

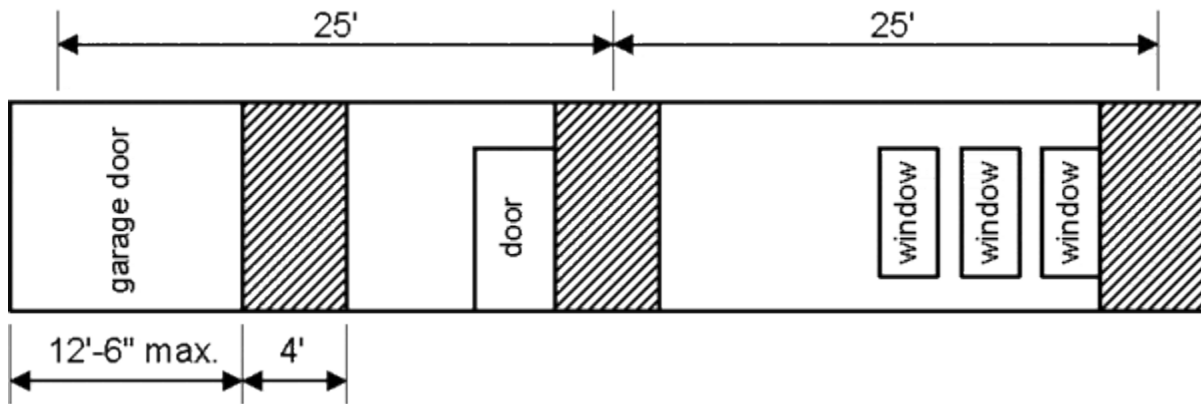


## Wall bracing panel requirements

Exterior and interior walls must be braced in accordance with Minnesota State Building Code section R602 to resist wind loads and racking.

### Locations, spacing and amount of braced wall panels

Braced wall panels must be located in a braced wall line in accordance with Section 602.10 and at least 25 feet on center. Braced wall panels may also be offset from the ends of the braced wall lines such that they begin no more than 12'-6" from the ends. However, if both ends are offset by more than 12', a collector system must be designed. The amount of bracing is based on a percentage of total wall length, see figure below.

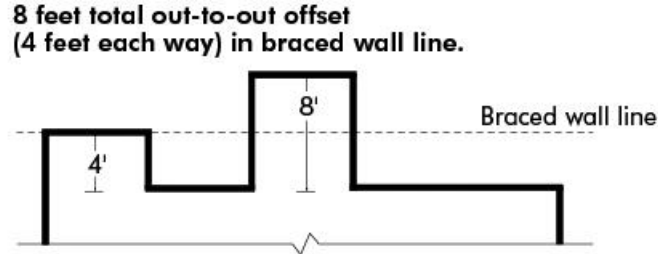


Amount required Table R602.10.1

Condition	Bracing method	Amount of Bracing
<p>One story Top of two or three story</p>	1, 2, 3, 4, 5, 6, 7, or 8	At least 25' o.c., not less than 16% of braced wall line
<p>First story of two story Second story of three story</p>	1, 2, 3, 4, 5, 6, 7, or 8	At least 25' o.c., not less than 16% of braced wall line for Method 3 and 25% for Methods 2,4-8
<p>First story of three story</p>	2, 3, 4, 5, 6, 7, or 8	At least 25' o.c. , not less than 25% of braced wall line for Method 3 and 35% for Methods 2,4-8

## Can there be off sets in a braced wall line?

Braced wall panels that are counted as part of a braced wall line must be inline, except that offsets out of plane of up to 4 feet shall be permitted provided the total out-to-out offset in an braced wall line is not more then 8 feet.



## Braced wall panel methods

Method	Material	Minimum Thickness	Panel length*
1	let-in bracing attached to top and bottom plates	1x4	per angle: 45° to 60°
2	diagonal wood boards @ 24" o.c.	5/8"	48"
3	Structural sheathing (most common)	5/16" for studs @ 16" o.c 3/8" for studs @ 24" o.c	48"
4	structural fiberboard	1/2" or 25/32" for studs @ 16" o.c only	48"
5	gypsum board (typical for interior walls)	1/2" fastened 7" o.c	48" applied to both sides 96" applied to one side
6	particle board	3/8" or 1/2" for studs @ 16" o.c only	48"
7	Portland cement plaster	3 coats with corrosion resistant lath	48"
8	hardboard	7/16"	48"

## Method 3 allowable reductions. (Most common)

When continuously sheathing the entire structure using Method 3 braced wall panels, openings for windows or doors may be closer than 48 inches to the corners based on the wall height and

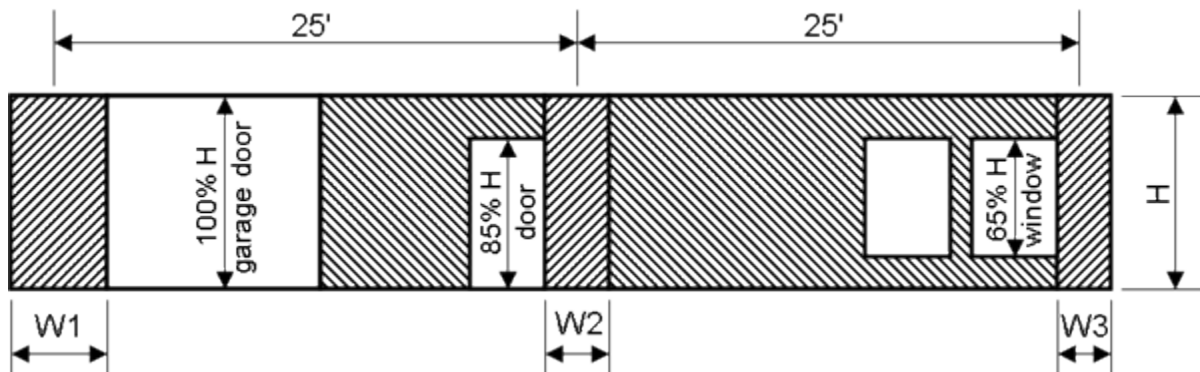
the height of the opening when in accordance with Table R602.10.5 but the percentages that are shown in table R602.10.1 must still be met. The maximum height of the wall is still 10 feet. However, this height may be increased to 12 feet with prior approval from the Building Official.

Table R602.10.5

Length requirements for braced all panels in a continuously sheathed wall

Minimum length of braced wall panel			Max. opening next to a braced wall panel (% of wall height)
8' wall	9' wall	10' wall	
48"	54"	60"	100%
32"	36"	40"	85%
24"	27"	30"	65%*

\*The dimensions for a 65% height opening may be used for 100% height when the structure is only one story, i.e., one-story garages.



## Narrow walls adjacent to garage doors or other large openings

If the braced wall panel lengths can't be achieved even with the allowed reductions permitted by Table R602.10.5, other methods can be allowed. The MN building code allows an Alternate Braced Wall Panel construction in accordance with R602.10.6, which consists of:

### One Story Buildings

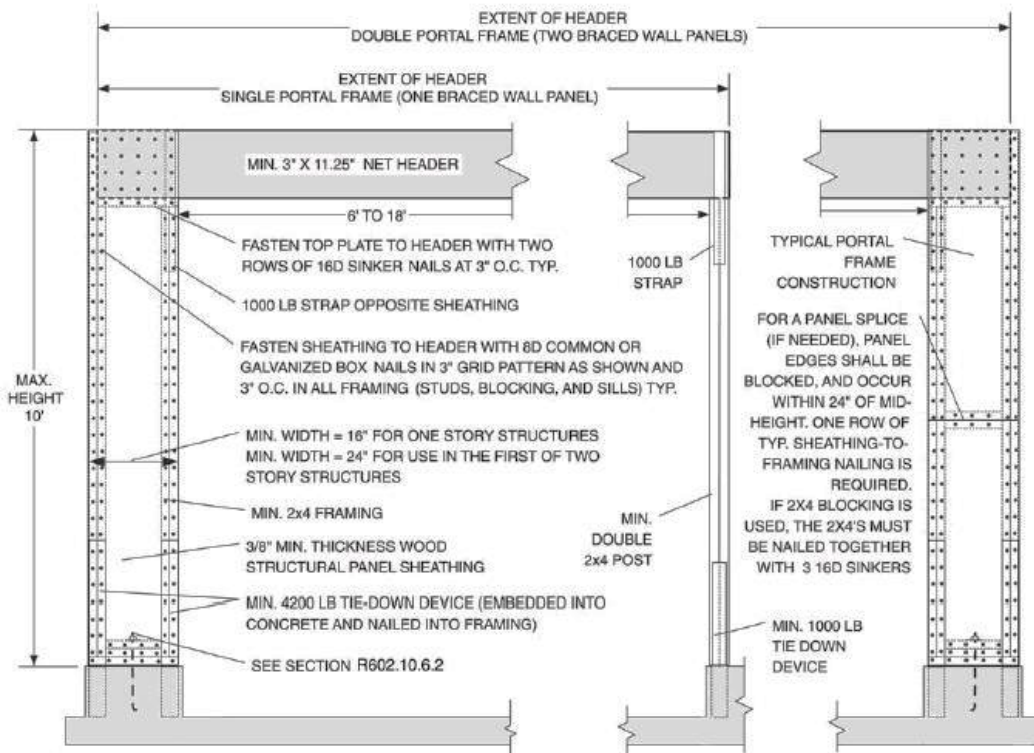
1. Each panel must have a length of at least 16 inches and a height of not more than 10 feet.

2. Each panel shall be sheathed on one face with a single layer of 3/8 inch minimum thickness wood structural panel fastened with 8d common or galvanized box nails 3 inch O.C. in all framing. The sheathing shall extend up and over the header and shall be nailed to the header in a 3 inch grid pattern.
3. A minimum 2-2x12 header shall extend between the inside faces of the first full length outer studs of each panel. The clear span of the header between the inner studs of each panel shall be not less than 6 feet and not more than 18 feet in length.
4. A strap with at least 1000 # uplift capacity must attach the inner studs of the panel to the header. This strap must be on the opposite side of the header from the sheathing.
5. A single 5/8 inch anchor bolt and two hold-downs with a minimum uplift capacity of 4200 pounds are required to anchor the panel directly to the foundation. All hold-down devices must be the embedded strap type, installed per the manufacturer's installation requirements. The panels shall be supported directly on a foundation that is continuous across the entire length of the braced wall line.
6. When the footing depth is required to be 12 inches or greater, a 12" x 12" continuous foundation with a #4 rebar top and bottom can be used at door openings in the braced wall line. This reinforcement shall be lapped not less than 15 inches.

**First Story of Two Story Buildings:**

In the first story of a two story building, the requirements noted above shall be followed, except each wall panel shall be a minimum of 24 inches in length.

**Figure R602.10.6.2**



## Other approved methods

---

If you wish to deviate from the prescriptive requirements of International Residential Code Section R602.10, then you must have the lateral load resisting system of your building designed by a registered design professional licensed in the State of Minnesota

To determine wind load, the calculations must follow the requirements of Section 1609 of the International Building Code (IBC). The basic wind speed for The city is 90 mph. Most residential construction in the city qualifies as Exposure B with an Importance Factor ( $I_w$ ) of 1.00. Please note: wind load must be applied to both windward and leeward sides simultaneously.

### Design Method and Calculations

Section 2305 of the IBC, "General Design Requirements for Lateral-Force-Resisting Systems," and accepted engineering practice shall be employed in the design professional's calculations.

Calculations, at a minimum, must:

- Show a detailed analysis of the wind load determination.
- Show a detailed design of the building diaphragms (Section 2305.2) and shear walls (Section 2305.3).
- Specify the sheathing thickness, nail sizes and nailing pattern for diaphragms and shear walls.
- Ensure there is an adequate load path to the foundation.
- Show a detailed analysis of all connections along the lateral load path.
- Show an analysis of the existing lateral load resisting system with the new applied loads when utilizing an existing structure to resist lateral loads of an addition.
- Ensure post-to-beam connections are capable of resisting shear and rotation.
- Bear the original signature and seal of the registered design professional.

Calculations which do not meet the above requirements will not be approved by Building Plan Review during the permit application process.

### Construction Documents

When submitting plans for a building that utilized an engineered design, the related calculations must be attached to the plans. The drawings must also include comprehensive details outlining the construction requirement of the diaphragms and shear walls. These detail sheets must also bear the original signature and seal of the responsible design professional.

(This information is only to be used as a general guideline for building and does not contain all requirements.)

