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Committed to Growing Digital *and* Print Media

Welcome to the 2021, Frame Building News Post Frame Directory. We have been evolving rapidly over the last two years. We have added magazines, online buyers' guides, live trade shows, virtual-digital trade shows and now we are launching a consumer book division.

Much of this growth has been digital or online. Our opt-in email list has grown almost 400%.

Part of this digital growth is completely redesigned websites for each magazine.

When you receive this issue, www.framebuildingnews.com will be live.

The issues are available online and formatted so you can easily read them on your devices. And they are searchable; if you type "fasteners" or a company name in the search bar, all of the articles including fasteners or that company come up.

One critical issue that I would like to stress is that we are in no way lessening our commitment to our print publications. In fact, the 2021 Post Frame Directory is more than twice the size of the 2020 version: More suppliers. More builders. More Product Profiles.

The sentiment that print is dying is misguided. It is changing and evolving. But we have launched three new print titles within the last two years during a global meltdown. So if print is dead, we must be zombies.

Print, digital, and social media are different tools with different applications. If you pursue one exclusively you are limiting your marketing or your education.

The other reason to continue growing print is a significant segment of the post-frame community is not online. Our commitment is to support and grow the entire industry. Our objective is to provide and

gather information, not pick winners and losers.

Speaking of print, this issue is packaged with the June/July issue of *Garage, Shed & Carport Builder*. If you like *Garage, Shed & Carport Builder*, fill out the enclosed subscription card and send it back to us, or subscribe online. The magazine is ready to stand on its own, so we will discontinue packaging it with *Frame Building News* and *Rural Builder*, which is one more piece of evidence that print publications are going strong.

I hope you enjoy the June issue of *Frame Building News* and find the Post Frame Directory a valuable resource.

Gary Reichert
Publisher



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FRAMEBUILDING THE **POST-FRAME 2021 DIRECTORY**

You will find this, the 2021 Post-Frame Directory, to be more inclusive than the 2020 Directory. We've fine-tuned our process a bit, and made significant efforts to include those suppliers and manufacturers that will be able to provide your business with the materials you need to succeed in 2021 and beyond. It is a resource for the entire post-frame industry to be retained and referred to throughout the year.

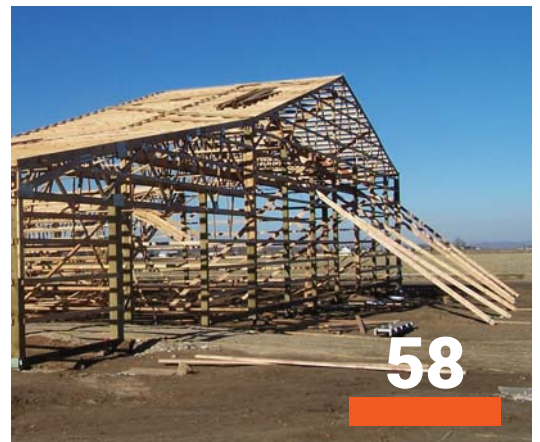
The Builder/Contractor section also

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tion for CMs who can supply the components you may need.

Whether you are a builder, designer, engineer, building owner, or commercial developer—look no further for suppliers, component manufacturers and contractors who can provide the products and services to enhance your next building.

If you would like to see something added (or changed) in next year's Directory, please contact me at karen@shedd-wallmedia.com or 715-513-6767. **FBN**



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ON THE COVER:

Garage with cupola courtesy of Everlast Roofing, Inc.

Cover design by Kevin Ulrich



Industry Partners



Info At Your Fingertips

You may notice this issue is a bit more hefty than usual — with all the additional directory listings plus all the Product Profiles, we quickly ran out of space and needed to add more pages. For the first time ever, all of the post-frame Product Profile categories are published in a single issue of Frame Building News. You'll find the Product Profiles are a great complement to the Post-Frame Directory, which begins on page 15.

You'll also find the directory to be more than twice the size it was last year. There are double the number of suppliers, plus we've added a section of Designers & En-

gineers. Also, thanks to the SBCA, we've included a group of component manufacturers. If you find yourself in need of a source for trusses, you can start your search right here in these pages.

Speaking of trusses, Sean Shields joins us once again with his continuing series on long-span trusses. This time, he addresses proper truss bracing to prevent failure during construction. He even included easy-to-read diagrams. (p. 58)

If you don't find your company in the Directory, but would like it to be included, give me a call or send me an email with your company information. We will add it to our records for the next time the Direc-

tory is published.

Due to space constraints, a few submissions were left of this printed version. However, the omitted information will appear in the online, digital version. We don't yet know the exact date or what the format will be, but the Post-Frame Directory will be featured prominently on our new website: <https://www.framebuildingnews.com>. This new website is in beta testing at the moment, but we're filling it with a wealth of information for post-frame builders.

Until next time — be well.



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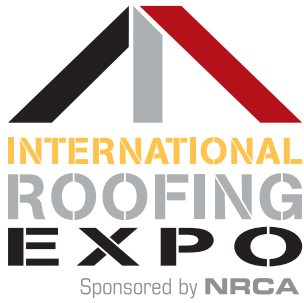
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SmartBuild Releases Design Software for Garages and Sheds

SmartBuild Systems, a software program for post-frame design, now fully supports Garages and Sheds:

- Shingle visuals for roofs
- Horizontal siding for walls
- Takeoffs of multiple layers for roofs and walls (sheathing, underlayment, house wrap, etc.)
- Stick frame as well as post frame framing styles
- Wood floor framed systems for portable sheds.

SmartBuild for Garages and Sheds offers the power and flexibility that the original SmartBuild provides for post frame construction. A complete inventory is supported with unlimited user options for color schemes, window, doors, and other items. SmartBuild for Garages and Sheds — a user-friendly, intuitive input system with robust support — generates 3D models, complete material lists, labor estimates, pricing, sales contracts, and a complete set of construction drawings.

According to SmartBuild Systems CEO Keith Dietzen, the new capabilities for Garages and Sheds are offered within the original SmartBuild program at no extra cost to SmartBuild licensees.

“Many of our post frame customers have been asking us to build support for Garages and Sheds for some time. We did not want to slow down our post frame progress, so we waited until we added staff to address Garages and Sheds. As a result of increasing staff from 6 to 14, we were able to devote the necessary resources for this important project.”

Dietzen says the response to the SmartBuild Post Frame technology has been overwhelming. “Just this winter, we added several hundred new customers. It turned out to be a smart move four and a half years ago to enter the Post Frame soft-

ware market. There was a real need and our growing customer base is evidence that our equation of constantly improving software is what the industry has needed. I trust we will get a similar response from the Garages and Sheds community.”

A free trial of SmartBuild for Garages and Sheds is available at smartbuildsystems.com/garages-and-sheds/.



MFMBuilding Products Expanding

MFMBuilding Products [www.mfmbp.com], a manufacturer of a full envelope of waterproofing and weather barrier products for the building industry, has recently announced a substantial expansion project for 2021 at its Coshocton, Ohio, headquarters. This coincides with the company’s 60th anniversary being celebrated in 2021.

The thrust of the expansion project is adding close to 50,000 square feet to the production area and the acquisition of new production equipment to meet the rising demand for product. MFMB has been acquiring additional raw materials to ensure product availability for their customer base and this new facility will accommodate this additional inventory. The building is planned to be completed by the fall of 2021, and the new production equipment to be installed and operational by early 2022.

Other aspects of the expansion project include razing a building on the company property, constructing new offices in the main headquarters building, and the addition of a new, state-of-the-art Research & Development laboratory for increased quality control and new product development. In total, the company expects to hire an additional 20 full-time employees

as part of the Expansion Project.

According to Tony Reis, President, “The Expansion Project is the result of continued company growth and the company’s commitment to meeting the needs of our customers today and in the future. With this investment, we hope to introduce new waterproofing projects to our portfolio of existing waterproofing membranes. As an ESOP company, there is a lot of excitement among our employees as MFMB continues to grow.”

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2021

Dynamic Fastener Releases New Tool/Fastener Guide

Dynamic Fastener [toll-free (800) 821-5448] has released a new version of its popular Tool and Fastener Hand Guide. The free, 140-page full-color guide provides concise answers to questions pertaining to fastener applications, engineering data, availability of types, size ranges and fastener materials specific to the metal building industry.

In addition to discussing screws and anchors, the Guide provides prices and other useful information relating to flashings, sealants, insulation tapes, safety equipment, hand tools, power tools and more. The 2021 publication includes details on the Dyna-Guard snow retention system for metal roofs. It also includes information about the company’s new rivet initiative that resulted in a stock level of 100 million rivets with 75 million pre-painted in more than 100 different colors.

Beck Automation Celebrates 20th Anniversary

This year, Beck Automation (www.beckautomation.com), St. Louis, Missouri, marks its 20th anniversary. In 2001 Joe Beck and Jeff Potthast set out to provide the best controls and service to the metal forming industry. Since starting in their respective basements, Jeff and Joe have brought a company of two to almost 30 employees.

While keeping up with technological advances, Beck Automation designs state of the art control systems, and are continually developing their Connex software to better manage, track, and streamline customers' facilities.

Beck Automation controls and related products make production machines and the day-to-day operations more efficient and profitable. They manufacture controls for rollformers, cut-to-length lines, slit/cut-to-length lines, tube mills, portable rollformers, and trim shop folders. They also offer a plant-wide Enterprise Suite called Connex to integrate the office to the plant floor. Complete retrofit projects may include engineering, custom software, panel building, and installation.

Mill Steel Co. Acquires Prassas Metal Products

Mill Steel Co., one of the nation's largest distributors of flat-rolled carbon steel, has purchased the commercial assets of Prassas Metal Products, a Los Angeles-based steel trading and stocking distributor of pre-painted and coated coil products with a reputable 30-year track record. Terms of the finalized business transaction were not disclosed.

This deal is characteristic of Mill Steel, which maintains a consistent track record of double-digit growth. It strengthens its geographic footprint with additional sourcing opportunities and greater reach in the Southeastern United States.

"When favorable opportunities such as this present, our aggressive acquisition strategy allows us to transact quickly to the benefit of our customers," said Mill Steel President and Chairman Pam Heglund.

Mill Steel has assumed steel processing and supply for PMP's broad array of construction industry customers in the Southeastern, Mid-South and Western United States. The transition will be seamless as Mill Steel reported it is upholding existing contracts.

"I appreciate the smooth transition and Mill Steel's commitment to customer service," noted Prassas Metal Products CEO Jim Prassas, who will take on a consulting role with Mill Steel as the business assets are integrated.

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US LBM Acquires Texas-Based Higginbotham Brothers

US LBM (www.uslbn.com), a distributor of specialty building materials in the United States, has acquired Higginbotham Brothers, a building products dealer with 38 locations in Texas and two in Oklahoma. With this acquisition, US LBM now operates more than 320 locations nationwide.

Higginbotham Brothers dates to 1881, when the company opened its first general store in Texas. Today, Higginbotham Brothers supplies professional builders, remodelers and do-it-yourselfers with lumber and a deep catalog of specialty building products, including hardware, windows, doors, plumbing materials and interior/exterior paint, from its 40 locations across Texas and Oklahoma. Corby Biddle will continue to lead Higginbotham Brothers' day-to-day operations as president and general manager. **FBN**

RIMA International Allies with High Performance Insulation Professionals (HPIP)

The Reflective Insulation Manufacturers Association International (RIMA-I, www.rimainternational.org) continues to identify ways to educate on the benefits and uses of reflective insulation, radiant barrier and interior radiation control coatings (IRCCs) and search out opportunities to improve the knowledge of the industry and its technology. Part of this effort is working with other organizations to contribute training and other educational resources to help those interested in being the best in the industry reach that goal.

RIMA-I recently finalized an MOU to ally with the High Performance Insulation Professionals (HPIP, www.hpipros.org) organization to contribute resources and training to their certified contractors. HPIP is the only 501c3 in the insu-

lation industry dedicated to establishing a unified certification for contractors and those entering the workplace. Through online learning, live events, and accreditation of partner events, they promote a unified insulation certification the public, consumers, builders, and government entities can use to recognize and appreciate a trained contractor.

For nearly 30 years, their certified contractors have understood what the rest of the industry is starting to figure out. There are incredibly effective insulation systems that deserve a larger market share than they currently have. There are contractors who go above and beyond to be the best of the best, and they should be recognized as such. HPIP is focused on supporting the best contractors and systems in the insulation industry; and RIMA International is proud to partner with them and contribute to this effort.



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Shield Wall Media Launches New Rollforming Magazine Website

Shield Wall Media, publisher of Rollforming Magazine and owner of the Construction Rollforming Show, has announced that a website devoted exclusively to the roll-forming industry is up and running. The launch in early May of www.rollformingmagazine.com is part of ongoing changes the company is making to bring information relevant to the everyday challenges of construction rollformers front and center.

“The launch of the new Rollforming website is the first step in an exciting new direction for Shield Wall Media. Growing our digital presence in the specific niches related to our individual magazines will open many doors. In addition to growing our newsletter and digital subscriber lists, it will create a mechanism for us to generate data and conduct market research. This has been painfully lacking

in our little corner of the construction industry. Some of the information will remain proprietary, but my intent is to make the majority freely available to our readers and advertisers. Accurate information is one of the keys to helping our industry out-compete other building sectors. Wait until you see what is next,” said Gary Reichert, Owner and Publisher of Shield Wall Media.

“Since launching Rollforming Magazine in 2018, one of our ultimate goals was to create a website that was equally devoted to construction rollformers. Once sharing a website with other construction titles in our company, the new website stands alone to give undivided attention to the unique goals and challenges of the industry. It’s a great time for the roll-forming industry, and on www.rollformingmagazine.com, we wish to bring you the information you need to operate successfully,” said Sharon Thatcher, Man-

aging Editor of Rollforming Magazine.

The website has been streamlined to be straight forward and user-friendly on smart phones and tablets as well as desktop computers, so you can access helpful information anywhere you go. Articles from each issue of Rollforming Magazine can be searched and browsed by category from a convenient drop-down menu or through populated sections on the home page.

Articles can also be browsed by issue, or you can download the full pdf files of our back issues for free to experience the magazine cover-to-cover. There are already so many ways for construction roll-forming professionals to source the information they need on www.rollformingmagazine.com. As we continue to grow, we hope the website can facilitate more connectivity to each other and the roll-forming community. **FBN**

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Product Reports

Why manufacturers go through the effort and expense of product certification

BY KAREN KNAPSTEIN

The International Code Council Evaluation Service (ICC-ES, <https://icc-es.org/>) is a nonprofit, limited liability company that does technical evaluations of building products, components, and materials to verify they meet building code specifications. The organization was formed February 1, 2003, when the four American building-product evaluation services (National Evaluation Service, BOCAI Evaluation Services, ICBO Evaluation Service, and SBCCI Public Service Testing and Evaluation Services) combined operations. ICC-ES-certified building products have been tested and found to meet specific standards, such as the International Building Code® (IBC) and the International Residential Code® (IRC).

Manufacturers can spend tens of thousands of dollars on the testing and certification process to get a single product certified by the ICC-ES. This is an indication that having products evaluated and certified by an unbiased third party is an important step in product development, marketing, and sales.

David Delcoma, Product Marketing Manager, MFM Building Products and Mark Stover, President, Perma-Column shared some of their thoughts about why it's important for manufacturers to go through the trouble and expense of getting building products certified.

"There are many different code agencies in this country," explained David Delcoma. "Most are specific to a region or a state." For example, products evaluated and approved for Miami-Dade applies to code standards in two counties in Florida, although those

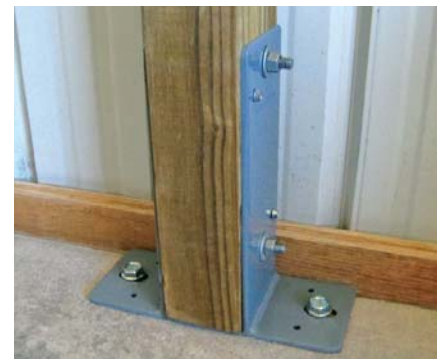
products that pass Miami-Dade may also meet Florida's state standards. "The ICC issues certification for products that meet nationally recognized standards," he said.

The ICC report process begins when a company applies for an evaluation report. The application includes product information and testing data from independent, third-party labs to see if they meet IBC and IRC specifications. All the data is reviewed by the ICC to make sure the product meets the building code requirements; if it does, the ICC issues a report with an approval number. New reports are issued for one year, after which they may be renewed at one- or two-year intervals.

"What the report tells the builder is the product meets the standards," said Delcoma. The report data includes, but is not limited to, the scope of the evaluation, what the standards are, and with which codes the product is compliant. The report also provides the recommended use of the product and its limitations. It will also say if it must be installed in a certain manner. [ICC-ES evaluation reports are



ESR-4238 states Perma-Column are compliant with the International Building Code (2015) and "has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the Florida Building Code—Building and Florida Building Code—Residential."



Perma-Column's Sturdi-Wall and Sturdi-Wall Plus brackets were assigned an ICC certification ESR-4239 in April 2020. PHOTOS COURTESY OF PERMA-COLUMN

According to the International Code Council Evaluation Service (ICC-ES): “Code Officials look for the ICC-ES Mark on building and plumbing products for peace of mind when approving products.”

public documents, available free of charge on the internet to anyone with an interest in the construction industry. [https://icc-es.org/evaluation-report-program/reports-directory/.](https://icc-es.org/evaluation-report-program/reports-directory/)]

“We want to have ICC certification with new products because the building community recognizes the value of it,” Delcoma explained. “If we’re going to submit a product to the ICC, we look up what the standard is, and we’ll actually evaluate our own product in-house to see if we’re near what the product needs to do — how it

needs to perform. We first test our products ourselves to get the closest we can to the results we need for ICC certification. Then we send it off to a third-party lab. They’ll pull product right off the production line or out of the warehouse; it’s a random selection so we can’t doctor up a specific carton for better results. It’s clearly in the third party’s hands and the ICC’s hands in securing the product from the manufacturer.

“The ICC will recognize certain labs around the country,” continued Delcoma.

Miami-Dade County Sets The Bar High

Since Florida’s Miami-Dade County is considered a High Velocity Hurricane Zone (HVHZ), it has some of the country’s strictest building codes. After the products have been tested to meet the code, the Department of Regulatory and Economic Resources’ Product Control Section issues Notices of Acceptance (NOA) for products that are allowed to be used in their county. If products have been tested and approved for use in HVHZ areas, they will most likely meet ICC-ES and other testing standards.

“The labs are up to specifications and have the newest testing techniques. We use three, sometimes four independent testing agencies, depending on their workflow. How long it takes to get a product through the entire process depends on the product, timing, and how busy the lab is,” he said.

Perma-Column’s Sturdi-Wall and Sturdi-Wall Plus brackets received their ICC certification reports (ESR-4239) in April 2020. With the issuance of the bracket certification report, all of Perma-Column’s products have been certified to meet IBC

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and IRC specifications.

“It was two years of hard work requiring significant investments in time, money, people, and resources,” Stover said. “But this is the best way to ensure the quality of our products and it shows our commitment to the industry.”

Stover mentioned the significant challenges of getting ICC certification: “Obtaining an ICC certificate of compliance is not easy,” he said. “A manufacturer must be willing and able to invest significant time and resources during the approval process.”

Once a report is issued, it’s not a “one-and-done” process. Since building codes are updated periodically, it’s necessary to re-evaluate products to see whether they meet the new standards. If the code changes, the product must be retested to see if it meets the new code. Even if the code relevant to an ICC-certified product doesn’t change when a new version comes out, the manufacturer may have a new certificate issued that reflects the newest building code version (year). In either case, the manufacturer must pay the ICC. Another option: The manufacturer can pay a reduced rate to renew the certificate for another term but not update to the most recent building code year.

“What the report means for the builder,” Delcoma said, “is the builder knows that if the product has certification, he knows how the product will perform, the standards it will meet, and gives him peace of mind that he’s not putting on an inferior product. It’s a lot of peace of mind.

“The majority of building materials that have ICC approval ultimately get covered up,” he continued. “Once the building is done you don’t see the product. What’s giving the builder peace of mind is that the product is working.” If a moisture barrier isn’t working, there may be a window leak or a roof leak, and mold may be starting to grow. “Using ICC-approved products reduces the number of callbacks. That’s the number one reason to use them,” he said.

“Certification from ICC enables builders to more quickly attain necessary project approvals and permits,” said Stover. “We use ICC-ES because it’s the cream of

the crop – there’s no better certification. Getting certified with the ICC means you meet the International Residential Code and the International Building Code.”

In Stover’s opinion, using building components that are certified is important for the entire post-frame industry. “A lot of pole buildings aren’t built to code, and they’re not engineered,” he explained. “Smaller builders don’t have access to engineers. They need to look at products that are certified that will help them when they run into code inspections and things like that.

“If the industry grows, we grow,” he continued. “One way to grow this industry is to provide ICC certification for our products so builders can work with the assurance that Perma-Column products meet national and international code requirements while consumers can feel more confident in their post-frame investment.”



MFM Building Products’ Peel & Seal was issued report ESR-1654. Photo by MFM Building Products.

In a future article, we’ll speak with building designers and inspectors to get their take on what ICC-ES (and other accrediting services’) certified products mean in the specifying and inspection processes. **FBN**

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You will find this, the 2021 Post-Frame Directory, to be more inclusive than the 2020 Directory. We've fine-tuned our process a bit, and made significant efforts to include those suppliers and manufacturers that will be able to provide your business with the materials you need to succeed in 2021 and beyond. It is a resource for the entire post-frame industry to be retained and referred to throughout the year.

The Builder/Contractor section (p. 22) also returns in this issue. They are organized by state so you can easily find the information you need.

We have two brand new sections this year. One is dedicated to Component Manufacturers (CMs, p. 18) and the other to Building Designers (p. 26). We give our sincere thanks to Sean Shields of the Structural Building Components Association (SBCA) for providing us with



the contact information for CMs who can supply the components you need.

Whether you are a builder, designer, engineer, building owner, or commercial developer—look no further for suppliers, component manufacturers and contrac-

tors who can provide the products and services to enhance your next project.

If you would like to see something added (or changed) in next year's Directory, contact me at karen@shieldwallmedia.com or 715-513-6767. **FBN**

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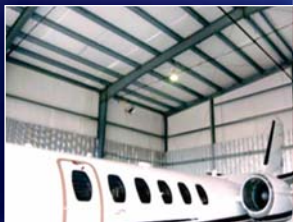
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260-632-0606 (fax – Woodburn)
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www.ramcosupply.com

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www.ridgelinesafety.com

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generalinfo@rigidply.com
www.rigidply.com

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205-695-0433 (fax)
info@roofmartllc.com
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Service Area: Northern Alabama
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info@wayne-dalton.com
Wayne-Dalton.com
Service Area: US & Canada



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www.wickbuildings.com
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4sales@cnrconstruction.com
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www.mortonbuildings.com
Service Area: Nationwide

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www.newcombconstruction.com
brian@newcombconstruction.com
Service Area: Illinois

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stephanie@maximc.com
Service Area: Kentucky

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kellybishopinc@yahoo.com
Service Area: Michigan

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beth@sikkemaequipment.com
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jims@pioneerinc.com
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Service Area: Southwest Michigan

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dan@wedevenbros.com

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Westphalia, MI 48894
989-587-6900
www.wirthandfedewa.com
info@wirthandfedewa.com
Service Area: Michigan

MINNESOTA

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630-486-6746
www.lesterbuildings.com/
ajohnstone@lesterbuildings.com

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Detroit Lakes, MN 56502
218-847-3281
www.foltzbuildings.com
info@foltzbuildings.com
Service Area: Minnesota

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kingkraftllc@gmail.com
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www.rambuildings.com
sales@rambuildings.com
Service Area: Minnesota, North Dakota

Waage Post Frame

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www.waagepostframe.com
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karenh@bblusa.net
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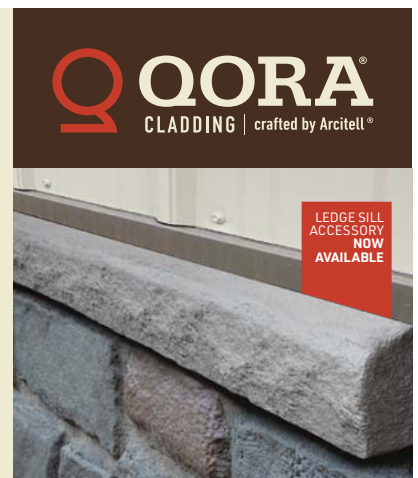
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Service Area: Washington

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Extreme Post Frame, LLC

96 Brownell Dr., PO Box 37
Millwood, WV 25262
800-986-4198
scott@extremepostframe.com

WISCONSIN

Brickl Brothers Inc.

PO Box 125
West Salem, WI 54669
808-786-0890
www.bricklbro.com
mbrickl@bricklbro.com
Service Area: Wisconsin

Burnham Lumber Company, Inc.

839 CTH G
Rewey, WI 53580
608-943-6323
608-943-6298 (fax)
BurnhamL@hotmail.com
Service Area: Southwest
Wisconsin and Tri-States Area

Leid Construction

120362 County Rd. A
Athens, WI 54411
715-680-0483

Meigs Inc. Building Specialists

1529 State St., PO Box 412
Black Earth, WI 53515
608-767-2729
www.meigsbuilds.com
dave@meigsbuilds.com
Service Area: Wisconsin

MPB Builders Inc.

654 E Oshkosh St.
Ripon, WI 54971-1160
920-748-2601
www.mpbbuilders.com
office@mpbuilders.com
Service Area: Wisconsin

Mueller Builders of SW WI LLC

32323 Cty. Hwy N
Richland Center, WI 53581
608-585-4400
www.wickbuildings.com
jbmuller5@yahoo.com
Service Area: Wisconsin

Poppo River Construction

W5718 Kington Rd.
Greenwood, WI 54437
715-229-7016
715-229-7018 (fax)
contact@
PoppoRiverConstruction.com
www.PoppoRiverConstruction.com
Service Area: Central Wisconsin

Schley Buildings LLC

7848 US Hwy. 45
Three Lakes, WI 54562
715-546-3634
www.schleybuildings.com
comments@schleybuildings.com
Service Area: Wisconsin

Sensenig Construction

W3682 Willow Rd.
Curtiss, WI 54422
715-229-9598

Walters Buildings

PO Box 388
Allenton, WI 53002
800-558-7800
262-629-5233 (fax)
sales@waltersbuildings.com
www.waltersbuildings.com
Service Area: Wisconsin, Illinois,
Ohio, Kentucky, Minnesota

WYOMING

A & B Buildings & Supplies

A Division of Garland Enterprises
82 E Ridge Rd., PO Box 2025
Sheridan, WY 82801
307-672-9001
jsmith@abbuildings.com
www.abbuildings.com
Service Area: Wyoming

Duramacks Structures

4060 I-80 Services Rd
Burns, WY 82053
307-630-2804
www.duramacks.com
sales@duramacks.com
Service Area: Wyoming

Homestead Structures

4901 S. Douglas Highway
Gillette, WY 82718
307-682-3941
jerri@homesteadstructures.biz

CANADA

Enframe Construction Ltd

RR1 Site 4 Box 49
Sexsmith, AB T0H 3C0
Canada
780-568-3375
office@enframeconstruction.com

Premium Built Structures

120, 112 Queensgate Crescent
Red Deer, Alberta T4P 0P9
Canada
877-277-3648
403-770-8653 (fax)
info@premiumbuilt.ca
www.premiumbuilt.ca
Service Area: Western Canada

Remuda Building

272179 TWP RD 241B
Rocky View County,
Alberta T1X 2E2 Canada
403-651-4304
info@remudabuilding.com
remudabuilding.com
Service Area: Alberta

Tall Timbers Construction Inc

52419 Range Rd. 265
Spruce Grove, AB T7X 5B2
Canada
780-418-1611
talltimbersconstruction@gmail.com

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PRODUCT PROFILES

BUILDING PACKAGES

Wick Buildings



Since our founding in 1954, Wick Buildings has become one of the nation's largest producers of post-frame buildings. Our buildings are constructed for a variety of uses, including: Residential homes and "shouses" (shop/shed house combinations); sophisticated animal confinement systems; horse housing and training facilities; on-farm storage buildings and workshops; suburban structures; municipal and church buildings; commercial, retail, and light industrial buildings.

www.wickbuildings.com
855-438-9425

Reed's Metals



Reed's Metals, headquartered in Brookhaven, Mississippi, provides metal roofing systems, metal roofing panels, pole barns, and pre-engineered steel buildings. Reed's is comprised of nine sites utilizing state-of-the-art technology and fabrication methods. Among Reed's offerings are pre-engineered metal buildings, rigid frame buildings, Galv-Econ buildings, post-frame structures, mini storage buildings and LX Tube Building Structures.

www.reedsmetals.com
800-581-4645

EPS Structures



EPS manufactures pre-engineered post-frame and SIP buildings from three plants across the U.S. EPS markets these buildings through a dedicated dealer/builder network. Builders can offer customers building packages for residential, agricultural, and commercial use.

www.epsbuildings.com
712-859-3219

Trachte Building Systems



Trachte designs, manufactures, and erects a full line of steel self-storage buildings, including micro units, interior partition and corridor, and boat/RV.

www.trachte.com
608-837-7899

Stockade Buildings, Inc.



Stockade Buildings is celebrating 47 years of providing quality pre-engineered building packages and award-winning services to our Authorized Builders. For the Agricultural, Equestrian, Commercial, Industrial and the Housing market. Stockade has the pre-engineered system with the design flexibility for success.

www.stockadebuildingsinc.com
800-548-6765

Graber Post Buildings



Graber Post Buildings continues to be a phone call away for all post-frame building materials and do-it-yourself packages. GPB manufactures metal panels for any residential, commercial, industrial, agricultural or roofing application. It also produces custom trusses, metal trims, laminated poles and also features a steel coil division.

www.graberpost.com
800-264-5013

PRODUCT PROFILES

DOORS

Kevmar Garage Doors



Kevmar Garage Doors is a manufacturer of quality garage doors based in Arthur, Illinois. Door sales are primarily to post frame and backyard shed builders in the Midwest. The Kevmar product line includes 15 models available in 4 colors. Doors are typically delivered directly to builders on company trucks. Kevmar models also include a line of residential specialty doors.

www.kevmarmfg.com
217-543-2828

Plyco Corporation



If you're looking for a commercial, residential or agricultural door, Plyco has the right door for your construction projects. Contractors rely on Plyco for a comprehensive line of durable walk doors that meet today's building codes. Plyco offers pre-hung service doors individually packaged, pre-drilled for lock set, and insulated with injected polyurethane foam. Plyco walk doors are perfect for post frame, metal frame and commercial buildings.

www.plyco.com
800-558-5895

MWI Components



MWI's doors will make the impression you strive for. Choose from thousands of color combinations for your Bale, Dutch or Arcadian Sliding Doors. MWI's completely galvaneal substrate doors come in double cross-buck or half-light options; the company also offers sliding doors in fully assembled or kit form. Finish your look with the Arcadian Sabre Slim, an exterior lockable, polished, chrome-plated handle. The keyed entry on 1-1 1/2" Split Sliding Arcadian Doors and interior latch functions will make your doors the talk of the industry.

www.mwicomponents.com
800-360-6467 ext. 5

Diamond Doors



The Diamond bi-fold door and insulation package option is a great investment. ESP ridged board panels and foam weather seal create a complete barrier from the elements, preventing energy loss from your building. The insulation panels are pre-cut in factory for easy installation and have a consistent R value of R12 (2") and R16 (3"). These insulated bi-fold doors are great for heated machine shops and aircraft hangars.

<https://diamonddoors.com/>
866-325-7600

Extrutech Plastics, Inc.



Extrutech All Weather Doors are corrosion proof, bright white, with a smooth flat 1-3/4" thick PVC door panel and solid PVC frame with a weather strip sealed edge. They are available as single and double doors, in standard or custom sizes, as well as replacement door panels to fit existing frames. For use in high moisture, salty, acidic areas where corrosion may be a problem, or for controlled environments such as car washes, dairies, labs, and more.

www.epiplastics.com
888-818-0118

Safe-Way Door



Safe-Way Door is a leading manufacturer of quality residential, commercial and industrial overhead garage doors in steel, wood and aluminum. Doors are available in multiple configurations including polyurethane and polystyrene insulated, uninsulated and up to 11 colors in steel and multiple powder-coat colors in aluminum. Commercial door sizes are available in all panel designs. Pictured is an Ambient Model 273 with long tinted contemporary glass in Rosewood.

www.safewaydoor.com
574-267-2813

PRODUCT PROFILES

DOORS

I-Beam Sliding Doors



Sliding Doors with Ultra Glide Track & Trolley System. Heavy duty 6,000-lb. capacity and 115 MPH wind rated. Fully adjustable: up-down, in-out. Never drag, bind or come out of adjustment. Aluminum frame doors with easy latches. Plus, Incredible Swing Doors (shown). Electric screw-jack lift for ultimate safety. Aluminum frame, fully automated door system. Easily retro-fit.

www.ibeamdoor.com
815-945-3667

Trac-Rite Door



Trac-Rite manufactures roll-up doors for a multitude of uses including self-storage, residential, agricultural, and commercial, dedicated to providing long lasting products delivered with uncompromising service.

www.tracrite.com
608-837-8895

A.J. Manufacturing

A.J. Manufacturing builds high-quality steel walk doors. Options include pre-painted white, clay, bronze or brown panel and frame, or fully stainless steel doors. They are pre-hung in steel, aluminum or stainless steel frames with 4 x 4.5" fixed pin, or ball bearing hinges for 4-way universal swing, even with a foamed-in-place door lite or a deadbolt bore. The 1-3/4" doors are polyurethane foam injected for an R12 insulating value.



www.ajdoor.com
800-328-9448

Asta America



ASTA AMERICA is your trusted provider for sheet roll-up doors. For more than 30 years, ASTA AMERICA has provided high-quality products with unparalleled service to the carport and shed markets. We offer a full-line of sheet roll-up doors in every size, color and option in the book. We offer unwavering dedication to the quality of our products and commitment to unsurpassed customer service.

www.astaamerica.com
770-738-8103

Shed Windows and More, Inc.



Shed Windows and More specializes in doors that are the specific sizes needed for outdoor buildings such as sheds, garages, barns, playhouses, and chicken coops. Starting in 2019 we also started featuring garage doors, roll-up steel doors, fiberglass and steel pre-hung doors, and decorative glass inserts for doors. All doors are processed in house.

www.shedwindowsandmore.com
843-399-1820

Midland Door Solutions



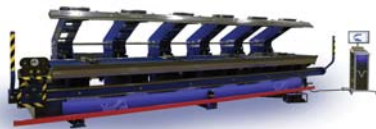
Midland Door Solutions is a full-service door manufacturer that designs, builds and installs customized bi-fold and hydraulic doors for agricultural, aviation and commercial buildings. The company also works with architects to develop unique and artistic door designs for specialized applications. For nearly 25 years, it has provided customers durable, high-quality doors and unparalleled customer service.

www.midlanddoorsolutions.com
800-921-7008

PRODUCT PROFILES

EQUIPMENT, MACHINERY, TOOLS

Hershey's The Metal Meister



Wouldn't you like to have the same kind of quality and service that you strive to deliver to your customers? Variobend USA is the answer to your quest for speed, accuracy, and service in a trim folder. European design coupled with American manufacturing and service, Variobend USA folders are built with you in mind. Look no further! You can experience it for yourself! Need more proof? We are happy to let you talk with Variobend USA owners.

info@HersheysMM.com
877-289-3030

Acu-Form



Acu-Form Trim Roll Formers produce precise parts in a variety of profiles, including custom matches. Our machines are built for longevity and ease of operation. All our forming dies are made from D2 tool steel for a longer wear life. The ease of operation and accurate production save you time, which is money. These machines can be powered by electric, hydraulic or mechanical.

www.acuformequipment.com
330-674-4003

Marion Manufacturing



Marion Manufacturing adds the value to the metal by designing, fabricating, and installing custom manufacturing and production machinery. Marion specializes in metal-forming equipment such as roll formers, uncoilers, shears, stackers, etc. Marion Manufacturing also offers a full-service machine shop and re-tooling and service on other brands of equipment.

www.marionmanufacturing.com
620-382-3751

Roll Former Corporation

Since 1978, Roll Former seamers have a history of quality and durability. Our seamers produce perfect seams on all materials from 12 oz. copper to 24 gauge



Kynar-finished Galvanize/Galvalume at 30 fpm without damage to the material. They can seam NTM, Knudson and ESE profiles! The Model SSX will form a complete double-lock standing seam with a single pass. Our exclusive nose switch cuts the unit off if it comes to the edge of the roof, eliminating expensive and time-consuming accidents.

www.rollformercorp.com
215-997-2511

H&D Quality Builders



Increase job site efficiency by eliminating the need to remove excess dirt out of post holes by hand before tamping. Replace manual labor with equipment and reduce worker injuries with The Badger™ post hole cleaner, which attaches to the skidsteer and auger heads you already have in your fleet. Our 51" extension shaft connects any 12" or larger Badger to a standard 2 9/16" auger head. Available in diameters from 6"-36" (custom sizes available). Patent pending.

www.onecleanhole.com
309-923-7321

The Bradbury Group



The Bradbury BOSS™ Series is a state-of-the-art roll former and closed-loop servo shear with speeds up to 300 fpm and accuracy of 1/16". The BOSS™ can be close coupled to a new or existing roll former. The Bradbury Group has the complete panel line solution for all production and budget requirements. Configurations include precut, post cut, Single High, Double High®, and Raftered® roll formers with flying or stop-to-cut shears.

www.bradburygroup.com
620-345-6394

PRODUCT PROFILES

FARM & RANCH PRODUCTS

MWI Components



Grab & pull down first grill bar to unlatch



MWI has standard grill, drop & yoke front, solid and mesh horse stalls with over 50 stock colors for stalls with normal lead times. Enjoy a longevity-aiding, powder-coat finish with river-texture that will hide dirt & imperfections! Also, consider color-matched track packages and latches including our 14 ga. steel Vault Latch™ with a horse play resistant, secure retention system! The easy, low-force activation latch has a concealed latch mechanism, comes in left & right-hand configurations, and there's no assembly required.

www.mwicomponents.com
800-360-6467 ext. 5

CannonBall:HNP



CannonBall offers horse stall systems in black powder-coated 14-ga. galvanneal steel and anodized extruded aluminum materials. Stall grille sections, window grilles and door packages are available in a variety of section lengths, and formed to fit standardized dimensional lumber for easy installation. Track and trolley systems, feeders and a full assortment of finishing accessories also complement traditional post and free-standing construction projects.

www.cnbhnp.com
800-766-2825

AG-CO LLC



Cupolas by AG-CO are easy to install (only 3 pieces, including weathervane), low maintenance and economical. The cupolas come in 13 different top colors, 13 bottom section colors and 15 different weathervanes. With thousands of combinations, your customers are sure to get a unique and attractive addition to their building.

www.ag-co.com
800-522-2426

Plyco Corporation



Plyco offers a complete line of components for horse barns and livestock facilities. Plyco is a leading supplier of wholesale horse stall kits, horse stall grills and gates and horse stable Dutch door systems, all available in a variety of custom styles. The company has its own hardware for slide doors: Ply-Trac and Combo. Horse barns can be topped off with ridge vents and cupolas from Plyco. Durable doors for livestock buildings include the 98 Series line of walk doors, all constructed to survive the most corrosive environments.

www.plyco.com
800-558-5895

Royal Crowne



Royal Crowne cupolas are sure to enhance your building with that finishing touch it deserves. Cupolas are available in many different styles and sizes to fit many building styles. These cupolas are made from either cellular-PVC or Western red cedar, which will outperform most comparable products. Cupolas are then capped with either a copper or metal roof color of your choice.

www.royalcrowne.com
717-288-2630

Graber Post Buildings



Graber Post Buildings has been building horse barns and supplying products and materials for horse barns since 1973. It has every item you'll need, from the complete building package to the smallest stall component including Dutch doors, sliding doors and other horse stall components. Graber Post also offers all sizes of tongue and groove lumber to construct your stalls.

www.graberpost.com
800-264-5013

PRODUCT PROFILES

FASTENERS

Atlas Bolt & Screw



Our Wood Ultimate is the ultimate wood fastener. Backed by a lifetime warranty, it's Zinc Alloy cast head is warranted against red rust for the life of the building. The Zinc Cast head prevents failure during installation. Outfitted with a Dekfast Multiseal Washer, its assured to seal even when driven at extreme angles. It's Type - 17 point helps penetrate metal quicker while minimizing chips. The Wood Ultimate is available in a variety of sizes.

www.atlasfasteners.com
800-321-6846

Maze Nails



Add richness, sophistication and eye-appeal to all of your building projects by using Maze pre-finished nails. And, save time by eliminating the labor intensive job of touching up nail heads! Many of the sizes and colors of our "Split-Less"® Wood Siding Nails, Rubber Washer Nails, Stainless Steel Trim Nails and Fiber Cement Siding Nails are kept in stock — ready to ship. Coil and collated stick nails are painted to match all the major manufacturers' colors. Proudly made in Peru, Illinois. USA.

www.mazenails.com
800-435-5949

Dynamic Fastener



Dynamic Fastener has added lengths to partner with the popular 12-16 x 1½" T-17 Hi-Lo fastener. Lengths now available: 2", 3", and 4". All are available with a T-17 point, Hi-Lo threads, and a 5/16" hex washer head. This screw is used to attach up to 18-ga. sheet metal to wood. The screws can also be used to plug a previous #9 or #10 pole barn screw or anytime a slightly larger fastener is desired. Available with or without a 9/16" outside diameter sealing washer. Comes standard with the Dyna-Coat® 1000-hour salt spray premium coating.

www.dynamicfastener.com
800-821-5448

Direct Metals Inc.



Direct Metals Inc. supplies fasteners and building accessories to the post-frame and steel-frame building industries. A key product is the #12 diameter SCAMP 304 Stainless Steel Cap metal-to-wood fastener that can be used in new construction or as a replacement fastener. Other products include PAN-CLIP fasteners, rivets and panel clips for standing seam metal roofs, sealants, pipe flashings, solid and vented foam closures, reflective insulation and polycarbonate panels.

www.directmetalsinc.com
855-800-8878

DB Building Fasteners, Inc.



DB Building Fasteners specializes in domestic and imported self drilling fasteners for the metal building and metal roofing industries. DB's sheet-to-wood fasteners are available in #9 twin lead, #10 type S and #14 Type S. DB can also paint any color in house.

www.selfdrillers.com
909-581-6740

Leland Industries



Mini Drill Points (MDPs) are the solution when fastening panels into wood or lightweight steel. MDPs deliver clean cut holes with no pig tailing, with industry leading pullout values. MDPs can drill up to 16 gauge and will not fracture Fiberglass or PVC panels. The High Hex Head provides stability during installation and our Flow Cone Washer will never leak. MDP's Low Profile Head is ideal for residential applications. MDPs can be powder coated to match the color and warranty of your panel.

www.lelandindustries.com
800-263-3393

PRODUCT PROFILES

FASTENERS

BECK America



Meet the family of FASCO® (member of the BECK Group) Jumbo Nailers that is perfect for projects that require workers to use 4" to 6-1/4" nails. The sheer efficiency by which you can work will automatically put more money in your pocket after only a few uses. Pair with our Jumbo Nails or SCRAIL® that come in a wide variety of finishes including our patented Diamond Coating. No more hammering by hand!

www.beck-america.com
800-239-T00L (8665)

AceClamp® Solar



Solar Snap™ by AceClamp® Solar™ is an adaptive, robust solar racking system built to withstand harsh High-Velocity Hurricane Zone winds up to Cat 5. Designed to work with any of AceClamp's metal roof clamps, it's an ideal solution for SSMR, Island Style Cement Cover Board Roofing, and Single-Ply. Fully assembled components make for an easy-to-use, fast-installing product. The unique cross-platform design adapts to all roof types, meaning you'll have less inventory to maintain.

www.AceClamp.com
860-351-0686

East Coast Fasteners



The Ply-Lo Extreme line of fasteners is designed for extreme environments. The Ply-Lo Driller is the latest innovative addition to the company's fastener line, designed to save contractors time and money. The patented Ply-Lo Driller features a design intended to be more forgiving than other fasteners. This means the tip is designed to reduce the likelihood of "walking" when fasteners are driven at a slight angle. East Coast has fasteners available in colors to match virtually any panel in lengths of 1", 1-1/2", 2", 2-1/2" and 3".

www.plyco.com
800-558-5895

Logan Stampings



Logan Stampings and Building Products Development (BPD), Logansport, Indiana, are two of the most well-known names in the metal building and metal roofing market. Products include standing seam roof clips and accessories for a multitude of metal roof systems. Their inventory levels enable them to offer same-day shipping with most stock orders.

www.WeGotClips.com
866-564-2678

SFS Group USA Inc.



The SFS ConnexTite™ structural wood screw line is ideal for single and multi-ply truss, column header and joist applications, providing quicker installation and lower installed costs versus carriage bolts or ring shanked nails. Featuring a countersunk or large flange head and aggressive thread design ensures quick, tight connections. The ribbed point cuts through the densest lumber without splitting. ConnexTite fasteners install with an impact gun and T25 or T40 bit and carry IBC 1603 approval for structural connections.

us.sfs.com
800-234-4533

S-5!



The S-5-NH 1.5 clamp is designed specifically for 1-1/2" nail strip profiles with a wider horizontal (base) dimension ($\geq 0.475"$ and $\leq 0.800"$) and is an ideal mounting solution for VicWest Prestige, NewTech FF150 and similarly-dimensioned profiles. Featuring an innovative reversible "hinge" insert that forms to the shape of the seam to prevent damage, the NH 1.5 allows for a superior fit on these nail strip profiles, while offering optimal holding strength.

www.s-5.com
888-825-3432

PRODUCT PROFILES

COLUMNS, FOUNDATION & TRUSS PRODUCTS

Perma-Column LLC



Perma-Column® and Sturdi-Wall®: Treat yourself and your projects better. Treated lumber prices are skyrocketing while availability has hit rock bottom. Perma-Column® precast concrete columns and Sturdi-Wall® anchor brackets are the post-framing solutions of choice. Get your projects back on track. Readily available nationwide. Build better. Build stronger. Build to last.

permacolumn.com
800-622-7190

FootingPad by AG-CO



FootingPad brand isolated post footings has introduced a 20" diameter footing. With over 300,000 sold, FootingPad has reduced the labor cost in thousands of buildings. These composite footings are lightweight and easy to use, saving labor and equipment wear and tear. The new 20" FootingPad has a load capacity of over 6,500 pounds and joins a line of four other sizes, with the largest, 24", carrying loads over 9,300 pounds!

www.footingpad.com
800-522-2426

GreenPost by PlanetSaver

GreenPost from PlanetSaver Industries is an affordable, all-in-one solution for in-ground post decay, treatment retention and uplift restraint. GreenPost double-layer wrap is factory heat-sealed to the lumber, and delivered ready to install with uplift restraint notches. When used with cement, this technique provides maximum anchorage characteristics, resisting post withdrawal generated by wind load. It is non-toxic, environmentally friendly and termite tested.

GreenPost applicators: Richland Laminated Columns LLC, Ohio, (419.895.0036) and Structural Glulam LLC, Pennsylvania, (717.355.9813).



www.advancedpostsolutions.com
610-377-3270

Post Protector



"Get" that all pressure-treated wood in ground contact will fail and that all "alternative" foundations are designed to "separate wood from ground contact." You'll "go" Post Protector! All the goodness of post frame... simplicity, speed, in-ground strength, DIY friendliness, and of course, value... just without the ground contact.

www.postprotector.com
877-WONT-ROT (966-8768)

Ridgeline Safety Systems



Ridgeline Safety Systems' fall arrest solutions make it easy for workers to tie off, thus preventing falls. The system has two main components: anchors and ridge hooks. Anchors attach to the trusses before setting or, for retrofits, as soon as the old ridge is removed. These permanent anchors provide immediate tie-off points and will be covered by the new ridge cap. Ridge Hooks are used after the ridge cap is on and provide no-hole tie-off points for workers or repair technicians.

www.ridgelinesafety.com
309-923-7321

Plasti-Sleeve Post Protection



First on the market by many years, Plasti-Sleeve literally created the foundation alternative category for post-frame construction. The clean fitting, easy-to-use, slide-on Post Protection sleeves provide the economical protection that many post-frame customers now expect. Quality black polyethylene plastic, more than 20 specialized sizes, and great pricing make Plasti-Sleeve a smart choice for post protection. Market leadership has continued with Short-Sleeve, for economical grade-level post protection, and Plasti-Skirt, an easy-to-use plastic skirt board protector.

www.plastisleeve.com
763-856-5555

PRODUCT PROFILES

COLUMNS, FOUNDATION & TRUSS PRODUCTS

Rigidply Rafters



Glue-laminated arches, beams, posts, and timber trusses manufactured by Rigidply Rafters give beauty a completely new meaning. Rigidply also manufactures metal-plated roof and floor trusses, tongue-and-groove and V-groove decking, and offers a complete line of post-frame building materials to complete your project.

www.rigidply.com
717-866-6581

Graber Post Buildings

Graber Post Buildings Inc. has been known for more than 30 years as a producer and supplier of quality building products to the post-frame industry. GPB Nail Lam column is another one of its top-quality products. This column has a #1 SPIB certified finger joint and GPB's program is inspected to ensure that its columns meet the high standards that its customers expect. GPB Nail Lam Columns will save you time and money on your next project.



www.graberpost.com
800-264-5013

Extrutech Plastics, Inc.



The Extrutech Plastics "stay-in-place" concrete form for poured walls is pre-cut to project specifications and snaps together with a double-spline E-locking system. The Extrutech FORM offers an easy-to-clean sanitary surface on both sides. The product creates a structural wall system that is builder- and customer-friendly for use in dairies, car washes or food facilities. Initially designed for 6" poured walls, it is also now available for 8" walls.

www.epiplastics.com
888-818-0118

Starwood Rafters



Starwood Rafters' laminated wood products include Lam-Ply Truss, the company's most popular product. It combines plywood with glulams and dimensional lumber for stronger trusses that can be spaced farther apart. It can be used in many applications.

www.starwoodrafters.com
888-525-5878

Levi's Building Components



Uplift Plates from Levi's Building Components are designed to help the post-frame builder save time, money and meet or exceed the post uplift requirements for concreted posts. These inexpensive plates can be field applied with just a framing hammer, eliminating the need for extra tools and time associated with rebar and other uplift technology. They're lightweight, easy to handle and easy to install. They are low cost and stronger than rebar and protect the center of the post by eliminating exposure to the elements, thereby resisting decay.

www.levisbuildingcomponents.com
877-897-7020

Richland Laminated Columns



Manufacture/Wholesale. We make and distribute Glulam Poles, Nailam Poles, Perma-Column precast concrete bases, Sturdi-Wall brackets, Greenpost/PlanetSaver post wrap, Post Protector/Grade Guard Sleeves and The Footing Pad. With several different foundation options available for your post frame buildings, turn to Richland Laminated Columns for the most trusted and recognized products available. We offer sales and service nationally.

419-895-0036

PRODUCT PROFILES

INSULATION

Covertch - rFoil



rFOIL 2500 Series reflective Insulation is a layer of polyethylene bubbles bonded to and sandwiched between a radiant barrier metalized foil and white polyethylene sheet. rFOIL is specifically designed to control heat gain/loss, and prevent interior condensation in all types of post frame, metal and metal-clad buildings. It provides the best defense against the radiant heat transfer that occurs commonly in building systems. The key is the aluminized surface which blocks 96% of radiant heat transfer.

www.rfoil.com
800-837-8961

MWI Components



Infinity Shield™ is offered in standard rolls of 4'x125' Single Bubble Foil/Foil, Double Bubble Foil/Foil, Single Bubble White/Foil and Double Bubble White/Foil. We also manufacture a no seam 6'x125' and 8'x125' roll version of all the available SKUs. Infinity Shield™ is cost efficient and hassle-free. Additionally, the standard crushed edge tab (2") will result in simplified overlapping. Our ultra-white bubble has a more opaque finish — a result of additives throughout all layers of the bubble.

www.mwicomponents.com
800-360-6467 ext. 5

Kennedy Insulation Group



Versola Reflective Insulation is manufactured in the USA by Kennedy Insulation Group. Our manufacturing facility is dedicated to reflective insulation exclusively and our products are RIMA verified. Our line of both single and double reflective one side or two have been extensively tested and have surpassed all industry standards.

kennedyinsulationgroup.com
877-358-4580

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Northwestern Ohio Foam Products manufactures high-performance insulation for the agricultural, residential, commercial and industrial construction markets. MicroFoil, Solex, and Performance Star lines of reflective material are high-quality products offering outstanding features and benefits, including multiple options and R-Values for all your building needs. The Barrier Radiant Floor Under Slab Insulation provides an ideal solution for radiant-heated slab projects.

www.nofp.com
419-335-4850

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www.certainteed.com
610-893-6200

PRODUCT PROFILES

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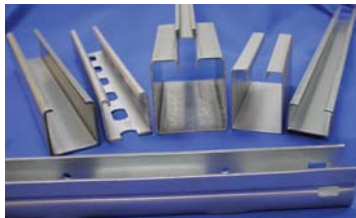
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APS500® Advanced Polymer Sealant is engineered to produce superior adhesion to metal, coated metals, aluminum, zinc, brick, wood, PVC and most common construction materials. It is a class 50 sealant that provides exceptional movement capabilities compared to other class 25 sealants. It is NSF registered, UV resistant, paintable, and provides long-life performance. It is formulated to install in temperatures as low as -32°F. Available in 24 standard colors, and in smooth or textured finish.

www.trianglefastener.com
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www.Johnsonrollforming.com
708-449-7050

RoofHugger



Roof Huggers are 10' long, tested, high strength, structurally correct, 16 gauge, 0.060" min., G-90, 50 KSI, "Z" shaped sub-purlins, specifically notched to let the ribs of any existing metal panel pass through the vertical leg of the "Z". This unique retrofit system allows any new metal roof to be installed over an existing metal roof without its removal, saving time and money, and allowing for thermal upgrading of the existing building.

www.roofhugger.com
800-771-1711

MWI Components



MWI's Uni-Seal® eliminates the need for angle-cut closures and is available in 20' rolls with factory-applied glue-strips: 1"x1"x20' and 1-1/2"x1-1/2"x20'. This valley and hip closure material consists of a polyurethane foam and has a vinyl coating. The continuous double glue strip is UV Stabilized and Fire Retardant.

www.mwicomponents.com
800-360-6467 ext. 5

Dynamic Fastener



Drop-Stop® sealer was designed for application to metal roofs and problem areas such as gutters and expansion joints. It can easily be applied over sloped, contoured surfaces and will give long-lasting, colorful protection. Made from select synthetic rubbers, Drop-Stop® is applied like heavy-bodied paints and stretches and recovers to bridge roof joints in which thermal movement can be expected. With 1,500 PSI tensile strength and 600% elongation capabilities, the product can tackle most metal repairs.

www.dynamicfastener.com
800-821-5448

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www.gssisealants.com
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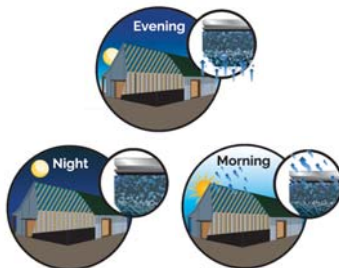
MFM Building Products Corp.



Peel & Seal is a versatile, self-adhering waterproofing membrane designed for low-slope roofing applications, as well as a flashing material around exterior penetrations and hard-to-waterproof areas. It features a tough, cross-laminated construction, self-seals around punctures, and can be left exposed to the elements. Comes in four color options, seven width sizes, and a 10-year warranty. Free samples available.

www.mfmbp.com
800-882-7663

DR!PSTOP



DripStop is the absolute best way to handle condensation in uninsulated metal buildings; it fights condensation without insulation. Specially designed air pockets store condensation and hold it overnight, then it evaporates back into the air as humidity. Since it arrives on the job-site already installed, it is not only safer, but it saves the time and labor costs of installing insulation. DR!PSTOP protects the steel by adding a layer of protection from the corrosive elements found in livestock confinement.

www.dripstop.com
937-321-3000

Marco Industries



As a leading ventilation manufacturer Marco Industries offers superior roof ventilation your way, with products tailored to fit your specific performance requirements and budget. Our ventilation products feature an exclusive nonwoven polyester material that delivers extreme durability, and breathes to help prevent moisture absorption. All ventilation products offer a 40-year limited warranty, easy one-person installations, and two full beads of M63, Marco's proprietary adhesive, for superior hold.

www.marcoindustries.com
800-800-8590

ST Fastening Systems



ST Fastening Systems supplies its MultiVent, MultiVent10, and MultiVent20 closures for those applications requiring airflow on metal roofs. Open cell foam MultiVent, 3' in length, woven polyester MultiVent10, 10' in length, and MultiVent20, 20' in length, allows as much as 98% free airflow through the material. However, it prevents wind-driven rain from penetrating the material when compressed. The designs are universal for both, with adhesive applied for easy field installation. MultiVent can be used on angled roof applications and MultiVent10 and MultiVent20 for ridge cap applications.

www.stfasteningsystems.com
800-944-8920

Ventco



ProfileVent is a single-layer ridge vent designed for metal roofs, specifically cut to fit more than 50 profiles. Mongoose, a ridge vent designed for sloped shingle roofs, has a pressure-sensitive strip to provide permanent adhesion to shingles. RidgeVent is an excellent choice for cedar, asphalt and slate roofs. Contractor's Choice ridge vent for sloped roofs helps vent the attic. Hip&RidgeVent for universal application to any screw down panels 1/2" to 1 1/2" high. All Ventco products are manufactured in the USA.

www.profilevent.com
833-300-9515

MWI Components



MWI offers a large color palette with over 100 colors for ridge vents to match most roll formers' metal panels. Additionally, MWI supplies Uni-Vent® II and Uni-Vent® III (to ventilate with a ridge cap) and manufactures two high and three low profiles of Ridg-Vents® for outstanding ventilation. To prevent rust stains and ease of handling, the vents have no raw metal edges. MWI is also the industry's leading manufacturer of steel and aluminum soffit. Pre-cut or special cut lengths are available, and sizes range from 7-144".

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PRODUCT PROFILES

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888-339-0059

ProVia



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www.provia.com
800-669-4711

Qora Cladding



Qora Cladding is an innovative cladding product that provides builders with the time-honored look of stone within hours versus weeks. Ideal for knee wall and wainscoting accents and applications, Qora Cladding's panelized system gives you faster coverage with an expansive 6.6 SF per panel. The product will not rot, decay or burn, and provides an aesthetic quality and 20-year warranty homeowners will love. Qora Cladding in Ashlar Stone is available in five colors.

www.qoracladding.com
301-223-2266

Graber Post Buildings



Graber Post Buildings has released a new Board & Batten siding panel. It provides the classic look of wooden board and batten with the strength and longevity of a steel siding system. We offer this in all 28 color options in 26 gauge.

www.GraberPost.com
800-264-5013

Petersen | PAC-CLAD



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www.pac-clad.com
800-PAC-CLAD

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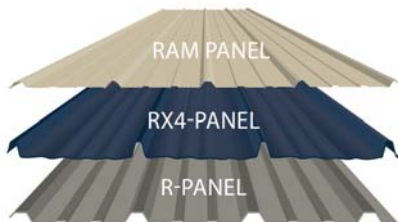
Union Corrugating Co.



Since 1946, Union Corrugating has been an industry leader in providing metal roofing products, supplies and wall systems for residential, commercial and agricultural applications. Our current residential and agricultural metal roofing options include MasterRib, ValuRib, Corrugated, 5V, SL150, Advantage-Lok II, FL100, Union Rib, TS-324, Trapezoidal Panel, 7/8 Corrugated, R/PBR/IR Panel, M Panel, SL175, ML150, and ML200. We also offer a full range of metal structural framing components including Ceese, Zeese, Receiver Channel and Eave Struts.

www.unioncorrugating.com
888-685-7663

Ramco Supply



Ramco Supply manufactures metal roofing panel systems. Standing seam roof profiles, exposed fastener and concealed fastener panels are available in a variety of substrates, gauges and colors, along with accessories, including DripStop. Ramco has developed a unique system that allows same-day pick-up of custom length metal roofing and siding, or Ramco can deliver and unload on-site in 48 hours.

www.ramcosupply.com
877-889-7802

Improved Website Includes Project Configurator Tool

S-5! recently launched its new website, www.s-5.com, which has been designed to create a more user-friendly, information-packed resourceful site for end-customers, manufacturers and distributors. The website now offers revamped content with up-to-date information and load test tables, featuring new and improved navigation, an enhanced user interface design and additional resources, including:

New Learning/Resource Center: Provides enhanced product pages, brochures, case studies, installation instructions and other marketing resources.

New Training Center: S-5! University features free live and on-demand webinars as well as AIA and NABCEP courses; also available in Spanish.

Improved Snow Calculator: The web-based snow calculator searches its en-

tire test database to determine accurate, engineered options and quantities for any application. Helps users understand their roof type, allows them to log and save all project data, and connect with a distributor or S-5! personnel to request an engineering stamp; with an option for exposed-fastened roofing.

New Project Configurator Tool: Helps customers design their projects from start to finish and guide them to find the right clamp, bracket and/or system for the specific roof profile. The Project Configurator Tool is linked to S-5!'s snow retention calculator. (A new solar calculator is coming soon.)

"We are delighted to offer a more user-friendly, up-to-date website providing web-based tools to help our customers make informed decisions," said S-5! CEO & Founder, Rob Haddock. **FBN**

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PRODUCT PROFILES

SNOW & RAIN MANAGEMENT

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www.s-5.com
888-825-3432

Dynamic Fastener



Dynamic Fastener's Dyna-Guard® snow retention system is designed to be used on virtually any style metal roof. Dyna-Guard® is an 8' long extruded aluminum rail with a T-shape profile. Dyna-Guard® is installed by attaching non-ferrous clamps or mounts to a metal roof and bolting or screwing the system to clamps or mounts. Eight Dyna-Clamps® with round-point stainless steel set screws and Sno-Dams® are also offered. Sno-Dams® attach to the back of Dyna-Guard® and inhibit snow and ice from sliding underneath.

www.dynamicfastener.com
800-821-5448

ST Fastening Systems



ST Fastening Systems offers Snow Trax snow-retention guards for exposed fastener roofs, and the MRC Snow Trax roof clamp for standing seam roofs. The Snow Trax is 16-ga. 304 stainless steel available in more than 20 powder-coated colors. Its adhered rubber gasket eliminates the need for additional sealant. The MRC is extruded aluminum and a colored rail slices through the clamp grooves to provide maximum protection from snow and ice.

www.stfasteningsystems.com
800-944-8920

SS Snow Stoppers



SS Snow Stoppers act as a restraining system that holds ice and snow in place, allowing it to melt away without the fear of sliding off of your roof. When installed properly, a barrier is created that does not distract from the aesthetics of your roof, but is still very effective at stopping an avalanche. RMG Premium and SS G Classic Snow Stoppers are 14-gauge stainless steel and come in 28 powder coated colors to match the roof.

717-598-0312

Raytec Manufacturing



HangTite and HangFast hidden gutter hangers, manufactured by Raytec Manufacturing, are exceptionally strong. Both have proven records of performance, strength, and ease of use in the field. Raytec engineers designed the Hangtite to be strong. Hangfast hangers, with the integrated screw, add speed to the installation without compromising performance. Both hangers are available in 5" and 6" sizes in aluminum, galvanized, and copper.

www.raytecllc.com
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The Snow Defender series is your quality choice for "Made in the USA" snow retention, with more than 40 quick-ship color choices in four styles: 4500 (shown) and 1500 for exposed fastener panels, 6500 for standing seam roofing, and 55RF for vertical seam profiles using S-5! Clamps—all with 15-year warranties. Levi's handy snow-guard calculator is available online.

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PRODUCT PROFILES

SOFTWARE

SmartBuild Systems



SmartBuild is a software system that empowers users to create custom designs for post-frame structures and sheds. SmartBuild uses cutting-edge technology to deliver complete 3D interactive input in a user-friendly web-based environment. Users are guided through a simple, menu-driven set of prompts to design any custom building. SmartBuild automatically creates framing, sheathing and trim cut lists, material lists, pricing, and drawings to make ordering materials streamlined.

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208-954-8570

New Program Provides Automated Metal Roof Bidding

SmartBuild Systems, along with its partners Sherwin-Williams and EagleView, has announced the launch of a new service available for customers of Sherwin-Williams. Roofing Passport [<https://smartbuildsystems.com/roofing-passport/>] is an integrated platform that completely automates the process of bidding on the reroofing of residential and commercial roofs, using metal panels.

Roofing Passport is a joint effort that marries EagleView's patented 3D roof geometry generation with the metal and trim specifying capability that SmartBuild built for its post-frame applications.

Once a user enters a street address into Roofing Passport, a 3D model of the roof populates in SmartBuild. The user selects a metal panel from a manufacturer's inventory and SmartBuild automatically does all the rest:

- Applies sheathing on the entire roof
- Selects all appropriate trims
- Does takeoff on all ancillary materials – screws, clips, adhesives, closure material, penetration boots, etc.
- Generates cut lists and shop drawings
- Calculates labor estimates and material pricing
- Creates the sales contract (via a completely customizable format)

According to Keith Dietzen, SmartBuild's CEO, "Roofing Passport is truly a game changer. Without ever leaving home or the office, a contractor can generate the most accurate bid of their life with less than five minutes of work -- and it costs as little as \$35. Unlike other systems that require users to manipulate geometry, or tell the software which pieces to use where, SmartBuild does all that thinking for you. Bid backlogs become a thing of the past!"

For manufacturers of metal panels, SmartBuild now offers tools for the post-frame market as well as the Metal Roofing market. **FBN**

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PRODUCT PROFILES

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www.us.onduline.com/pro
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MWI Components



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www.mwicomponents.com
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Plyco Corporation

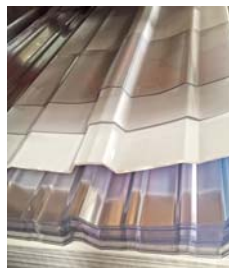
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www.directmetalsinc.com
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Palram Americas



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Below-Grade Insulation, Part 1

Preventing Frost Heave

By David R. Bohnhoff, Ph.D., P.E.
Professor Emeritus, University of Wisconsin – Madison

Editor's Note: This is part one of a two-part series that was originally published in *Frame Building News* in 2010. It will address the below-grade insulation inquiries that we have received. Table 2a (Freezing Degree Day Calculation) has been corrected since the original publication. Watch for part two – Preventing Heat Transfer – in the August edition.

It seems that recently more designers are questioning how to best insulate the foundation of a post-frame building. I attribute this to an increase in the number of heated post-frame buildings being constructed, along with an increased emphasis on reducing heat loss/gain in these buildings.

The latter is fueled by the green building movement and corresponding changes in energy conservation codes.

In virtually all cases where a post-frame building foundation is being insulated, the building has a concrete slab. The questions I get generally come from designers who have seen several different systems used to insulate these slabs, including systems that utilize exterior horizontal wing insulation (Figure 1a), systems that feature only vertical exterior insulation (Figure 1b), and systems in which insulation is placed under the concrete slab (Figures 1c and 1d).

Two Design Goals

It's important to understand that there are two principal reasons for installing below-grade insulation. The first is to control building heat loss/gain in an effort to minimize building operating costs and to reduce consumption of nonrenewable natural resources associated with energy

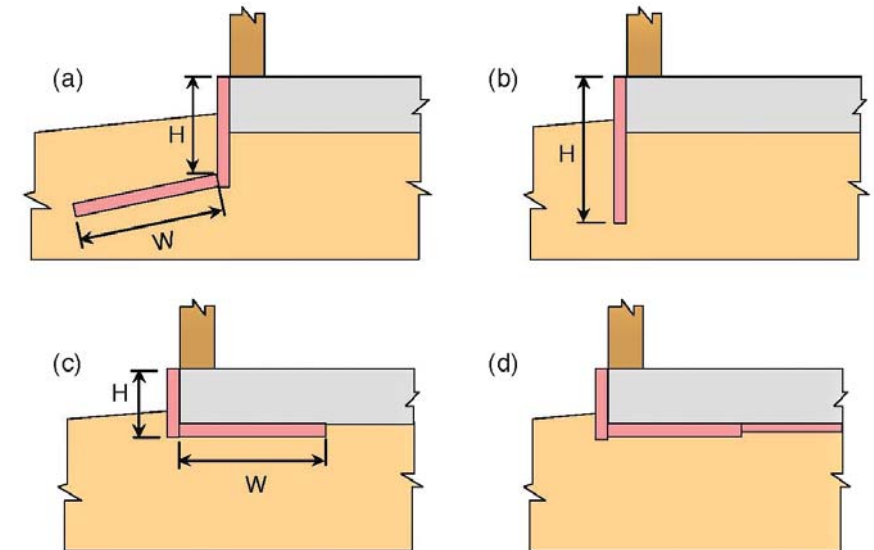


Figure 1. Below-grade insulation options for a concrete slab-on-grade: (a) vertical and horizontal wing insulation, (b) vertical insulation only, (c) insulation on outside and underside of perimeter edge, (and) (d) insulation on the outside edge and entire underside of slab.

production. The second is to prevent frost from heaving a slab and causing structural damage. The latter is a concern only in colder regions with frost-susceptible soils.

Designs for control of building heat loss/gain are based largely on requirements in American National Standards Institute (ANSI) and American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007 Energy Standard for Buildings Except Low-Rise Residential Buildings.

Designs for minimization of damage due to frost heave are based largely on requirements in Structural Engineering Institute (SEI) and American Society of Civil Engineering (ASCE) 32-01 Design and Construction of Frost-Protected Shallow Foundations.

The fact that SEI and ASCE administer

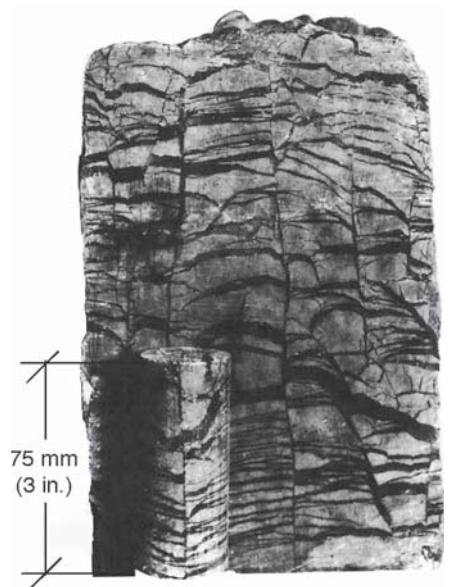


Figure 2. Sample of frozen clay showing ice segregation. From the *Canadian Foundation Engineering Manual*.

the standard that addresses frost heave and ASHRAE administers the standard that addresses building heat loss/gain underscores the two distinctly different purposes for using below-grade insulation — one structural and one energy related.

This article is the first in a two-part series on below-grade insulation of post-frame buildings. As the title indicates, this first article is dedicated to building design for frost-heave control. The second article will cover design requirements for heat-transfer control, as well as design details for below-grade insulation of post-frame buildings with embedded posts. These design details will be accompanied by a discussion on their constructability.

The Cause of Frost Heave

In areas where average daily temperatures stay below freezing for extended periods of time, soil heaving due to ice segregation can be a major concern. Ice segregation is the formation of discrete ice layers or lenses within the soil due to the migration and subsequent freezing of pore water, which is water in the spaces between soil particles. Frost heaving (also known as soil heaving or frost action) directly results from the fact that water expands approximately 9% in volume when it freezes.

The temperature at which pore water freezes depends largely on solute concentrations. Pore water with low solute concentrations will freeze within a fraction of a degree of 32°F, whereas pore water with high solute concentration may not completely freeze until its temperature has dropped to 25°F.

If pore water present near the soil surface at the beginning of winter were the only water to turn to ice, there would be no real frost heaving issues. Large ice layers and lenses (and hence problems) result when pore water turns to ice and then sucks water from warmer areas by capillary action. The suction that ice exerts on warmer soil water is termed cryosuction. As cryosuction feeds capillary water to the underside of ice layers and lenses, their thickness grows. The term ice segregation is used to describe this ice formation action because it segregates regions of previously mixed soil and water into regions of ice and dry soil.

Soil type	Frost susceptibility
Gravels and sands	None to low
Silty and clayey gravels	Low to medium
Silty and clayey sands	Low to high
Clays with a high plasticity index	Medium
Silts with a high plasticity index and clays with a low plasticity index	Medium to high
Silts with low plasticity index	Medium to very high

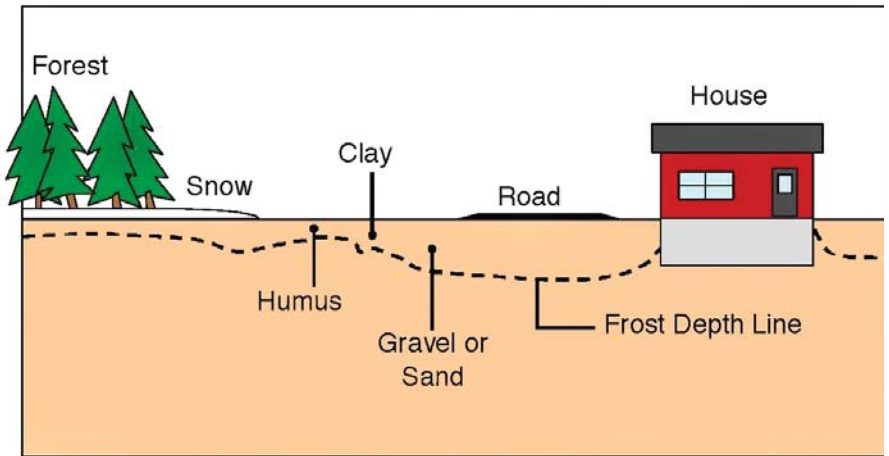


Figure 3. Effect of soil cover and soil type on frost penetration depth.

Table 2a Example Freezing Degree Day Calculation

Day	Maximum Daily temperature, °F	Minimum daily temperature, °F	Average daily temperature, °F	Freezing degree days per day ^(a) , °F•day	Cumulative freezing degree days ^(b) , °F•day
1	23	12	17.5	14.5	14.5
2	19	13	16	16	30.5
3	27	16	21.5	10.5	41
4	33	29	31	1	42
5	39	31	35	-3	39
6	37	24	30.5	1.5	40.5
7	19	8	13.5	18.5	59

- (a) A negative sign indicates a day when the average daily temperature was above 32 °F and thus more thawing than freezing occurred.
- (b) Assume Day 1 start of freezing season.

Segregation ice often forms regularly spaced layers as shown in Figure 2 [opposite page]. As each layer forms, it tends to suck the soil beneath it dry. When the force of cryosuction is no longer able to lift water from below, thickening of the current layer ceases, and cooling proceeds downward until a new ice layer can begin to form at a greater depth.

It is important to understand that ice segregation (and hence soil heaving) requires the presence of three components: frost-susceptible soils, water, and freezing temperatures. Remove any one of these three, and frost heave does not occur.

Frost Susceptibility of Soils

The frost susceptibility of a soil is largely a function of the amount and relative size of smaller soil particles. Smaller particles fill spaces between larger particles, thus reducing the effective size of soil pores. The smaller the effective pore size, the greater the capillary action within the soil.

In the Canadian Foundation Engineering Manual, soil scientist Arthur Casagrande reports that “under natural conditions and with sufficient water supply, expect considerable ice segregation in uniform soils containing more than 3% of grains smaller than 0.008 inches and in very uniform soils containing more than 10% smaller than 0.0008 inches. No ice segregation was observed in soil containing less than 1% of grains smaller than 0.0008 inches, even if the groundwater was as high as the frost line.” The manual also states that “the borderline between soils that are frost-susceptible and those that are not is not distinct, and those which appear to fall just clear of the Casagrande criteria should be treated with caution.”

Table 1 lists the frost susceptibility of soils. To relate soil types in the table to Casagrande’s limits, note that clay-sized particles are defined as those less than 0.00008 inches, silt-sized particles as those between 0.00008 and 0.003 inches, and sand-sized particles as those between 0.003 and 0.08 inches. As a point of reference, particles less than 0.003 inches in diameter (silts and clays) cannot be distinguished with the naked eye.

Table 1 shows that frost heave is a non-issue when one is building on sands and gravels that do not contain silts and clays. As silt content increases, frost heave becomes more problematic. The most frost-susceptible soils are silts with a low plasticity index (PI). The PI indicates the breadth of the range of soil moisture content values for which a soil exhibits plastic properties. Soils with a high PI tend to have more clay-sized particles and clay-type minerals. On the basis of the previous discussion, one may conclude that soils with a higher PI are more susceptible to frost heave. This is true to a point. As the clay content of a soil increases, a point is reached where the clay content is so high, and effective pore size so small, that water is essentially blocked from

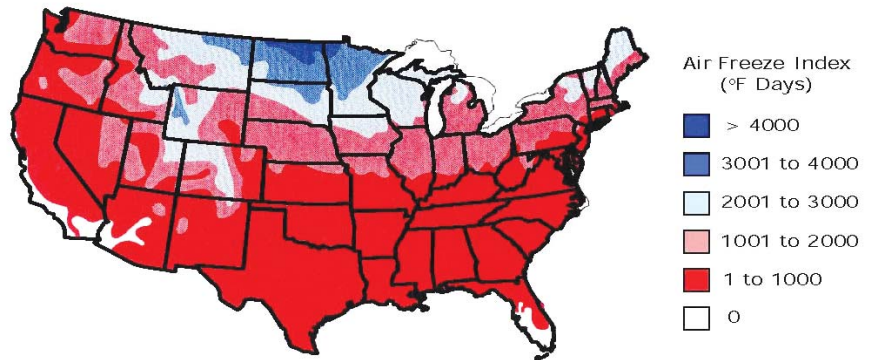


Figure 4. Air freezing index (AFI) values for a 100-year mean return period.

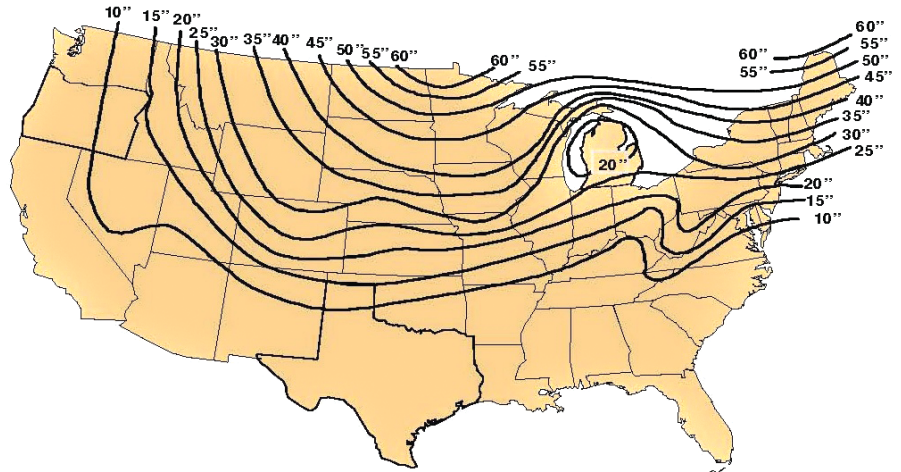


Figure 5. Average annual frost penetration depths.

moving through the pores. This is why a pure clay soil (i.e., a soil with a very high PI) is not as susceptible to frost heave as a pure silt soil (i.e., a soil with a lower PI).

Frost Penetration Depth

Frost heave is a problem only if the soil under a foundation freezes. To what extent frost penetrates a soil depends on soil type and cover (Figure 3) and on the temperature and duration of the winter weather.

The best measure of overall coldness and duration of winter weather is the air freeze index (AFI). This predictor of frost penetration depth is determined from cumulative freezing degree days. One freezing degree day accumulates for each degree the average daily temperature is below 32°F, with the average daily temperature taken as the average of the minimum and maximum daily temperatures. Table 2 shows how freezing degree days would accumulate for a 7-day period.

The AFI for a given winter is the largest difference between the maximum freezing degree day cumulative total reached at the start of the winter season and the minimum total reached during

the same winter. Figure 4 contains a map of the AFI100 values for the contiguous United States. AFI100 values are AFI values with a mean reoccurrence interval of 100 years. In Alaska, AFI100 values range from a low of 1,000 °F•days to a high of 12,000 °F•days!

Average annual frost penetration depths for the contiguous United States are shown in Figure 5. Because frost frequently penetrates depths greater than the average annual depth, foundations on frost-susceptible soils should always be placed at depths greater than those in Figure 5 unless other steps are taken to keep the soil below the foundation dry or from freezing.

Frost Heave of Shallow Foundations

With respect to frost heave, a shallow foundation is defined as any foundation whose base is not located below frost penetration depth. According to this definition, the embedded post-foundations used to support many buildings would not be classified as shallow foundations because they are purposely designed and installed with their base below frost penetration depth.

A concrete slab-on-grade floor placed inside a building with embedded posts should be treated as a shallow foundation. When overlying frost-susceptible soils, this slab may be subjected to frost heave unless the soil is kept relatively dry or is prevented from freezing. Frost heave in this case results in differential movement between the slab and embedded posts and can result in structural damage. Heaving will tend to be more uneven in a heated building because heat loss through the slab is more likely to keep soil under interior portions of the slab from freezing, while soil under slab edges freezes and heaves. It is not uncommon for such action to result in the formation of a crack in the slab that runs parallel to an exterior wall. This same differential slab movement and associated cracking are also a concern in buildings with posts mounted on the slab.

In general, if moisture in frost-susceptible soils underlying a slab is allowed to freeze, the slab would need be engineered with a proper amount of steel reinforcing to enable the slab to span, without failure, from high point to high point on the swollen soil surface. However, because no quick or accurate method currently exists for predicting variations in the location and magnitude of frost heave under a slab, designing a slab to float on frozen soil is really not an option available to the designer.

Another reason for not allowing soil under a slab to freeze is that frozen soil becomes extremely weak as it thaws. In fact, soil

left saturated by melting water is generally measurably weaker than it was in its prefreeze state. This reduction in soil strength is referred to as thaw-weakening. It is a major problem with clay and silt-type soils and is largely responsible for the formation of potholes in asphalt pavements.

Documents containing procedures for sizing concrete slab-on-grade floors include these: American Concrete Institute (ACI) 360R-06 Design of Concrete Slabs on Ground, the U.S. Department of Defense’s Unified Facilities Criteria (UFC) 3-320-06A Concrete Floor Slabs on Grade Subjected to Heavy Loads (available for free download at https://www.wbdg.org/FFC/DOD/UFC/ufc_3_320_06a_2005.pdf), Concrete Floors on Ground, written by J. A. Farny and S. M. Tarr and published by the Portland Cement Association (PCA), and Design of Post-Tensioned Slabs-on-Ground, published by the Post-Tensioning Institute (PTI). Although none of these documents contains methodology for predicting the effects of frost heave, the PTI document contains procedures for determining differential slab heave due to moisture content changes in expansive and compressible soils.

Methods For Minimizing Frost Heave Under Shallow Foundations

To minimize frost heave potential, a designer has two primary options: Place the foundation on well-drained soils that are not susceptible to frost heave, or prevent soil under the foundation from freezing.

Building on well-drained soils that are not frost heave susceptible is the most common method used to minimize frost heave. This option frequently involves replacing any frost-susceptible soils located within 1 or 2 feet of grade with sands and gravels. The depth to which such soil replacement is needed depends primarily on frost penetration depth and on the quantity of heat lost from the building to the soil.

It is always beneficial to construct the subgrade so that the soil underlying the foundation stays relatively dry. Not only is this

Table 3 Minimum Insulation Requirements for Frost-Protected Footings in Heated Buildings^(a)

AFI ₁₀₀ ^(b) , F•days	Vertical insulation		Horizontal wing insulation along walls		Horizontal wing insulation at corners		
	Minimum R-value ^(c) , h•ft ² •°F/Btu	Minimum depth below grade, D, inches	Minimum R-value ^(c) , h•ft ² •°F/Btu	Width, W _w , inches	Minimum R-value ^(c) , h•ft ² •°F/Btu	Width, W _c , inches	Length, L _c , inches
1,500 or less	4.5	12	NR	NR	NR	NR	NR
2,000	5.6	14	NR	NR	NR	NR	NR
2,500	6.7	16	1.7	12	4.9	24	40
3,000	7.8	16	6.5	12	8.6	24	40
3,500	9.0	16	8.0	24	11.2	30	60
4,000	10.1	16	10.5	24	13.1	36	60
4,500	12.0	16	12.0	36	15.0	48	80

(a) Insulation requirements are for protection against frost damage in heated buildings. Greater values may be required to meet energy conservation standards. Interpolation between values is permissible.
 (b) Air freezing index for 100-year mean return period. See Figure 4 for values by location.
 (c) Use the appropriate *effective* R-value from Table 4 when determining whether an insulation meets the minimum required R-value.

Table 4 Design Values for FPSF Insulation Materials

ASTM C578 insulation type ^(a)	ASTM C578 minimum insulation density, lbm/ft ³	Effective R-value per inch of thickness, $r_{eff}^{(b)}$, h•ft ² •°F/Btu/in.		ASTM C578 nominal R-value per inch of thickness, h•ft ² •°F/Btu/in.	ASTM C578 compression strength at yield or 10% deformation ^(a) , lbf/in ²	Allowable bearing capacity ^(c) , lbf/ft ²	Minimum insulation thickness, inches		
		Vertical	Horizontal				Vertical	Horizontal	
Expanded Polystyrene (EPS)	II	1.35	3.2	2.6	4.0	15	720	2	3
	IX	1.9	3.4	2.8	4.2	25	1,200	1.5	2
Extruded Polystyrene (XPS)	X	1.35	4.5	4.0	5.0	15	720	1.5	2
	IV	1.6	4.5	4.0	5.0	25	1,200	1	1.5
	VI	1.8	4.5	4.0	5.0	40	1,920	1	1
	VII	2.2	4.5	4.0	5.0	60	2,880	1	1
	V	3.0	4.5	4.0	5.0	100	4,800	1	1

(a) The primary means for identifying ASTM C578 insulation type at a retail level is via the compression strength at yield or 10% deformation. For example, Owens Corning's Foamular 150, 250, 400, 600, and 1000 are XPS insulations with compressive strengths of 15.0, 25.0, 40.0, 60.0, and 100.0 lbf/in², respectively, and they are classified as ASTM C578 types X, IV, VI, VII and V, respectively.

(b) Effective R-values are based on laboratory tests and field studies of insulation products under long-term exposure to moist, below-ground conditions. 'Vertical' effective R-values shall be used for insulation placed vertically on exterior foundation walls. 'Horizontal' effective R-values shall be used for insulation placed horizontally below ground.

(c) Allowable bearing capacity is based on ASTM C578 compressive strength at 10% deformation divided by a safety factor of 3.0 for conditions without cyclic loading (e.g., highway vehicle loading).

important for minimization of frost heave, it is also important for maintaining soil bearing capacity, maximizing soil thermal resistance, minimizing liquid and vapor diffusion into a building, and extending the durability of building components in soil contact.

The extent to which the soil underlying a foundation can be kept dry depends on such factors as foundation elevation relative to the surrounding terrain, soil type, distance to the ground water table, and type of perimeter drainage system (if employed). With respect to soil type, coarse-grained soils (i.e., sands and gravels) are much preferred because they drain quickly and are associated with minimal capillary action. As a rough approximation, capillary rise is 3 inches in a fine gravel, 6 inches in a coarse sand, 10 inches in a medium sand, 20 inches in a fine sand, 40 inches in a silt, and 80 inches in a clay. As previously noted, capillary action for a particular soil is largely a function of the amount and relative size of the smaller particles in the soil as they dictate capillary size. Thus, a soil that is 80% sand and 20% clay is likely to have a capillary rise approaching that of a pure clay soil.

The second option for control of frost heave is to prevent freezing of soils located under the slab with a strategic use of insulation as shown in Figure 6. This insulation keeps building-heat energy and/or heat energy stored in deep underlying soil from being rapidly lost to cool winter air. When properly sized and placed, the insulation keeps all soil located immediately below even the shallowest of foundations from freezing. Shallow foundations that feature such insulation systems are commonly referred to as frost-protected shallow foundations (FPSFs).

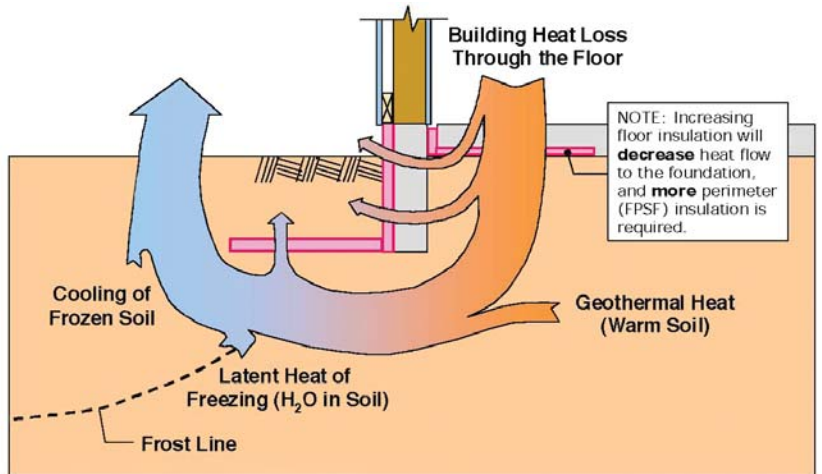


Figure 6. FPSF heat flow diagram for a heated building with optional floor insulation.

SEI/ASCE 32-01

Procedures for sizing and locating FPSF insulation are contained in SEI/ASCE 32-01 Design and Construction of Frost-Protected Shallow Foundations. SEI/ASCE 32-01 is actually a slightly modified version of a National Association of Home Builders Research Center (NAHB RC) document published in 1994. The NAHB RC document was based on Scandinavian codes in existence since the 1960s; since the early 1950s, more than 1.5 million homes have been built with FPSFs in Sweden alone. NAHB RC prescriptive requirements for FPSFs appeared in the original version of the International Residential Code published in 2000. SEI/ASCE 32-01 was published in 2001 (as the -01 indicates).

The manner in which FPSF insulation is installed depends on the thermal classification of the building. SEI/ASCE 32-01 defines three building types: heated, unheated, and semiheated. A heated building is one with a minimum average monthly indoor

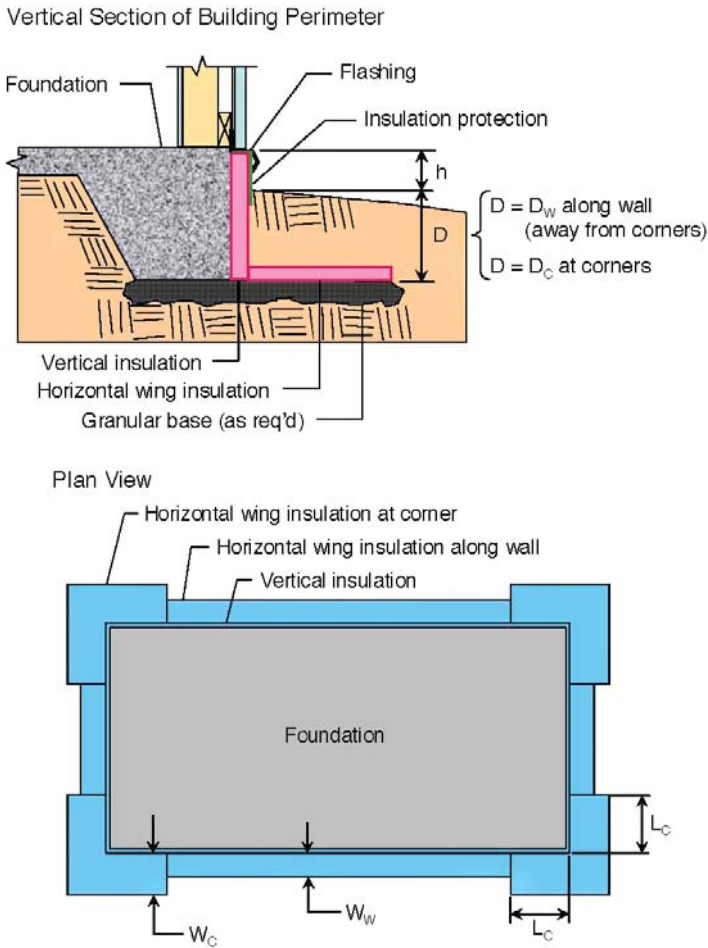


Figure 7. Frost protected shallow foundation dimensions. The floor height above the finished grade (dimension h) is limited to a maximum of 12" when the simplified FPSF design method is used.

temperature greater than 63°F. An unheated building is one with a minimum average monthly indoor temperature less than 41°F. Buildings falling between these two extremes are defined as semi-heated.

Slab-on-grade floors of heated buildings are protected from frost heave by using the insulation systems shown in Figures 1a and 1b. Although systems with insulation located under the slab (Figures 1c and 1d) prevent building heat loss, it may not prevent soil located directly under the slab from freezing at locations near the building perimeter.

Simplified FPSF Design Method for Heated Buildings

SEI/ASCE 32-01 contains both a simplified and a detailed method for determining insulation requirements for heated buildings. The simplified FPSF design method is a prescriptive specification requiring insulation in accordance with Table 3. This table contains R-values and dimensions for exterior vertical insulation and exterior horizontal wing insulation. Dimensions used in Table 3 are graphically defined in Figure 7. Table

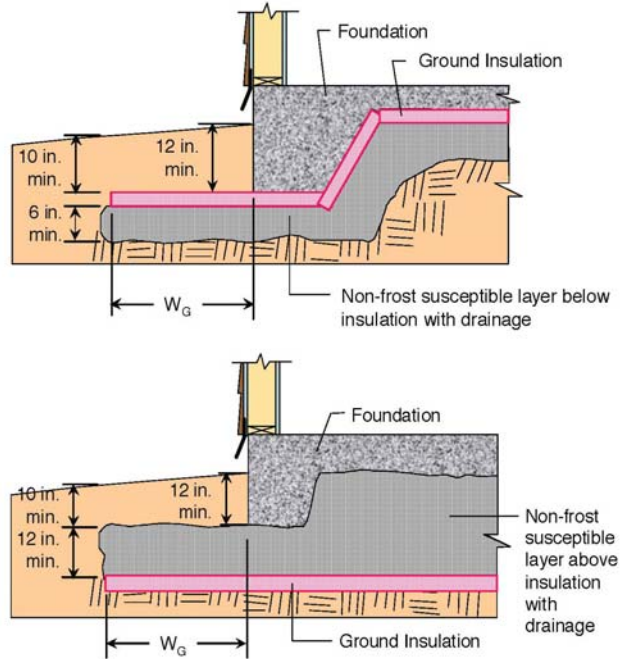


Figure 8. FPSF dimensions for an unheated building.

4 contains effective insulation R-values to be used when one is determining whether insulation meets the required minimum R-value specified in Table 3. The simplified design method cannot be used when there is insulation underlying the slab with an R-value greater than $10 \text{ h} \cdot \text{ft}^2 \cdot \text{°F}/\text{Btu}$.

Detailed FPSF Design Method for Heated Buildings

In reality, there are an infinite number of combinations of insulation dimensions and R-values for both vertical and horizontal wing insulation that can be used to protect a heated building from frost heave. The SEI/ASCE 32-01 detailed FPSF design method is a performance specification that provides the designer with the flexibility to select the combination of insulation R-values and dimensions that work best for the job. In addition, the detailed method enables the designer to account for effects of insulation placed directly under a slab-on-grade floor. As noted in Figure 6, such insulation will decrease heat flow to the foundation, thereby requiring more perimeter insulation.

The detailed FPSF design method consists of the following steps:

Step 1: Determine the site’s design AFI. Approximate the AFI from Figure 4 or obtain a more site-specific value from the National Climatic Data Center FPSF website (<https://www.ncdc.noaa.gov/climate-information/statistical-weather-and-climate-information/frost-protected-shallow-foundations>).

Step 2: Calculate the R-value for the floor slab, R_F . Consider all insulating materials in the cross-section, including any floor covering. Table 5 contains R-values for selected materials. When determining R_F , use dry-condition R-values for all materials includ-

Table 5 Thermal Properties of Selected Floor Materials (ASHRAE Handbook of Fundamentals)

Material description	R-value per inch of thickness, $h \cdot ft^2 \cdot ^\circ F / Btu \cdot in.$	R-value, $h \cdot ft^2 \cdot ^\circ F / Btu$
Plywood or wood subfloor	1.25	
Wood (lumber)	0.90	
Concrete (150 lbm/ft ³)	0.05	
Concrete (100 lbm/ft ³)	0.18	
Gypsum-fiber concrete (87.5% gypsum, 12.5% wood chips)	0.60	
Cement/lime, mortar, and stucco (120 lbm/ft ³)	0.10	
Cement/lime, mortar, and stucco (80 lbm/ft ³)	0.22	
6 mil plastic		negligible
Carpet and fibrous pad		2.08
Carpet and rubber pad		1.23
Cork tile (0.125 inches thick)		0.28
Terrazzo (1.0 inches thick)		0.08
Tile (asphalt, linoleum, vinyl, rubber)		0.05
Wood flooring (0.75 inches thick)		0.68

Table 6 Required Thermal Resistance of Vertical Wall Insulation

AFI ₁₀₀ , F•days	Minimum R-value of vertical wall insulation ^(a) , R_v , $h \cdot ft^2 \cdot ^\circ F / Btu$					
	Floor height above finished grade, $h < 12$ in.			Floor height above finished grade, $h = 24$ in.		
	$R_F \leq 6$	$R_F = 15.0$	$R_F = 28.0$	$R_F \leq 6$	$R_F = 15.0$	$R_F = 28.0$
375 or less	0.0	4.5	5.7	3.0	5.7	8.5
750	3.0	5.7	8.5	4.6	5.7	11.4
1,500	4.5	5.7	8.5	5.7	5.7	11.4
2,250	5.7	5.7	8.5	5.7	7.4	14.2
3,000	5.7	6.8	9.7	5.7	8.5	15.3
3,750	5.7	8.0	11.4	6.8	9.7	17.0
4,500	6.8	10.2	13.6	8.0	11.9	19.3

(a) Interpolation of R_v values is permitted for h values between 12 and 24 inches, R_F values between 6, 15, and 28 $h \cdot ft^2 \cdot ^\circ F / Btu$, and all listed AFI₁₀₀ values.

Table 7 Minimum Insulation Dimensions with No Wing Insulation or with Wing Insulation at Corners Only^(a)

AFI ₁₀₀ , F•days	No wing insulation			Wing insulation ($R = 5.7 h \cdot ft^2 \cdot ^\circ F / Btu$) at corners only		
	Vertical insulation depth along walls, D_w , inches	Vertical insulation depth at corners, D_c , inches	Vertical insulation length at corners, L_c , inches	Vertical insulation depth along walls and corners, D_w and D_c , inches	Vertical insulation length at corners, L_c , inches	Width of wing insulation at corners, W_c , inches
1,500 or less	12	12	-	12	-	-
2,250	14	14	-	14	-	-
2,625	16	24	40	16	40	20
3,000	20	32	40	20	40	20
3,375	24	40	60	24	60	20
3,750	30	51	60	30	60	24
4,125	36	63	60	36	60	32
4,500	43	71	80	43	80	32

(a) Interpolation of dimensions is permitted for intermediate AFI₁₀₀ values.

Table 8 Required Thermal Resistance of Wing Insulation for Use Along Walls with $D_w = 16$ inches^(a)

Width of wing insulation along wall, W_w , inches \	12	18	24	30	36	42	48
AFI ₁₀₀ , $^\circ F \cdot days$	Minimum R-value of wing insulation along wall, R_{wi} , $h \cdot ft^2 \cdot ^\circ F / Btu$						
2,250 or less	0.0						
2,625	2.5						
3,000	6.5	6.1	5.3	4.5			
3,375		8.2	7.4	6.5			
3,750			9.1	8.5	7.7		
4,125			11.2	10.2	9.6	8.9	
4,500				12.3	11.4	10.7	10.0

(a) Interpolation of R-values is permitted between W_w values and between AFI₁₀₀ values.

Table 9 Required Thermal Resistance of Wing Insulation for Use at Corners with $D_c = 16$ inches^(a)

Width of wing insulation along wall, W_w , inches \	16	24	30	36	42	48
AFI ₁₀₀ , $^\circ F \cdot days$	Minimum R-value of wing insulation along wall, R_{wi} , $h \cdot ft^2 \cdot ^\circ F / Btu$					
2,250 or less	0	0.0				
2,625	40	6.5	4.9	4.0		
3,000	40	9.6	8.6	8.0	7.4	
3,375	60		11.1	10.5	9.8	9.1
3,750	60		13.1	12.5	12.0	11.2
4,125	60			14.5	13.7	13.0
4,500	80				15.9	15.1

(a) Interpolation of R-values is permitted between W_w values and between AFI₁₀₀ values.

ing insulation. If RF varies over the slab area, calculate RF as the average over the perimeter (i.e., outer) 3 feet of the floor. If RF exceeds 28 $h \cdot ft^2 \cdot ^\circ F / Btu$, the designer must follow guidelines in the following section for an unheated building, because heat from the building is substantially blocked from moving into the ground and protecting the foundation.

Step 3: Use Table 6 and the information from Steps 1 and 2 to determine the required R-value of the vertical insulation, R_v .

Step 4: Based on the required R_v from Step 3, select an adequate thickness of insulation using the effective R-values, r_{ep} listed in Table 4. Individual panel thickness shall not be less than the minimum insulation thicknesses listed in the right columns of Table 4. Vertical insulation must extend from a depth D to the exterior, above-grade wall without exposing the foundation wall or other thermally conductive materials, as shown in Figure 7.

Step 5: Use Table 7 to select insulation dimensions for situations in which no wing insulation is desired, or where wing insulation is desired at corners only. Note that this wing insulation must have an R-value of 5.7 $h \cdot ft^2 \cdot ^\circ F / Btu$. Alternatively, use Tables 8 and 9 to determine wing insulation dimensions and R-values for applications where the depth D of all vertical insulation (i.e., that along the wall and at corners) will be fixed at 16 inches.

Step 6: Select an adequate thickness for required wing insulation by dividing the required minimum R-value of the insulation by its effective horizontal R-values, r_{ep} listed in Table 4.

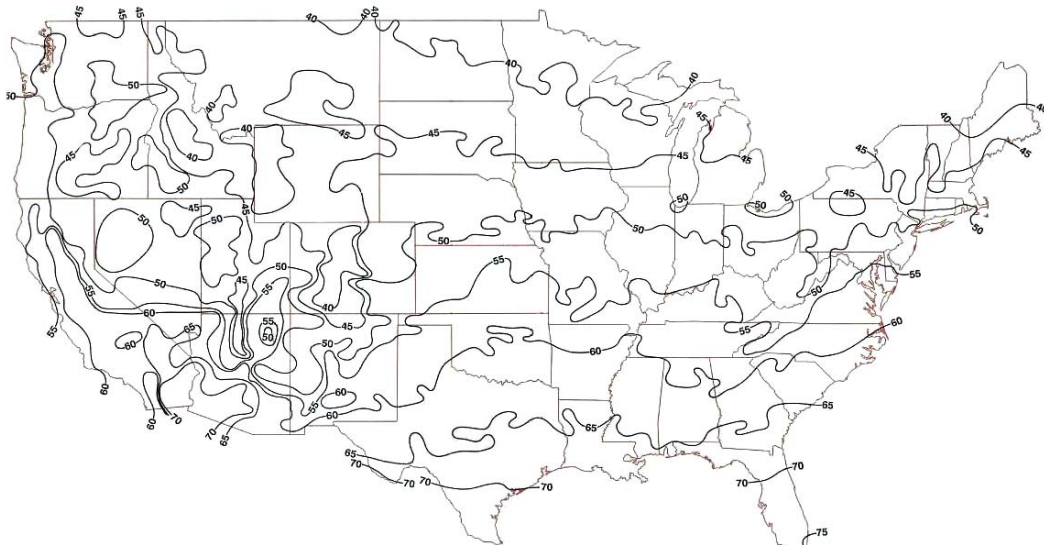


Figure 9. Mean average annual temperatures for the contiguous United States.

Table 10 Required Ground Insulation Properties for Unheated Buildings^(a)

Mean annual temperature, °F\		< 32	36	38	40	> 41
AFI ₁₀₀ , °F•days	Minimum horizontal extension ^(b) , W _G , inches	Minimum R-value of below slab insulation and horizontal insulation extensions, h•ft ² •°F/Btu				
750 or less	30	5.7	5.7	5.7	5.7	5.7
1,500	49	13.1	9.7	8.5	8.0	6.8
2,250	63	19.4	15.9	13.6	11.4	10.2
3,000	79	25.0	21.0	18.2	15.3	14.2
3,750	91	31.2	26.1	22.7	-	-
4,500	108	37.5	31.8	-	-	-

(a) Interpolation of R-values is permitted between mean annual temperatures and between AFI₁₀₀ values.
 (b) Horizontal extension width is the same for corner locations as it is for points along the wall.

FPSF Design Method for Unheated Buildings

Geothermal energy is solely relied upon to keep frost-susceptible soils beneath the foundation of unheated buildings from freezing. As Figure 8 shows, this energy is prevented from rapidly leaving the soil by a continuous layer of insulation placed under the entire foundation. A non-frost-susceptible soil layer at least 6 inches thick must be placed below the insulation, or a non-frost-susceptible soil layer at least 12 inches thick must be placed above the insulation. The ground insulation layer and the non-frost-susceptible layer are additive to the minimum footing depth of 12 inches shown in Figure 8. Outside the foundation perimeter, the insulation must have a soil cover at least 10 inches thick.

The distance W_G that the ground insulation is required to extend past the perimeter of the building and the R-value of the insulation are obtained from Table 10. These values are dependent on AFI₁₀₀ values as well as the mean annual temperature for the building site. See Figure 9 for mean annual temperatures.

R-values from Table 10 may be reduced by 0.3 h•ft²•°F/Btu for every 1 inch that the non-frost-susceptible layer thickness is increased beyond the required minimum. In addition, the R-value can be reduced by 0.3 h•ft²•°F/Btu for every 1-inch increase in soil cover thickness above the 10-inch minimum. Finally, W_G

may be reduced by 1.25 inches for every 1 inch that the insulation is buried beyond the 10-inch minimum cover.

FPSF Design Method for Semi-heated Buildings

The foundation of buildings classified as semi-heated shall be designed in accordance with the detailed FPSF design method for heated buildings, but with the minimum vertical insulation depth increased by 8 inches for both wall and corner areas of the semi-heated building.

Summary

Two good options exist for minimizing frost heave of shallow foundations in cold climates. First, the foundation can be located on soils not susceptible to frost heave. In this case, not all soils below a foundation need to be non-frost-susceptible, only those located above the frost penetration depth. The second option is to install insulation that prevents soil underlying the slab from freezing. Data and procedures presented in this article can be used to size these insulation systems. In heated buildings, this insulation is located around the outside of the foundation. In unheated buildings, it is located directly under the entire foundation. **FBN**



Brace For It

Set yourself up for success when installing initial long-span trusses

By Sean Shields, SBCA

Long-span truss installation isn't for the faint of heart. Post-frame builders know this better than most. As the first article in this series pointed out [*Frame Building News*, November 2020, pp. 28-30], trusses are designed to only support loads applied within a specific, typically vertical, plane. This is because trusses are narrow in relation to their depth and span and require lateral support as a result. Without this lateral support, the truss, or a portion of its members, will tend to buckle out-of-plane. This lateral bending increases as the truss span lengthens, making it more difficult to keep longer span trusses in plane throughout the installation process.

With this in mind, the second article in this series provided best practices pertaining to truss delivery and jobsite storage. [*FBN* January 2021, pp. 24-26.] Since lateral bending can cause significant damage to the truss, sometimes in ways that are not readily apparent during installation, it behooves the installer to work with the component manufacturer (CM) to make sure the trusses are delivered to a location on the jobsite that reduces necessary handling.

The third article focused on the equipment and methodology used in long-span truss lift, acknowledging that things can go sideways quickly and with very little warning. [*FBN* April 2021, pp. 14-17.] The consequences can also be devastating, from significant truss damage to building collapse and injuries. Fortunately,

BCSI-B1 Summary Sheet - Guide for Handling, Installing, Restraining & Bracing of Trusses

The BCSI-B1 is a guide for builders features proper techniques for unloading, storing, lifting, erecting, installing, restraining and bracing trusses. It includes specific information for protecting trusses from weather and damage at the jobsite, how to lift bundles and individual trusses by crane, restraining/bracing guidelines to prevent trusses from toppling during erection, installation tolerances to keep the trusses in plane and plumb and basic construction loading and materials placement recommendations.

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BCSI B1 provides field-tested best practices to avoid these outcomes and ensure every long-span truss lift goes smoothly.

This article is going to look at another portion of BCSI B1 that provides very important guidance pertaining to setting the initial set of roof trusses and exploring why it is vital this first group of trusses is braced properly to avoid out-of-plane buckling during installation. It will also look at some important aspects of bracing connections and installation tolerances.

Setting the First Truss

In addressing the beginning of the installation process, BCSI-

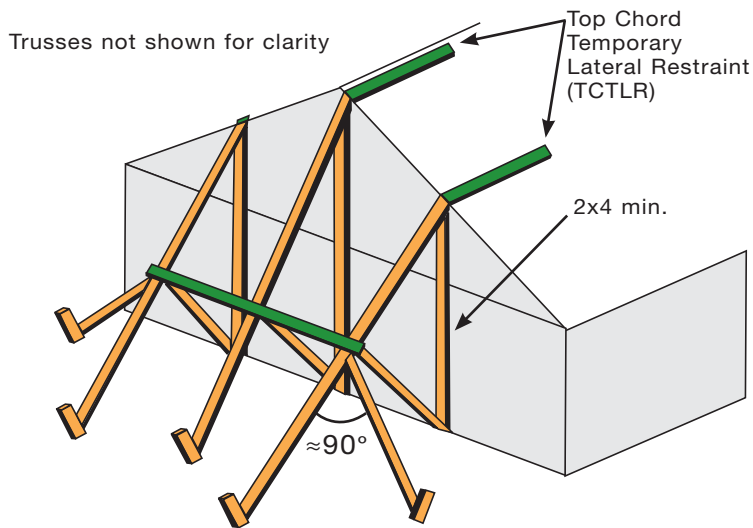


Figure B1-16

B1 states, “It is important for the Contractor to provide substantial bracing for the first truss erected. Trusses making up the rest of the first set are tied to the first truss and rely upon it for stability. Likewise, after this first set of trusses is adequately diagonally braced, the remaining trusses installed rely on this first set for stability. Performance of the truss bracing system depends to a great extent on how well the first set of trusses is restrained and braced.”

Essentially, the stability of the first truss you set plays a big role in the overall stability of the truss system throughout the installation process. Exterior ground bracing is a vital part of that stability. BCSI Figure B1-16 and B1-17 illustrate best practices for installing ground bracing. This bracing should provide continual support from the point of attachment to the truss down to the ground where it is attached to stakes driven into the ground and securely anchored. It’s important to note the diagonal ground braces should be tied together with a lateral restraint (illustrated in green), along with ground brace struts to ensure the diagonal braces don’t buckle.

To adequately resist lateral loading during the installation process, whether from wind loads or live loads created by installers, top chord temporary lateral restraints (illustrated in green) should be installed directly in line with the diagonal ground braces to ensure the load is transferred through the bracings and not the first truss.

When the building height or exterior ground conditions make it prohibitive to install exterior ground bracing, BCSI B1 provides guidance on installing interior ground bracing. If this is done, it is recommended the first truss installed should be located near the

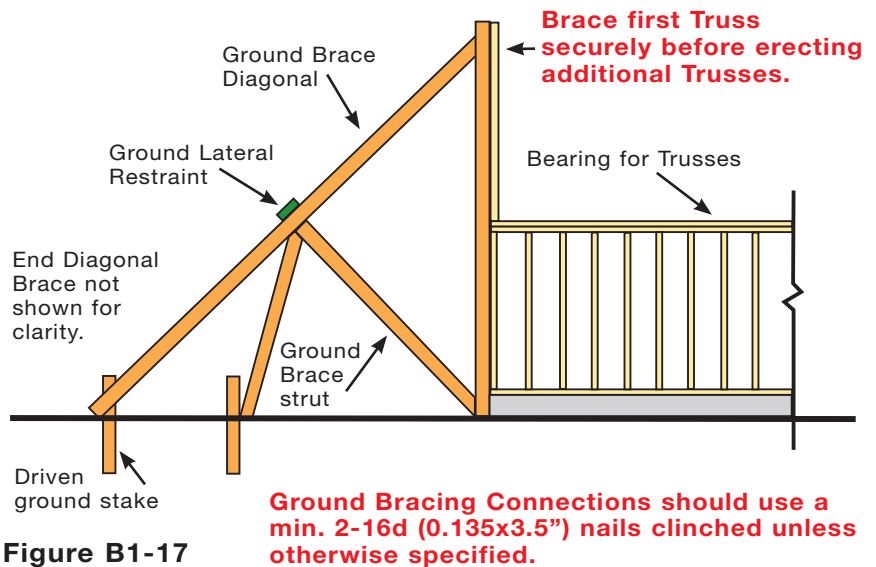


Figure B1-17

mid-point of the building (see Figure B1-18, next page). Once it is properly braced to the ground, the first set of trusses can be installed and then restrained and braced accordingly before removing the ground bracing to set the rest of the trusses.

Installing Temporary Restraint and Bracing

Again, an individual long-span truss is very narrow in relation to its depth and span. As such, there are three planes within a truss system that need to be braced in order to prevent out-of-plane buckling: the top chord (roof) plane, the web member (interior) plane, and the bottom chord (ceiling) plane. During installation, BCSI states, “It is critical to install lateral restraint and diagonal bracing for the top chord and web member planes immediately to prevent out-of-plane buckling of the truss.”

Top Chord Plane

Proper installation of top chord lateral restraint and diagonal

bracing is the most important step because the top chords are particularly susceptible to lateral buckling. When affixing restraint and bracing to this plane, it is important to maintain exact spacing between trusses in order to adhere to installation tolerances, which will be addressed in the next section. An example of top chord lateral restraint and diagonal bracing is illustrated in Figure B1-24A. The purpose of the temporary lateral restraint is to tie each truss back to the ground bracing. The purpose of the temporary diagonal bracing is to provide resistance along a non-linear path to prevent the whole truss system from racking in one direction. For installers, this is an important concept to embrace.

Web Member Plane

Unlike the temporary bracing affixed to the top chord plane that must be removed as sheathing is applied (which provides its own restraint), there is some restraint and bracing within the web member plane that is designed to be permanent and there is additional diagonal bracing that should be temporarily applied during installation. The longer the truss span and the greater

the truss height, the more this temporary bracing may be necessary to prevent trusses from leaning or dominoing dur-

ing installation. This is covered in greater depth in BCSI B3, which we will explore in a future article.

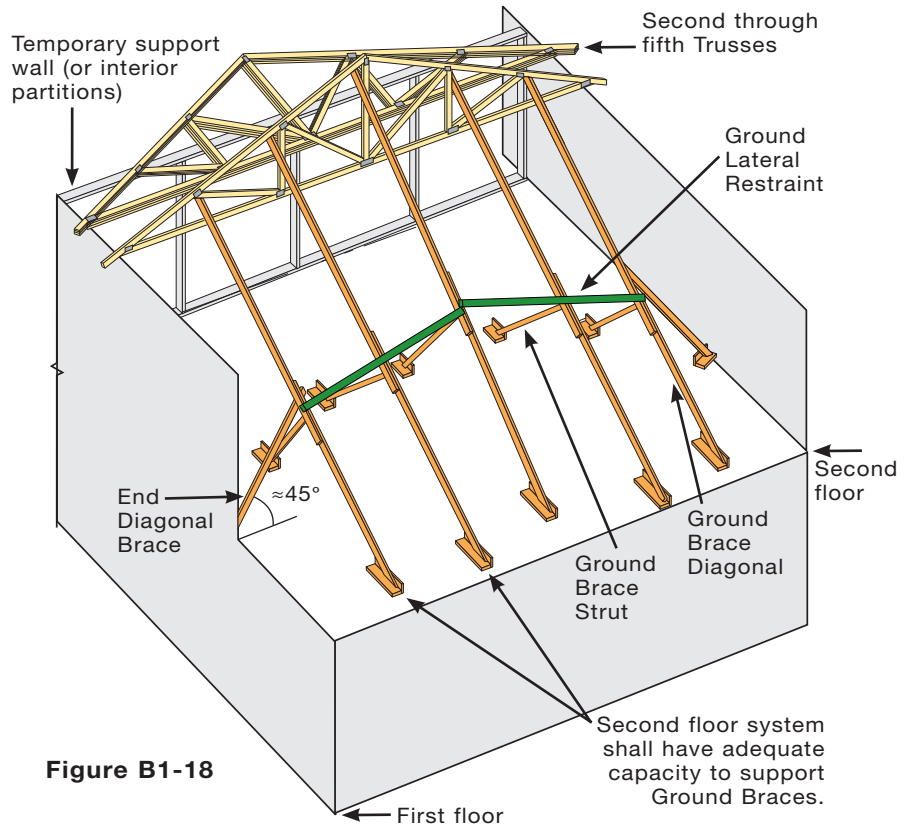


Figure B1-18

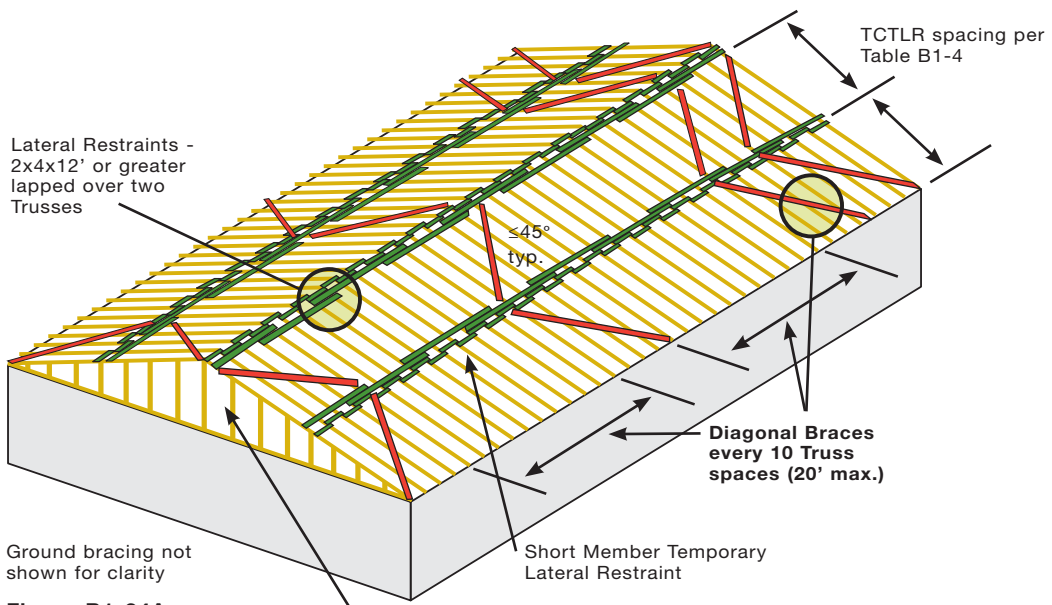


Figure B1-24A

NOTICE Refer to **BCSI-B3** for Gable End Frame Bracing.

Bottom Chord Plane

Temporary lateral restraint and bracing for the bottom chord plane also helps maintain on-center spacing, as well as laterally “stiffening” a group of trusses within the system. Temporary diagonal bracing should also be installed for the same reason as for the top chord, to provide resistance along a non-linear path. This restraint and bracing can be left as part of a permanent stability bracing system once installation is complete, or can be removed once the ceiling diaphragm is installed.

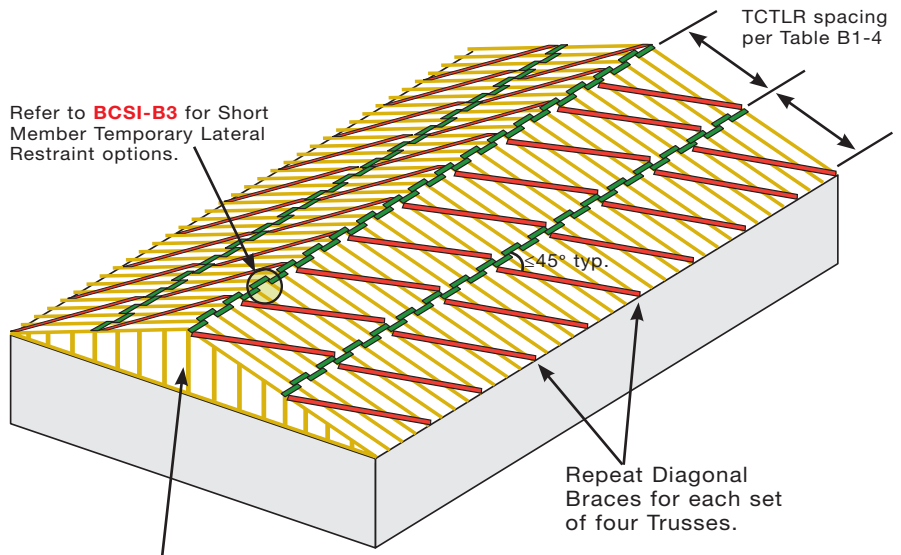
Installation Tolerances

In order for roof or floor truss systems to perform as design, as well as acceptable roof and floor lines for application of sheathing materials, each truss needs to be installed within established tolerances. With regard to plumb, BCSI recommends a truss should be no more than a quarter inch out of plumb for every foot of depth, not to exceed 2 inches. With regard to truss bowing out off plane, BCSI provides a standardized table of the maximum bow allowable based on truss lengths. For trusses over 30 feet, the maximum allowable bow is 2 inches.

The Bottom Line

Trusses are incredibly efficient framing elements that are essential in most of today’s post-frame buildings. During initial installation, it is vital installers adequately brace the first truss in the system to resist lateral loads that would cause an individual truss, or the whole truss system to buckle out-of-plane. BCSI contains best practice concepts to consider when it comes to ground bracing, as well as lateral restraint and diagonal bracing, to ensure the roof system remains stable until roof sheathing and the ceiling diaphragm are fully installed. **FBN**

Sean Shields is Director of Communications for the Structural Building Components Association (SBCA, <https://www.sbcacomponents.com>) and has authored over a hundred articles focused on structural framing and off-site construction since 2004.



NOTICE Refer to **BCSI-B3** for Gable End Frame Bracing.

Figure B1-24B

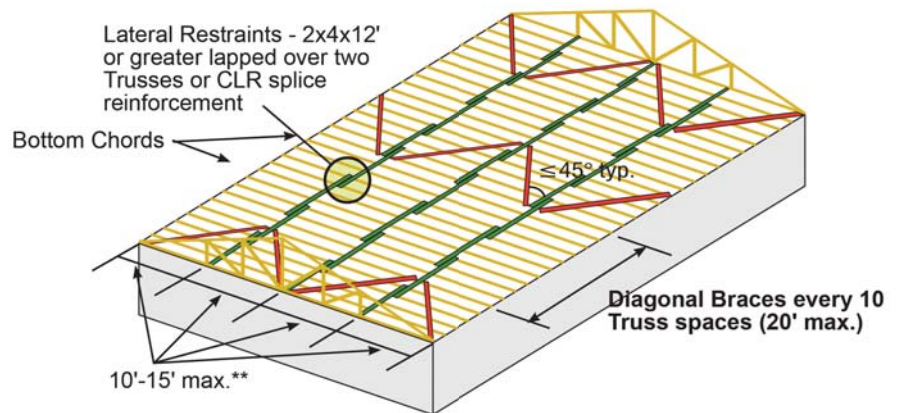
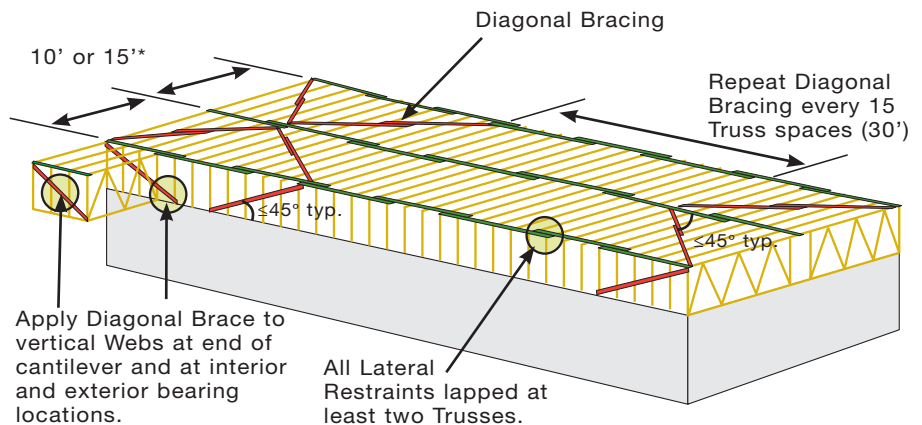


FIGURE B1-28



* Top Chord Temporary Lateral Restraint spacing shall be 10' OC max. for 3x2 chords and 15' OC for 4x2 chords.

Figure B1-29

Huff and Puff!

The right information will ensure your building won't blow in

BY SEAN SHIELDS, SBCA

A little bit of wind is a good thing. It helps plants reproduce, it helped explorers cross large bodies of water, and today it produces a fair amount of cost-efficient electricity. Conversely, a lot of wind is not a good thing. It causes tidal surges, it uproots trees, and it can damage, topple, or completely destroy those large, post-frame buildings you work so hard to erect.

That is why it is vital buildings are designed and built in a way that they adequately resist the forces wind exerts on them. This article will explore wind loading and uplift, the methodology truss designers use to ensure these forces are properly resisted, and lay out what information the building owner/contractor needs to provide to the component manufacturer (CM) so they can employ this methodology.

Wind Loads and Uplift

Wind has multiple effects on a building's structure. Shear wind load is a horizontal force that exerts pressure on walls and other vertical elements that typically cause a building to tilt or rack, which can lead to cracking of interior and exterior sheathing and damage to structural connections and framing elements. Lateral wind loads are also a horizontal force that can cause a structure to move off its foundation or even overturn. Finally, uplift wind load affects roof truss heels and other cantilevered structures, pushing them upward.

All of these wind loads must be resisted, and the amount of anticipated wind load-



Need More Information?

Choosing which method to use when designing uplift connections for trusses can raise a number of questions for building designers, code officials and truss designers regarding which analysis method, MWFRS or C&C, should be used in wind load calculations for the design of uplift connections for trusses. SB

CA provides answers to many of these questions in its research report, "MWFRS Method vs Components and Cladding Method for Truss Uplift Connection Design for Wind." The report, along with a wind load truss design guide and designer checklist can be found at <https://www.sbcacomponents.com/truss-uplift-design>.

ing over the life of the building is impacted primarily by where the structure is built. *ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7)* provides the latest guidance on wind speeds and special conditions, such as hurricane winds and other extreme wind climates, and a base wind speed that factors into the wind loads the structural framing must be designed to resist.

The actual wind speed that must be used

in a building design is governed by the building codes adopted by local jurisdictions and enforced by the building department of the county or township.

Wind Loading Methodology

For truss design, *ASCE 7* lists two methods for calculating wind loads: Main Wind Force Resisting System (MWFRS) and Components & Cladding (C&C). MWFRS pertains to a structural frame or an assembly of structural elements working together

to transfer wind loads acting on the entire structure to the ground. This system typically receives wind loading from more than one surface. In contrast, cladding elements receive wind loads directly, such as roof coverings and wall coverings. Components receive wind loads either directly or from the cladding and then transfer the loads to the main wind force resisting system. Fasteners and purlins are examples of components. C&C elements are exposed to higher wind pressures than MWFRS elements and must be designed accordingly.

Selecting a method of wind load analysis depends on whether uplift connections are being designed for an individual truss member (e.g. web, top chord, etc.), or for the entire truss as both MWFRS and C&C methods can apply, depending on the situation.

Today's truss design software uses a combined analysis, incorporating both the MWFRS and C&C methods to generate wind uplift and downward pressure loading conditions. MWFRS applies to the assembly of multiple parts, while C&C covers an individual part or connection.

Using this combined analysis, truss or rafter uplift connections (at the plate line or as attached to a header, beam, or girder) are designed for wind load using the MWFRS analysis method, and individual truss or rafter members are designed using the C&C analysis method.

Necessary Information

Regardless of the design method used, the CM needs as much loading information as possible from the post-frame building designer, whether that is the building owner or the contractor. The building designer is responsible for providing the structural design documents and all the necessary load and dimension information. Whether it's identifying the correct wind speed or a particular wind load analysis, MWFRS or C&C needs to be used (specified) for a particular case.

If a project does not require a licensed professional building designer, the owner or the owner's agent is still responsible for providing this information. Problems can arise, for example, if the end reactions on the truss designer's truss design drawings are different than the building designer's calculations of roof-to-wall anchorage forces.

Further, it is critical that all the correct elevations are identified and provided, as this can have a significant impact on wind pressures exerted on certain structural elements.

It's also important to note if knee braces are used in the walls to provide supplemental lateral wind resistance and/or stiffen the connection between the trusses and the top of the wall to allow for taller structures. Knee braces create primary and/or secondary

bending moments into the walls and truss chords that must be incorporated into the truss designs.

This is important to point out because for many post-frame buildings today, the responsibility for determining the magnitude and direction of the loads that the knee brace will impart on the truss is left to the truss designer. However, this should be specified by the party responsible for the overall building design.

Bottom Line

Wind load analysis will affect the lumber sizes and grades, the metal connector plate sizes, and most importantly, the bracing in most truss designs. If the correct wind speeds and/or analysis methodology is not used in the design of the truss, or if there are vital pieces of information missing with regard to items such as elevations, end reactions, and knee braces, there may be unanticipated performance issues down the road. **FBN**



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- Fasteners:** ST Fastening Systems
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