

# APA STRUCTURAL-USE PANELS OVER SPACED-BOARD ROOFS



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When replacing roofing, it is often necessary to cover spaced boards with a solid roof deck. APA Rated Sheathing panels, which include plywood and oriented strand board, may be used for this purpose. When the panels are attached over the spaced boards to the rafters or trusses, the resulting roof structure will have greater resistance to wind and seismic forces than the original spaced-board roof. The spaced boards do not have to be removed or replaced, except to repair decayed, broken or warped pieces.

The recommendations in this Technical Note are consistent with ASCE 7-02 and the 2003 IBC for wind uplift capacity for design wind speeds up to 100 mph (3-second gust) and a gable-end or hip roof with a 30-foot mean height with a slope between 2/12 and 12/12 at an inland location (Exposure B). Hurricane-prone regions of the Atlantic and Gulf coasts will typically require additional fastening to resist higher wind-load forces. The existing roof sheathing boards are assumed to be 1-inch nominal boards at a maximum spacing of 12 inches o.c.

Structural requirements for the panels are usually minimal because of installation over the spaced boards. Panels 5/16 inch or thicker may be used.

Panels should be allowed to acclimatize for a few days before installing on the roof. Acclimatize panels by standing them on edge, out of the weather, with space between each for air circulation.

APA recommends that all panel end and edge joints be spaced 1/8 inch at time of installation, unless otherwise recommended by the panel manufacturer.<sup>a</sup> Cover sheathing as soon as possible with roofing felt for extra protection against moisture prior to roofing application. Attic ventilation should be verified as complying with current building code requirements and additional attic vents installed as required. Ensure that all bathroom, dryer and stove vents exhaust directly to outside air.

## **METHODS**

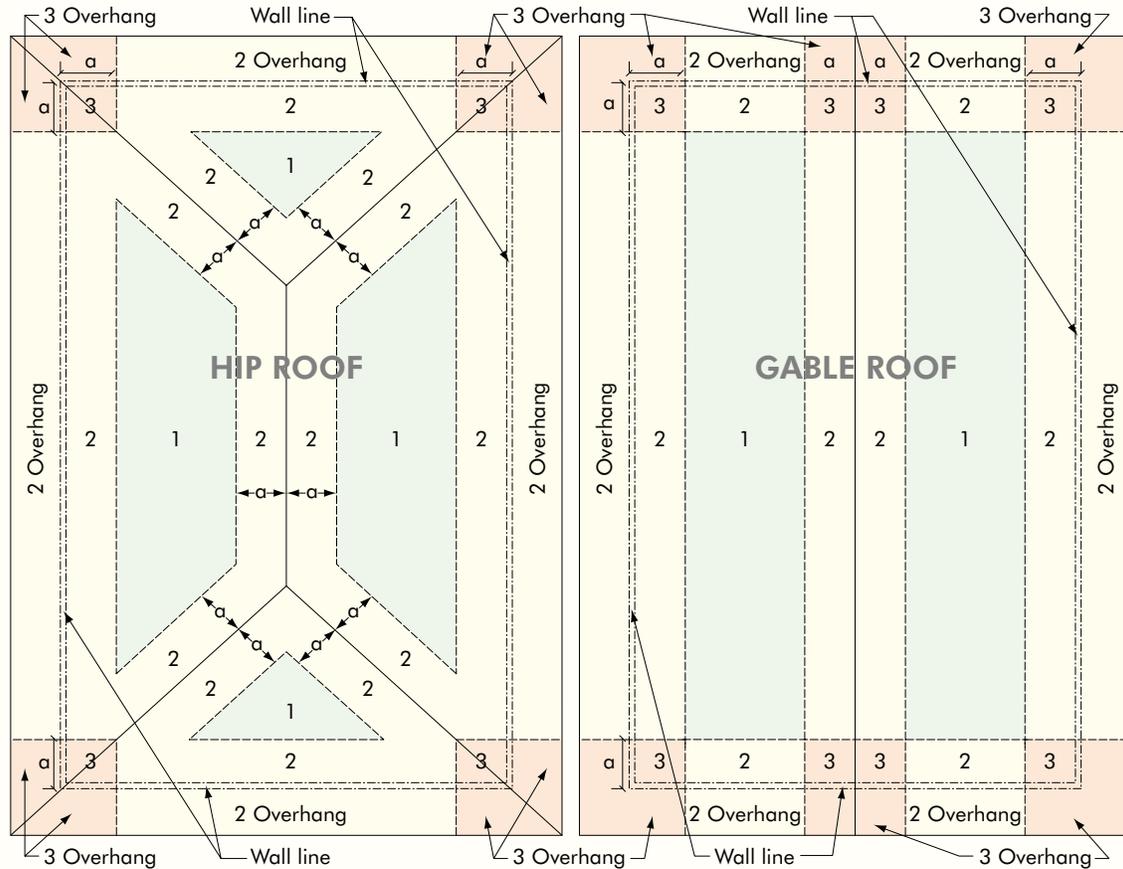
There are two basic approaches to installing structural panels over spaced boards. One is to place sheathing with panel ends or edges located over the roof framing and nail the panels to the framing through the boards. This method is recommended when such things as splits or large knots cause concern about the structural integrity of existing spaced boards. The second approach is to install the panels across the spaced boards, and nail the panels directly to the boards.

<sup>a</sup>Some manufacturers may require a space at the time of installation.

## NAILING ZONES

FIGURE A

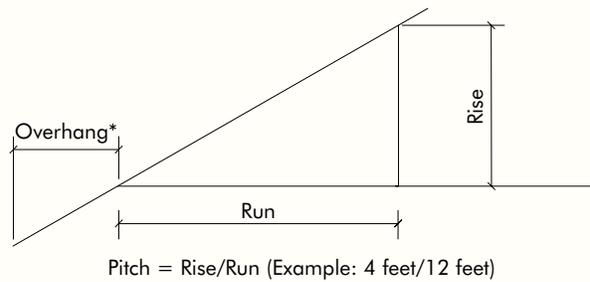
### MAIN ROOF ZONES



Distance  $a = 4$  ft in most cases (10% of least building width or 0.4 times building height, whichever is smaller, but not less than either 4% of least building width or 3 ft).

FIGURE B

### PITCH



\*Overhang nailing schedule is for any width of overhang but does not address uplift forces at roof/wall intersection.

Wind pressures vary depending on many factors, including the wind speed, the shape of the roof, the pitch or slope of the roof and the location of ridges, to name a few. Figure A outlines the two most common roof shapes on which these nailing recommendations are based, hip roofs and gable-end roofs. Figure B illustrates how the pitch of a roof is determined in rise-over-run terms.

Because the uplift pressures vary, the required nailing may also vary from roof zone to roof zone. Tables A and B provide nailing guidance for both hip and gable-end roofs.

**PANELS ATTACHED TO ROOF FRAMING (THROUGH SPACED BOARDS)**

Panels up to 3/4-inch thick may be attached to framing through spaced boards using 8d box nails (0.113 x 2-1/2 inches) with quantity as shown in Table A and illustrated in Figure C. Nail panels to framing at all spaced-board crossings, as shown in Figure C. Nails along edges continuously supported by boards should be spaced 6 inches o.c. Panel edges should not be cantilevered. It may be necessary to add additional boards or move existing boards to support panel edges.

FIGURE C

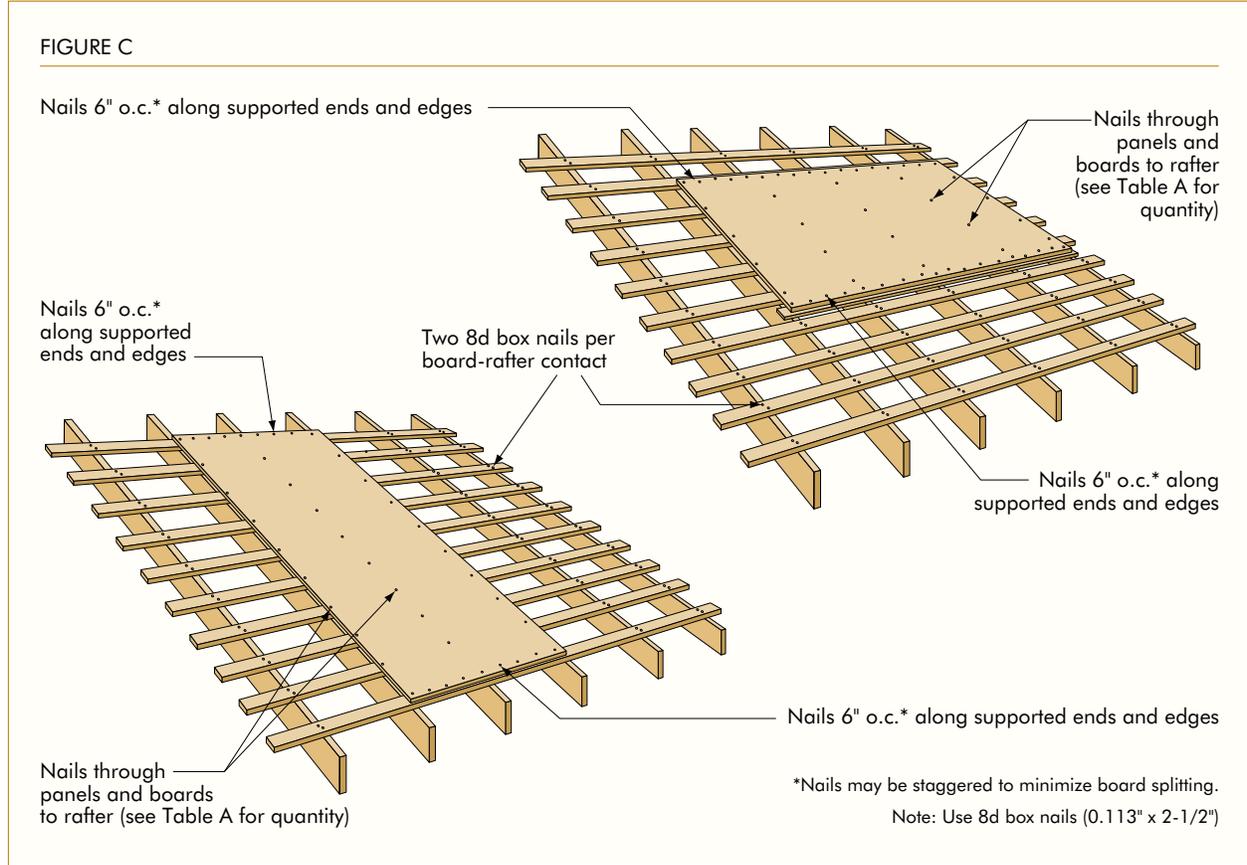


TABLE A

**PANELS NAILED TO RAFTERS OR TRUSSES<sup>1</sup> THROUGH EXISTING BOARDS**

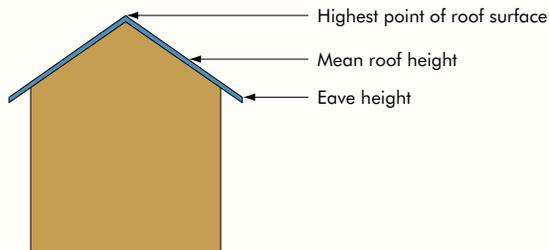
- Maximum Panel and Board Thickness: 3/4" each
- Maximum Rafter or Truss Spacing: 24" o.c.
- Box Nail (8d: 0.113" x 2-1/2")
- Wind Speed: 100 mph (3-second gust)
- Mean Roof Height: 30 ft
- Inland Location, Exposure B, Enclosed
- Occupancy Category II

Roof Region	Roof Pitch	Zone <sup>2</sup>	Board Spacing (inches o.c.)	Number of 8d Box Nails (Min. 0.113" x 2-1/2") Per Rafter Crossing
Main Roof <sup>2</sup>	2/12 to 6/12	1 & 2	6	1
			8	
			10	
			12	
	6/12 to 12/12	1, 2, & 3	6	1
			8	
			10	
			12	
Overhang <sup>3</sup>	2/12 to 6/12	2 & 3	6	1
			8	
			10	
			12	
	6/12 to 12/12	2 & 3	6	1
			8	
			10	
			12	

1. Existing boards assumed to have two 8d-box nails (0.113" x 2-1/2") per rafter contact point. Boards and rafters or truss chords assumed to have a minimum specific gravity of 0.42 (SPF).
2. Inside of exterior wall: Figure A.
3. Outside of exterior wall.

**Mean Roof Height**

Mean roof height is the average of the roof eave height and the height to the highest point of the roof surface. For roofs with a slope of 2/12 or less, mean roof height is the eave height.



Occupancy Category II includes most single- and multi-family residential buildings as well as most business and manufacturing buildings. (IBC Table 1604.5)

## PANELS ATTACHED DIRECTLY TO SPACED BOARDS

When panels are attached to spaced boards without regard to framing, the existing boards may need additional fastening prior to attaching the panels. Two 8d box nails (0.113 x 2-1/2 inches) are required for each spaced board at each rafter or truss support.

Attach panels, either parallel or perpendicular to the boards, with 6d box nails (0.099 x 2 inches) spaced according to Table B. Configurations that leave panel ends or edges continuously unsupported (cantilevered) should be avoided. Additional boards may be required (Figure D).

**Note:** Although not a code requirement, panel spacing is an APA **RECOMMENDATION** to provide installers with a means of minimizing the potential for panel buckling, which can lead to an unsightly appearance and customer complaints. Panel buckling may be an aesthetic or serviceability issue but is not a structural deficiency. There is no reason to expect this recommended space to be maintained once the panels become acclimated. Gaps that were initially present may have closed due to normal moisture-related expansion. If the flatness of the panels is acceptable, APA generally recommends that any finish roofing be installed as planned regardless of whether gaps are present.

FIGURE D

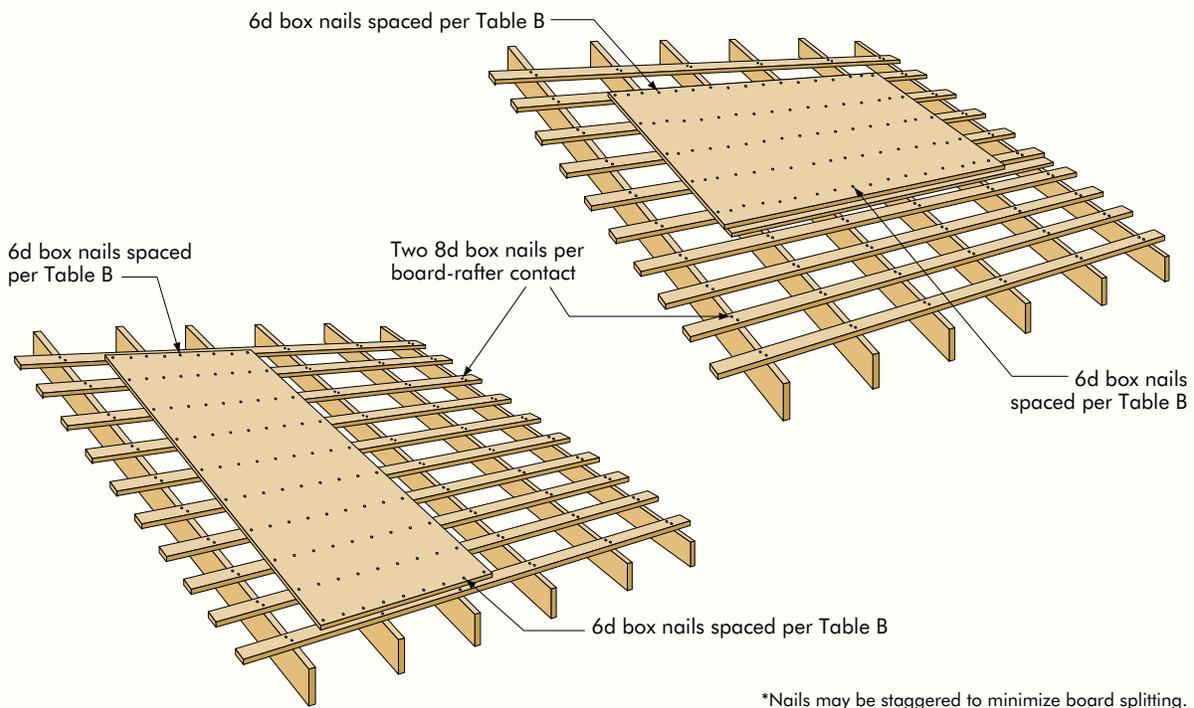


TABLE B

**MAXIMUM NAIL SPACING—PANELS NAILED TO BOARDS ONLY<sup>1</sup>**

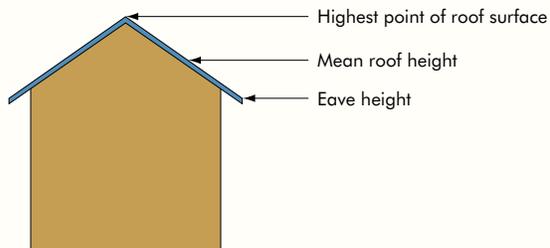
- Panel Thickness: Any APA Rated Sheathing That Permits Full Board Penetration by Nails
- Wind Speed: 100 mph (3-second gust)
- Mean Roof Height: 30 ft
- Inland Location, Exposure B, Enclosed
- Occupancy Category II

Roof Region	Roof Pitch <sup>2</sup>	Zone <sup>2</sup>	Board Spacing (inches o.c.)	Spacing of Nails (6d box, min. 0.099" Dia.) <sup>4</sup> (inches o.c.)
Main Roof <sup>2</sup>	2/12 to 6/12	1 & 2	6	12
			8	12
			10	8
			12	8
	6/12 to 12/12	1, 2 & 3	6	12
			8	12
			10	12
			12	8
Overhang <sup>3</sup>	2/12 to 6/12	2	6	12
			8	8
			10	8
			12	6
	6/12 to 12/12	2 & 3	6	12
			8	8
			10	8
			12	6

1. Existing boards assumed to have a net thickness of 3/4 inch and have two 8d-box (0.113" x 2-1/2") nails per rafter contact point. Boards assumed to have a minimum specific gravity of 0.42 (SPF).
2. Inside Exterior Wall: Figure A.
3. Outside Exterior Wall: Figure A.
4. Long enough to fully penetrate the boards.

**Mean Roof Height**

Mean roof height is the average of the roof eave height and the height to the highest point of the roof surface. For roofs with a slope of 2/12 or less, mean roof height is the eave height.



Occupancy Category II includes most single- and multi-family residential buildings as well as most business and manufacturing buildings. (IBC Table 1604.5)

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