

For SI: 1 inch = 25.4 mm.

**FIGURE R804.3.5(2)**  
**HEADER TO TRIMMER CONNECTION**

R804.3.7.1(2), unless studs are designed as full height without bracing at the ceiling. Flat blocking shall consist of C-shaped or track section with a minimum thickness of 33 mils (0.84 mm). For a gypsum board sheathed ceiling, the diaphragm length shall be in accordance with Table R804.3.7.1. For a wood structural panel sheathed ceiling, the diaphragm length shall be not less than 12 feet (3658 mm) for building widths less than 36 feet (10 973 mm), or not less than 14 feet (4267 mm) for building widths greater than or equal to 36 feet (10 973 mm).

The ceiling diaphragm shall be secured with screws spaced at a maximum 6 inches (152 mm) o.c. at panel edges and a maximum 12 inches (305 mm) o.c. in the field. The required lengths in Table R804.3.7.1 for gypsum board sheathed ceiling diaphragms shall be permitted to be multiplied by 0.35 if all panel edges are blocked. Multiplying the required lengths in Table R804.3.7.1 for gypsum board sheathed ceiling diaphragms by 0.9 shall be permitted if all panel edges are secured with screws spaced at 4 inches (102 mm) o.c.

**R804.3.7.2 Roof diaphragm.** A roof diaphragm shall be provided by attaching a minimum of  $\frac{3}{8}$ -inch (9.5 mm) wood structural panel which complies with Section R803 to roof rafters or truss top chords in accordance with Table R804.3. Buildings with 3:1 or larger plan aspect ratio and with roof rafter slope (pitch) of 9:12 or larger shall have the roof rafters and ceiling joists blocked in accordance with Figure R804.3.7(2).

**R804.3.8 Roof tie-down.** Roof assemblies shall be connected to walls below in accordance with Table R804.3. A continuous load path shall be provided to transfer uplift loads to the foundation.

**SECTION R805**  
**CEILING FINISHES**

**R805.1 Ceiling installation.** Ceilings shall be installed in accordance with the requirements for interior wall finishes as provided in Section R702.

**SECTION R806**  
**ROOF VENTILATION**

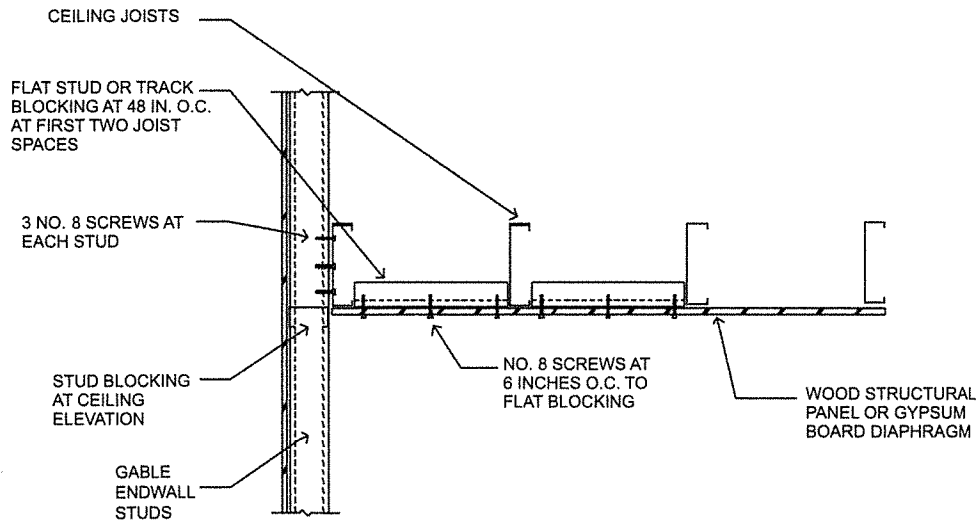
**R806.1 Ventilation required.** Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain or snow. Ventilation openings shall have a least dimension of  $\frac{1}{16}$  inch (1.6 mm) minimum and  $\frac{1}{4}$  inch (6.4 mm) maximum. Ventilation openings having a least dimension larger than  $\frac{1}{4}$  inch (6.4 mm) shall be provided with corrosion-resistant wire cloth screening, hardware cloth or similar material with openings having a least dimension of  $\frac{1}{16}$  inch (1.6 mm) minimum and  $\frac{1}{4}$  inch (6.4 mm) maximum. Openings in roof framing members shall conform to the requirements of Section R802.7. Required ventilation openings shall open directly to the outside air.

**TABLE R804.3.7.1**  
**REQUIRED LENGTHS FOR CEILING DIAPHRAGMS AT GABLE ENDWALLS**  
**GYPSUM BOARD SHEATHED, CEILING HEIGHT = 8 FEET<sup>a, b, c, d, e, f, g</sup>**

EXPOSURE CATEGORY		ULTIMATE DESIGN WIND SPEED (mph)			
B		126	< 139	—	—
C		110	—	126	< 139
Roof pitch	Building endwall width (feet)	Minimum diaphragm length (feet)			
3:12 to 6:12	24 - 28	20	22	28	32
	> 28 - 32	22	28	32	38
	> 32 - 36	26	32	38	44
	> 36 - 40	30	36	44	50
6:12 to 9:12	> 24 - 28	22	26	32	36
	> 28 - 32	26	32	38	44
	> 32 - 36	32	38	44	52
	> 36 - 40	36	44	52	60
9:12 to 12:12	> 24 - 28	26	30	36	42
	> 28 - 32	30	36	42	50
	> 32 - 36	36	42	50	60
	> 36 - 40	42	50	60	70

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

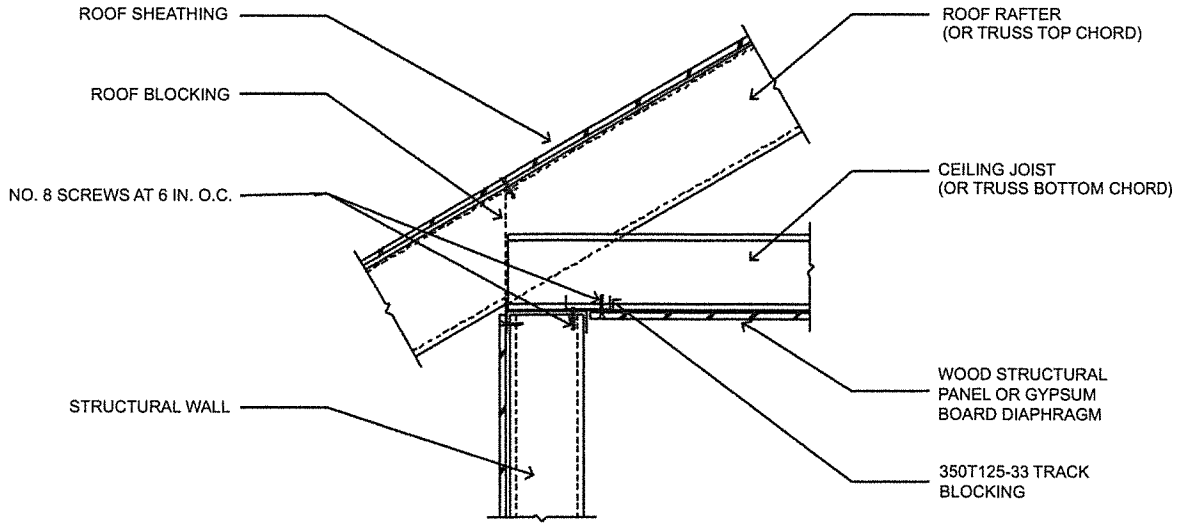
- a. Ceiling diaphragm is composed of 1/2-inch gypsum board (min. thickness) secured with screws spaced at 6 inches o.c. at panel edges and 12 inches o.c. infield. Use No. 8 screws (min.) where framing members have a designation thickness of 54 mils or less and No. 10 screws (min.) where framing members have a designation thickness greater than 54 mils.
- b. Maximum aspect ratio (length/width) of diaphragms is 2:1.
- c. Building width is in the direction of horizontal framing members supported by the wall studs.
- d. Required diaphragm lengths are to be provided at each end of the structure.
- e. Multiplying required diaphragm lengths by 0.35 is permitted if all panel edges are blocked.
- f. Multiplying required diaphragm lengths by 0.9 is permitted if all panel edges are secured with screws spaced at 4 inches o.c.
- g. To determine the minimum diaphragm length for buildings with ceiling heights of 9 feet or 10 feet values in the table above shall be multiplied by 1.15.



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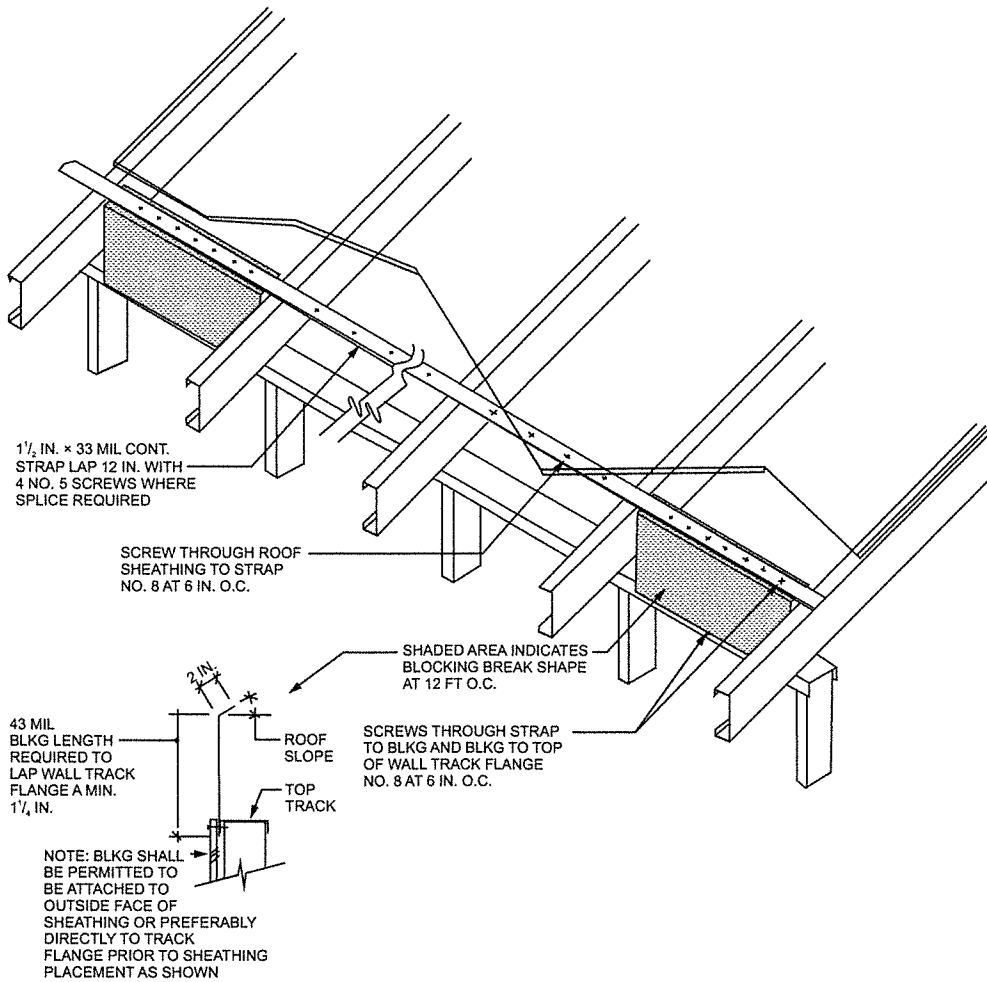
**FIGURE R804.3.7.1(1)**  
**CEILING DIAPHRAGM TO GABLE ENDWALL DETAIL**

**ROOF-CEILING CONSTRUCTION**



For SI: 1 inch = 25.4 mm.

**FIGURE R804.3.7.1(2)  
CEILING DIAPHRAGM TO SIDEWALL DETAIL**



For SI: 1 mil = 0.0254 mm, 1 inch = 25.4 mm.

**FIGURE R804.3.7(2)  
ROOF BLOCKING DETAIL**

**R806.2 Minimum vent area.** The minimum net free ventilating area shall be  $1/150$  of the area of the vented space.

**Exception:** The minimum net free ventilation area shall be  $1/300$  of the vented space provided one or more of the following conditions are met:

1. In Climate Zones 14 and 16, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. Upper ventilators shall be located not more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

**R806.3 Vent and insulation clearance.** Where eave or cornice vents are installed, insulation shall not block the free flow of air. Not less than a 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

**R806.4 Installation and weather protection.** Ventilators shall be installed in accordance with manufacturer's instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

**R806.5 Unvented attic and unvented enclosed rafter assemblies.** Unvented attics and unvented enclosed rafter framing assemblies created by ceilings that are applied directly to the underside of the roof framing members and structural roof sheathing applied directly to the top of the roof framing members/rafters, shall be permitted where all the following conditions are met:

1. The unvented attic space is completely within the building thermal envelope.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.
3. Where wood shingles or shakes are used, a minimum  $1/4$ -inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In California Climate Zones 14 and 16, any air-impermeable insulation shall be a Class II vapor retarder, or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.

4.1. A Class I or Class II vapor retarder shall be installed on the indirectly conditioned space side of all insulation in an unvented attic with air-permeable insulation, for condensation control.

See the California Energy Code, Figure 100.1-A—California Climate Zones.

5. Insulation shall be located in accordance with the following:

5.1. Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing. No insulation shall be required when roof tiles, wood shingles or wood shakes, or any other roofing system using battens and no continuous underlayment is installed. A continuous underlayment shall be considered to exist if sheathing, roofing paper or any continuous layer having a perm rate of no more than one perm under the dry cup method is present.

5.1.1. Where only air-impermeable insulation is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.

5.1.2. Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Section 5.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the R-values in Table R806.5 for condensation control.

5.1.3. Where both air-impermeable and air-permeable insulation are provided, the air-impermeable insulation shall be applied in direct contact with the underside of the structural roof sheathing and shall be in accordance with the R-values in Table R806.5 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

5.1.4. Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air tempera-

**ROOF-CEILING CONSTRUCTION**

ture is assumed to be the monthly average outside air temperature of the three coldest months.

5.2. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

**TABLE R806.5  
INSULATION FOR CONDENSATION CONTROL**

CLIMATE ZONE	MINIMUM RIGID BOARD OR AIR-IMPERMEABLE INSULATION R-VALUE
6-15 tile roof only	0 (none required)
3-15	R-5
1 & 2	R-10
16	R-15

**SECTION R807  
ATTIC ACCESS**

**R807.1 Attic access.** Buildings with combustible ceiling or roof construction shall have an attic access opening to attic areas that have a vertical height of 30 inches (762 mm) or greater over an area of not less than 30 square feet (2.8 m<sup>2</sup>). The vertical height shall be measured from the top of the ceiling framing members to the underside of the roof framing members.

The rough-framed opening shall be not less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. Where located in a wall, the opening shall be not less than 22 inches wide by 30 inches high (559 mm wide by 762 mm high). Where the access is located in a ceiling, minimum unobstructed headroom in the attic space shall be 30 inches (762 mm) at some point above the access measured vertically from the bottom of ceiling framing members. See *the California Mechanical Code* for access requirements where mechanical equipment is located in attics.