give more attention to the chemical makeup and nature of the water, and the suitability of these discharges for either onsite or offsite disposal or discharge.

Depending on how, how much and where one is discharging, there likely are water quality standards that will need to be met prior to the release of the water. Federal regulations for controlling discharges of pollutants from municipal separate storm sewer systems (MS4s), construction sites, and industrial activities were incorporated into the NPDES permit process by the 1987 amendments to the Clean Water Act and the subsequent 1990 promulgation of federal storm water regulations by the U.S. Environmental Protection Agency (EPA). The EPA regulations require construction and storm water discharges to comply with an NPDES permit. In California, EPA delegated its NPDES permitting authority to the State Water Resources Control Board (SWRCB).

In cases where a nearby local sanitary sewer is available and allowable for discharge, those local authorities (i.e., the publicly owned treatment works [POTW] or municipality) will allow or disallow discharge via a permit. NPDES permits or the equivalent state version, referred to as the SPDES permits, typically are not needed if the water is discharged to a sanitary sewer, reused on the construction site, discharged to adjacent land, used at an adjacent facility or treated off site. Therefore, these disposal options are preferred.

The acceptability of this wastewater by a municipality is ultimately the decision of the local authority and dictated by the POTW's own discharge permit or hydraulic limitations, which also may apply. If the POTW or local treatment authority is not suitable or deemed capable of treating for the contaminants found in the influent, the generator of the water may be required to pretreat it. It is not uncommon in some cases for the discharge to be required to meet EPA's drinking water maximum contaminant levels (MCLs) for instance.

Direct discharges to a waterbody, storm drain, or MS4 often requires extensive analytical data, money and time. A typical NPDES permit application requires detailed information about the chemical constituents in the proposed discharge, as well as a description of any treatment techniques used. Given the sensitivity of these receiving bodies of water and the aquatic resources within, discharge standards often are at or below the levels required in drinking water. Standards are very localized and specific to the receiving body of water.

Water Quality Issues

Dewatering typically faces three types of water quality issues: high levels of sediment, high pH (often from grouting or concrete work happening nearby) and naturally occurring contaminants. High levels of sediment and elevated pH commonly are problematic in temporary dewatering operations, where water is only removed during active construction. Temporary dewatering often involves the pumping of water accumulated in construction trenches and pits. Once construction is completed, the dewatering process may no longer be needed.

For temporary and simple dewatering treatment needs, often particle filtration or other filtration techniques are utilized to remove sediment. Simple, mobile temporary treatment systems can be an effective option for treating the extracted water during the active construction phase. Sometimes they are inadequate if additional chemical contaminants are present, such as iron, manganese, heavy metals, arsenic or other constituents that require a more sophisticated treatment train to meet discharge standards.

Permanent dewatering operations have longer-term considerations and involve extraction and treatment (often indefinitely) to provide support for underground structures. Prior to discharge, water quality considerations associated with groundwater removal need to be accounted for if they represent potential harm to human health, environmental health concerns for aquatic life or aesthetic issues in drinking water.

Common water quality contaminants that primarily affect aesthetic drinkability but are regulated by EPA include turbidity, iron, manganese, hardness (calcium and magnesium), odor, color and taste. Other water-quality contaminants are regulated for their direct impact on human health, such as arsenic, hexavalent chromium, selenium, radionuclides, nitrates, volatile organic carbons, lead and other heavy metals.

Treatment Approaches

In situations where dewatering activities produce water with elevated levels of contamination, a customized approach to treatment is needed to lower long-term costs. The capability to customize treatment methods that will best serve the site needs is an important factor to consider when designing a dewatering treatment facility. The quantity and quality of the water and a clear understanding of discharge objectives is essential.

One example of a common groundwater contaminant combination that needs to be treated prior to discharge is elevated levels of suspended solids, iron and manganese. These contaminants can be reduced to EPA's MCL limits (0.30 mg/L, 0.05 mg/L, and less than 5 ntu respectively) through a three-stage treatment train using an automated backwashing pre-filter followed by an oxidation/filtration system and a polishing stage of granular activated carbon filtration. With any treatment, residuals often are generated and must be managed properly. When dealing with elevated iron and manganese concentrations in the extracted water, backwashing of the oxidation/filtration system can occur daily. Special design techniques can be employed to capture, filter and recycle backwash water to provide a zero-liquid discharge option. Not only are solid waste residuals greatly minimized, but backwash water (i.e., wastewater) also can be recycled or even eliminated, lowering corresponding monitoring and disposal costs. The iron/manganese residuals generated from the backwashing operations can be dewatered to form non-hazardous solids that can be transported and disposed of periodically in a local area sanitary landfill at a relatively low cost.

Properly designed ex-situ treatment has become a familiar companion to construction dewatering. As the list of EPA-regulated contaminants grows, more situations are occurring in which these contaminants or co-contaminants, either naturally occurring or anthropogenic in origin, are found in construction-generated water that must be addressed on temporary or, more commonly, on a permanent ongoing basis. Understanding the regulatory constraints, geotechnical aspects of extraction (quantity), water quality, and corresponding treatment needs are all important considerations for developers and contractors undertaking these projects. Formation and selection of an experienced, qualified team early is critical for designing and implementing projects with such long-term implications. Developing a customized solution for managing wastewater discharges can greatly impact long term costs for permanent dewatering ventures.

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BY GREG AND SUE BURNET

Stair Stringers: Calculation and Layout

Stairs probably impact occupant safety more than any other construction element that carpenters are responsible for. At some point, we've all stumbled on stairs that weren't laid out correctly. Yet this basic element found in practically every structure causes more head scratching than just about anything else.

The building code (IRC, R311.7 Stairways) is strict regarding stair layout and includes minimum tread depth (10 inches), maximum riser height (7 3/4 inches in IRC, but this can vary by state), maximum variance between riser heights (typically 3/16 inch) in a given stairway, and more. Much has been written about stair construction and codes. In this article, we share some guidelines and tips for both calculating (see illustration, below) and laying out (see page 12) a safe set of stairs, gleaned from the scores of stairways we've laid out over the years.

Greg and Sue Burnet are co-owners of Toolbelt Productions (toolbeltproductions.com), an education and training firm for the building industry.

Calculating Rise and Run for Stairs

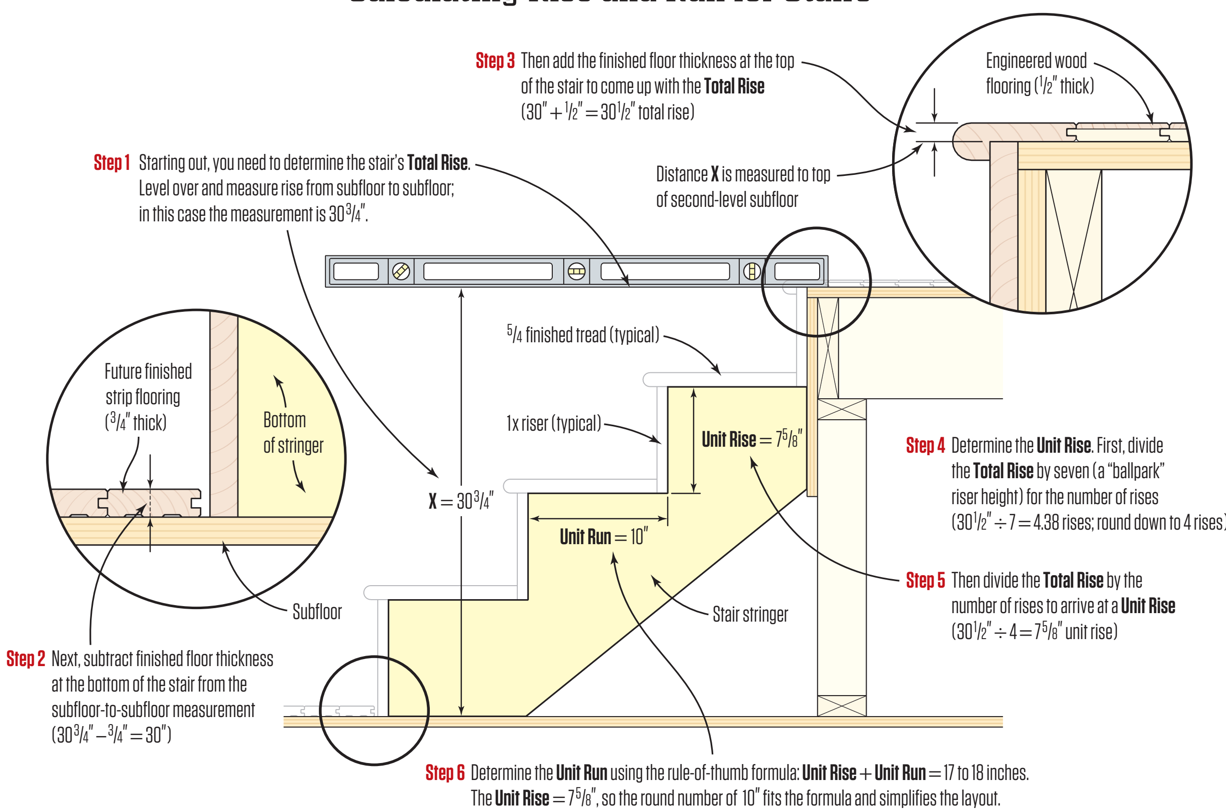
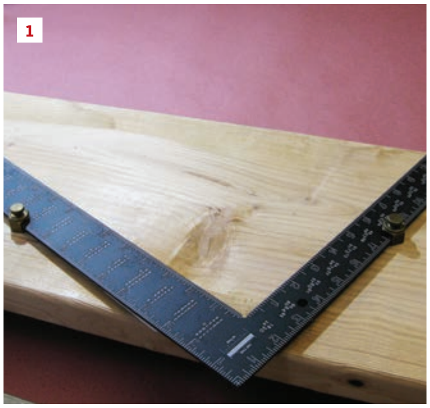


Illustration by Tim Healey; photos by Sue Burnet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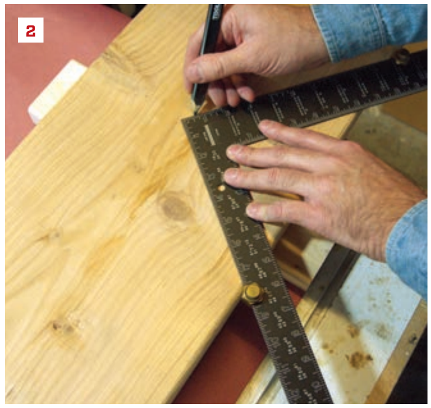
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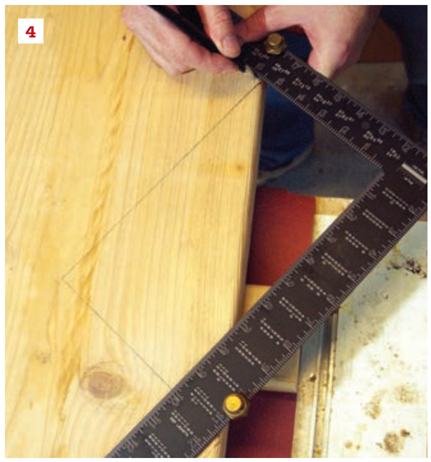
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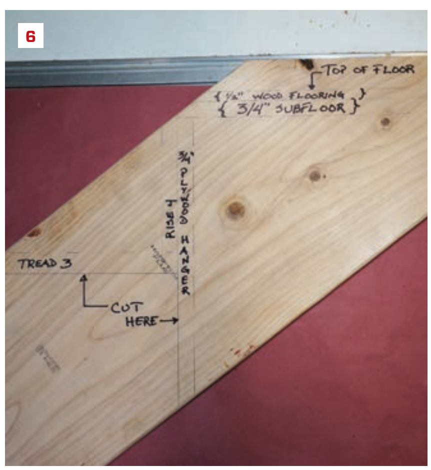

6

Laying Out Stair Stringers

A stringer is basically a full-scale elevation of the stairway. After determining the rise and run, along with the number of rises, attach stair gauges to a framing square at the proper measurements—in this case, 7 5/8 rise and 10 run **(1)**.

Place the square with the attached gauges against the edge of the stringer and trace the rise and run **(2)**. A tick mark in line with the measurement helps to align the next step.

Continue moving the square up the side of the stringer and tracing the steps until you have marked the proper number of rises—in this case, four **(3)**.

If the stops don't hit the lumber for the bottom rise, flip the square over to draw it in **(4)**. Then place your square on the stringer without the stops and square over the bottom line of the bottom rise. Do the same to lay out the top line of the uppermost rise.

Draw in all of the details for the bottom of the stair, including the tread and riser materials and flooring, both existing and planned **(5)**. If you don't know whether the stairs are going in before or after the finished floor, label both options clearly.

Do the same at the top of the stairs, including the subfloor and finished flooring **(6)**. Don't forget to include the hanger material at the top step. Double-check the rise and run measurements from the finished floor to the top tread, and clearly label the cut lines.

For more information on calculating and laying out stair stringers, go to **www.jlconline.com/training-the-trades/framing/stairs**.

If I Catch It, Can I Eat It?

DPH Releases Annual Fish Advisory, “If I Catch It, Can I Eat It?” With Updated Guidance on Fish Caught on the Housatonic River

The Connecticut Department of Public Health (DPH) today announced the release of the 2017 edition of If I Catch It, Can I Eat It? A Guide to Safe Eating of Fish Caught in Connecticut. DPH has updated the guide in response to new sampling data that has indicated higher levels of fish contamination with polychlorinated biphenyls (PCBs) in the Housatonic River and the lakes – Lillinonah, Zoar and Housatonic – that are fed by the river. These PCBs are associated with the former General Electric Company (GE) transformer manufacturing facility in Pittsfield, MA.

If I Catch It, Can I Eat It? A Guide to Safe Eating of Fish Caught in Connecticut is available in both English and Spanish on the DPH website by clicking here.

“The purpose of this DPH guide is to give advice on how to safely eat fish caught in Connecticut,” said Brian Toal, an Epidemiologist with DPH’s Environmental Health Section. “Fish are a good source of protein and omega 3 fatty acids, a nutrient thought to help protect people from heart disease and beneficial to the developing fetus. As a result, DPH recommends that the public continue to eat fish. However, certain guidelines should be followed in order to eat fish safely.”

The higher levels of fish contamination may be due to recent weather events and/or remedial work in the Pittsfield, MA area, located in the upper part of the Housatonic River watershed. The new data resulted in more restrictive advice for largemouth and smallmouth bass in Lakes Lillinonah, Zoar and Housatonic. Pregnant woman and children should not eat bass from the lakes and others should not eat more than one meal every 2 months. Fish sampling for PCBs in the Housatonic River will continue in future years and the consumption advisory will be reviewed annually based on that data. Both the English and Spanish versions of the guide are available at all tackle shops, local health departments, and town clerk offices. The guide also emphasizes store bought fish with a list of “good fish to eat and fish to limit or avoid.”

The standard advice for fish caught in Connecticut for high risk groups, like pregnant women and children, is to eat no more than one meal per month of freshwater fish caught in Connecticut. For all other groups, the advice is to eat no more than one meal per week of freshwater fish. This standard advice is due to mercury contamination found in Connecticut freshwater fish. In addition, there is a guideline that recommends limiting or avoiding striped bass and bluefish caught in Long Island Sound due to Polychlorinated Biphenyl (PCB) contamination. The advisory guide also has a listing of the water bodies and species in Connecticut with specific consumption recommendations.

For more information or to obtain a copy of the update, please contact Sharee Rusnak at (860) 509-7740 or sharee.rusnak@ct.gov.

Grundfos Water survey
https://mail.aol.com/webmail-std/en-us/suite

Arsenic and Uranium in CT Wells

New Report Shows Some Private Wells in Connecticut Test High for Naturally Occurring Arsenic, Uranium

A report published today by the U.S. Geological Survey, in cooperation with the Connecticut Department of Public Health (DPH), reveals that water from some private wells across the state has registered high levels of Arsenic and Uranium.

As part of the joint research project, DPH, with the help of local health officials, collected and analyzed water samples from 674 private wells in Connecticut. The lab results indicated that seven percent of the private well samples tested for Arsenic or Uranium at levels higher than Maximum Contaminant Levels, which are regulated in public water supplies and newly constructed private wells under Connecticut law.

These results were then examined by USGS Scientists, who compared the water sample collection sites in relation to geologic information in those areas.

"During our research, we discovered there was more Arsenic and Uranium in private wells than was previously known," said Sarah Flanagan, USGS Hydrologist.

While high levels of Arsenic and Uranium were discovered across the state, the USGS found there were specific areas of high concentrations in wells that correlated with certain types of bedrock. This data indicated higher levels were associated with 81 different types of bedrock in Connecticut; however, bedrock type alone was not always predictive of higher or lower concentrations.

"For example, some major bedrock categories that had generally low levels of contamination, also had a few isolated wells with high concentrations of Arsenic or Uranium," said Sarah Flanagan, USGS Hydrologist and lead author of the study.

The results of this study reaffirm DPH's previous recommendation that private well owners in Connecticut should test their wells for naturally occurring Arsenic and Uranium.

"Our study shows that any private well in Connecticut has the potential to have elevated Arsenic or Uranium," said Ryan Tetreault, DPH Private Well Program supervisor. "Private well owners should have their well tested at least once for these contaminants."

Arsenic and Uranium are metals that can be found naturally in bedrock around the world. Sometimes, water from wells drilled into bedrock aquifers can contain Arsenic or Uranium that has leached out of the bedrock. Arsenic exposure has been related to many adverse health outcomes and can increase the risk of certain cancers. It also may be a risk factor for a developing fetus, and can affect child intellectual function. Naturally occurring Uranium can have adverse effects on the kidneys, but does not have high levels of radioactivity and is not considered a significant cancer risk.

According to DPH, routine testing required for private wells does not usually include testing for Arsenic and Uranium. It is up to private well owners to have their well tested for these contaminants. Potential homeowners may also ask for such testing when purchasing a home with a private well. Local health departments have the authority to require testing for arsenic and uranium for new wells if they have reason to believe there is a problem in their jurisdiction.

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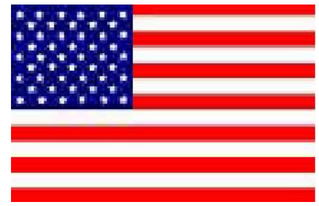

The Licensing Board meetings are held at 9:30 am
Dept of Consumer Protection
165 Capitol Avenue. Hartford

The public is always welcome.

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Larryhp@cox.net