

# Could Balloon Frame Wall Systems Make a Comeback?

by Brice Hereford



Tall walls are not a framing relic, but possibly a new opportunity for component manufacturers.

In many quarters of the building industry today, the balloon framing of walls is considered an archaic building method. I disagree with that premise and believe that balloon framing was a system developed way ahead of its time. In the light of the advances in technology and equipment in use today, we are better equipped to fabricate these wall panels and erect them on site easier than at any prior time in building history.

**Balloon Frame:** A wooden building frame composed of closely spaced members nominally 2 inches in thickness, in which the wall members are single pieces that run from the sill to the top plates at the eave. [Source: Fundamentals of Building Construction, Edward Allen and Joseph Iano (2004)]

## Balloon Framing's History

Balloon framing was invented in the 1830s in Chicago after the invention of mass manufacturing of nails and the development of sawmills that could cut 2x\_ dimensional lumber pieces from timber. This method was a change from the laborious timber framing that was standard up until then. Balloon framing spread around the country quickly and built many of the triple-decker multi-family housing units in cities from Seattle to Boston.

I created the drawings presented in this article based on projects I worked on in Cambridge, MA in the mid- to late 1970s with architects Doug Bell, Jerry Fandetti and others. They were townhouses built to replace several large Victorian houses that had fallen into disrepair. These were also some of the first condominiums available on the market in those days. With our primitive methods of site building the sill to peak walls and setting them into place, we were developing an advanced energy efficient framing system to respond to the oil shortages of the 1970s. (See house photos above and on cover).

### at a glance

- Balloon wall framing applications are considered an archaic building method.
- CMs can build tall walls by laying out extra long studs on a table and placing truss plates on the joints. Then roll the gantry over them to secure the plates.
- If you are building balloon or "tall" walls, we want to hear from you! Email editor@sbcmag.info.

With the development of the truss and component industry and the low costs of crane rentals at the jobsite, balloon framing can now come into its own.

Into the 1980s and '90s, balloon framing was starting to occur elsewhere in the country, most notably in Portland, OR where Bill Reed of R&R Energy Resources was building houses using balloon framing in the 1990s at \$25 per square foot!

Over time, western framing or box framing (now called platform framing) supplanted balloon framing, primarily due to the ease and availability of smaller length studs and building floor by floor.

With the development of the truss and component industry and the low costs of crane rentals at the jobsite, balloon framing can now come into its own. There are many advantages to this type of framing. It uses less wood and the structure shrinks and settles less. The wall panel system is easy and inexpensive to build and insulate at the yard. In fact, both windows and siding and insulation (cellulose or foam) can be installed on the ground before installation. Used in conjunction with floor sections and roof trusses, buildings can be built in less than a week. This further reduces the cost of wall panel framing. And given the recent focus on green building practices, balloon framing is a "green solution" in that it uses fewer resources and is quickly assembled and insulated. It can also be very energy efficient and may help qualify for "green points" under LEED, Green Globes or NAHB.

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### Balloon Frame Walls...

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#### Tall Walls Not a Stretch for Component Manufacturers

Not only are there on-site framing advantages to balloon framing, but I believe that building component manufacturers are perfectly positioned to fabricate these "tall" or "jumbo" walls. They can be made on truss tables with truss plates to quickly and securely fabricate extra long studs and efficiently construct the wall panels, complete with fire-blocking and ribbon boards or ribbon strips. Additionally, engineered wood products such as LVL, LSL or engineered rim board for the end studs, plates and ribbon strips further reduce shrinkage while increasing the load carrying capability. With the use of 8x24' OSB board, sheathing these walls are quick with the additional shear strength indicative to such large sheets of OSB.

From there, the tall walls arrive on the jobsite where a crane will pick and place them with ease. The use of structural wood screws to connect the panels to each other and to the floor system makes for an extremely simple installation with added strength at the connections.

Currently, many of you make wall panels, but most are standard one story heights. By increasing the size to two or two-and-a-half story wall heights, you may be able to save 25 to 40 percent on panel installation as compared to site built construction.\*

I believe that with the current housing market and future urban housing needs, there is a convergence here that will greatly benefit component manufacturers over the next few years.



You also have the option of creating your own installation crews or developing a network of builders who are very conversant with this building system and will do the erection of the walls, floor and roof with little if any supervision from you.

I believe that with the current housing market and future urban housing needs, there is a convergence here that will greatly benefit component manufacturers over the next few years. Though the single family and tract housing market has slowed way down, there has been a marked increase in wood framed multi-unit, multi-story projects nationwide. Balloon framed wall systems present an attractive aesthetic alternative to what I'll call rather unattractive "boxes"! These are great for urban infill projects and many communities are in the process of replacing their existing housing stock.

What follows are some tips for assembly and installation I've gathered over the years.

\*Estimated percentage of time and material savings based on SBCA's Framing the American Dream study and a cost comparison conducted by Blenker Building Systems (see J/F 2008 issue of *SBC Magazine*).

### FABRICATION

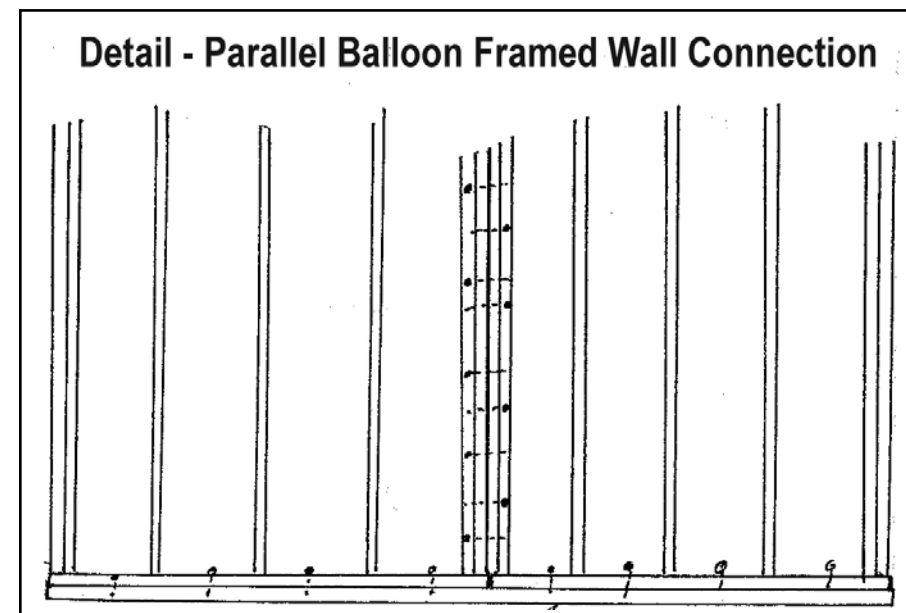
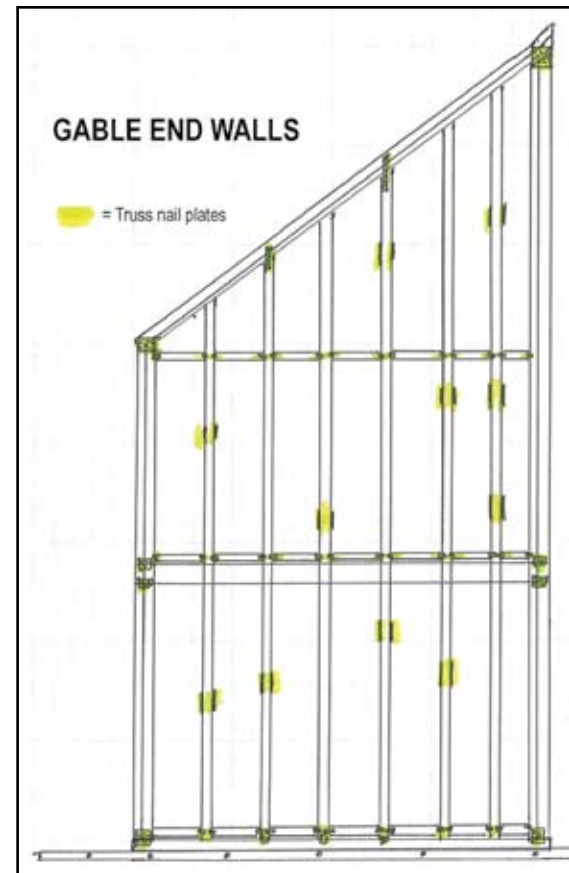
With some adjustments, it is possible for building component manufacturers to build these jumbo wall panels using the very same equipment that they use to make large roof trusses. The first step is to make up the extra long studs by laying the wood sections on a table and placing truss plates on the joints and then rolling the gantry over them to secure the plates. Once all the studs have been made the suitable length for the wall, it is laid out on the truss table. Nail the sole and top plates to the studs. Truss plates (TPs) will be used in the following areas (see illustrations):

1. The four corners will have large TPs to maintain the integrity of the walls angles.
2. TPs should be used to connect the top and bottom plate to every third stud to help maintain the continuous load path.
3. Fireblocking will be connected to the studs with TPs.
4. Ribbon strip will be cut into the studs and secured with nails and TPs at every stud.

Once the TPs and ribbon strip are installed, the gantry rolls over the wall and secures the TPs.

The next step is sheathing the wall. The availability of 8x24' OSB panels makes sheathing quick and easy with little if any blocking needed. The fastest way is to set the sheathing in place, chalk the stud lines and have workers nail it off with guns right on the table.

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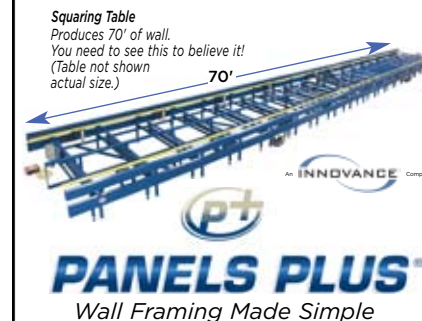


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**Balloon framed wall applications in custom homes.**  
A tall wall for the vaulted great room of a custom home is craned into place. Although the home is only one story, the walls are considered balloon framed because of their height.



**A commercial application of a balloon wall.** A version of a tall wall is set with a crane at a commercial site. With the concrete foundation poured, framers secure the walls to the trusses in aerial lifts.  
*(Photos courtesy of Blenker Building Systems, Inc.)*

## Balloon Frame Walls...

Continued from page 19

It is possible to clapboard the wall and set the windows at this time as well if desired. It is far easier, less labor intensive and less expensive to perform all of these functions on the table in a controlled environment rather than in the field.

Once a wall is complete it is rolled outside and set carefully in a staging area and covered with poly or tarps if necessary.

## INSTALLATION

With the invention of the all terrain, extended reach forklifts for jobsites, many building walls can be hoisted into place with these vehicles instead of a rented crane. However, if a crane is required, with suitable advance planning, the building's walls, floors and roof can be set in under a week. Before the set, it is imperative that the mudsill is level. It is important for the concrete foundation walls to be as level as possible. Any variance at this level increases greatly at the top of a

two to three story wall. Make any modifications needed to the mudsill, shave it down or add shims under it to ensure a level surface for the walls. This is critical.

The walls are delivered to the jobsite in the order in which they will be raised. The crane hooks onto one and lifts it up and sets it on the mudsill. Structural wood screws are used to connect the sole plate to the mudsill. Long 2x4s are used to brace the walls. Once the first wall is set, plumbed and leveled and braced securely, the next one is lowered into place, leveled,

plumbed and connected to the first wall (see detail on page 19). The more precise you are at leveling and plumbing now, the less time required later to make this happen. Continue setting walls in place one after the other for single or multiple units. Structural wood fasteners on the market (FastenMaster Loks, GRK Fasteners RSS screws, USP's wood screws or Simpson Strong-Tie SDS screws) give the connections greater shear strength than nails with the added advantage of being easily removable if later adjustments have to be made.

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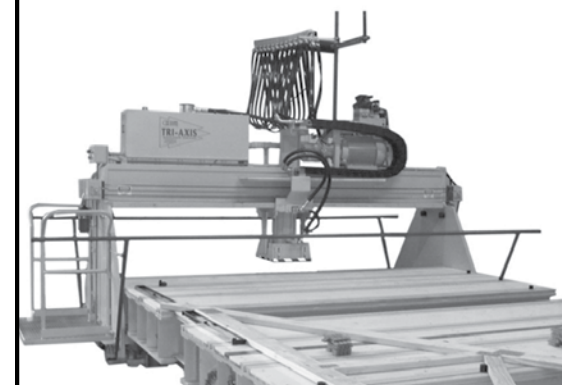
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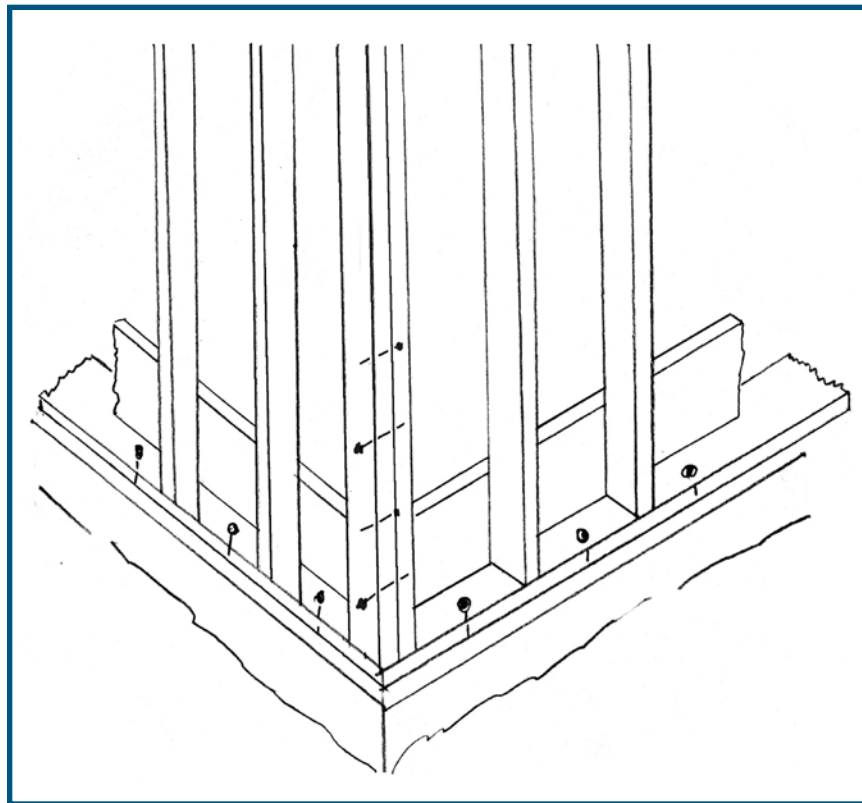


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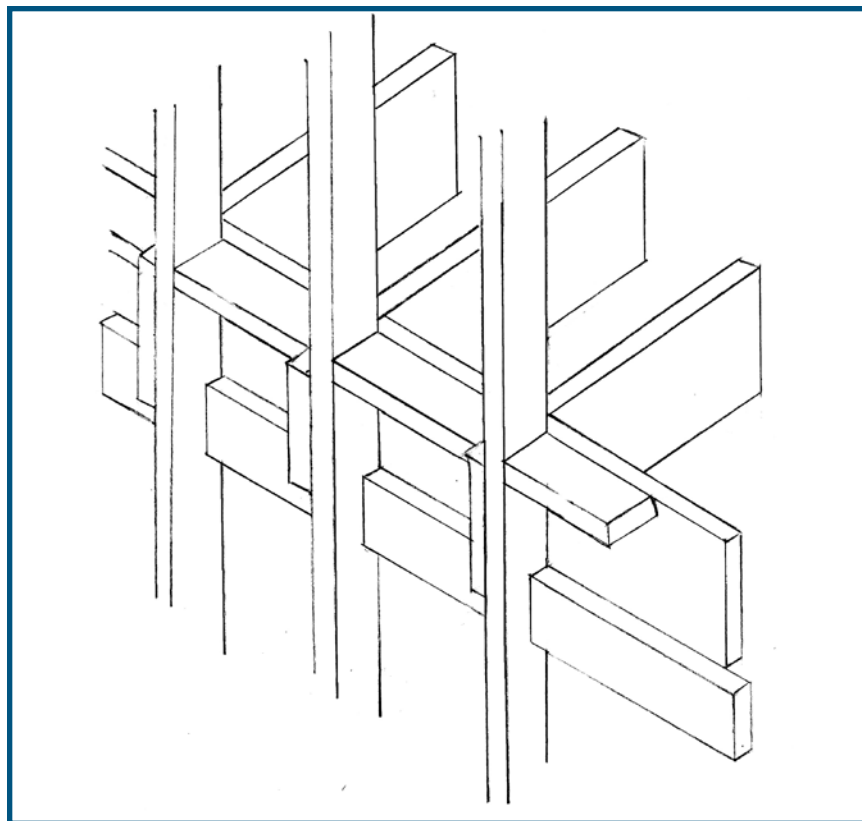
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Multiple townhouse units can also be erected in remarkably short periods of time with this method.



Perpendicular Balloon Framed Wall Connection – Outside Corner



Second Floor Exterior Wall Detail

### Balloon Frame Walls...

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Once the walls are set, it is time to work on the floors. There are several options for floor systems. You can use open web floor trusses or I-Joists or dimensional lumber for the joists. The ends will rest on the 1x4 ribbon strip let-in to the studs, and will be secured by fasteners to the stud. These flooring components can be hoisted up from below or lowered in from above with the crane which is still on-site. Several joists could be lowered in at once by the crane if they are all tied together. The floor system could be pre-assembled in panels eight feet wide and lowered in by the crane at an angle so they will fit first onto one ribbon strip and then to the other end is lowered into place and secured. The structural wood fasteners through the joists into the studs will also serve as a further anchor for the walls to keep them in place.

There is also the alternative of having a timber-frame, post-frame or post and beam superstructure utilized instead of the ribbon strips supporting the floor joists. It could be lowered into place and the floor system would be built on these. This would eliminate the necessity of the ribbon strip. The exterior walls could be tied into this superstructure as needed.

Once the floor systems are in place, the roof trusses can be set. Then the roof is sheathed and the house is closed in. With proper timing and coordination a single home could be erected in three to four days, thereby saving the extra expense of the crane for extra days. Multiple townhouse units can also be erected in remarkably short periods of time with this method. **SBC**

*Brice Hereford is a LOK Product Manager for FastenMaster. He welcomes the opportunity to discuss this and/or work with any component manufacturer, builder, engineer and developer to build these structures. He can be reached at 413/537-4219 or briceh@verizon.net.*

## Balloon Framing Allowable by Code

The 2006 IRC encourages balloon framing in section R301.1.2 - Construction Systems: "the requirements of this code are based on platform and balloon-frame construction for light-frame buildings." Figure R602.3.(1)—Typical Wall, Floor and Roof Framing illustrates balloon framing, while Table R602.3(5)—Size, Height and Spacing of Wood Studs, indicates that maximum allowable unsupported stud length can be as long as 20' for nonbearing walls and as long as 10' for bearing walls without engineered design. In balloon framing, floor joists are allowed to rest on 1x4 ribbon strips. Section R502.6—Bearing states: "The ends of each joist beam or girder shall have not less than 1.5 inches of bearing on wood or metal and not less than 3 inches on masonry or concrete except where supported on a 1-inch-by-4-inch ribbon strip and nailed to the adjacent stud..." Fireblocking is imperative and adequately referenced in section R602.8—Fireblocking Required.

While the 2006 IBC does not specifically allow balloon framing, it doesn't disallow balloon framing either. It defers to the IRC in Section 2308, Conventional Light Frame Construction, in which section 2308.1 states: "Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height... shall comply with the International Residential Code." Further proof is found in Chapter 23, Section 2308.8.1 Bearing within the Floor Joist section: "Except where supported on a 1-inch by 4-inch ribbon strip and nailed to the adjoining stud..." Hence, IBC does allow balloon framing.

The language in IRC Section 2308 that applies to multiple single-family dwellings, or townhouses, is an example of the ideal application of balloon framed walls. These townhouses are ideal for replacing aged, existing housing stock requiring replacement in the next decade. They would also serve as a welcome alternative to the current phase of multi-story, multi-unit wood frame structures that are proliferating across the country and tend to lack architectural and structural appeal. **SBC**

## In Memoriam

### Mike Stineman

Mike Stineman, 64, of Citation Homes died December 2, 2008 after a year-long battle with leukemia. Stineman, former owner of Citation Homes in Spirit Lake, IA, was active in the Iowa Truss Manufacturers Association (ITMA). A graduate of Iowa State University, he married Barbara McMahon in 1965. The family moved to Spirit Lake, IA, in 1974, where Mike became Controller at Citation Homes and then served as President/CEO until early 2008.

"He was one of the original supporters of ITMA," said chapter president Tom Lambertz. Because of his location, Mike had to travel the farthest to get to ITMA meetings, said Lambertz. "But he always made the drive."

Roger Gibbs said Mike was one of the manufacturers who jumped right on board when ITMA was formed. "He felt very strongly about being involved in an organization that would bring the group together," he said.

He served on the ITMA Board for a number of years, on various committees and as secretary/treasurer for a number of terms. Fellow chapter member Ray Noonan said Mike was always willing to help. "When Cascade burned in 1997, Mike picked up my duties as secretary/treasurer until I could get the company back on its feet," he remembered.

Lambertz recalled that Mike was a good businessman and a strong supporter of the component industry. Noonan said he envied Citation's ability to retain long-time customers. "Mike had multi-generational customers—that's just the kind of business he ran," he said.

Several years ago, ITMA hosted a golf outing near Citation Homes. "We thought instead of him traveling to us, we'd bring the event to him this time," said Lambertz, noting Mike also welcomed the chapter to his plant for a tour.

Early in 2008, Mike made the difficult decision to close his business. Lambertz said it was tough on Mike. "He had a real spot in his heart for his employees, so I think it was hard for him."

In addition to his involvement in ITMA, Mike served as president of the Rotary Club and the Iowa Lumberman's Association. He also enjoyed being a grandpa, cooking, I.S.U. and Steelers sports, current events, annual Canadian fishing trips and weekly lunches with his friends, boating, and traveling with Barb.

Stineman was remembered at a memorial service on December 5 at the United Methodist Church in Spirit Lake. Memorials may be directed to the family for the American Cancer Society Hope Lodge in Rochester, MN, and the Spirit Lake United Methodist Church. As a celebration of Mike's life, his family asks that those who treasure him donate blood at their local blood banking service. **SBC**



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