

Strong-Wall® High-Strength Wood Shearwalls: Garage Portal Systems on Concrete Foundations

The Strong-Wall high-strength wood shearwall garage portal system provides higher allowable shear load with reduced concrete anchorage requirements. Portal walls may be used in single- or double-portal applications and shall be installed with a minimum 3" x 11 1/4" single- or multi-ply header depending upon loading and span requirements.

Codes: ICC-ES ESR-2652, City of LA Building Code Supplement and State of Florida FL5113

[For product data and naming scheme information.](#)

Garage Header Rough Opening Height

Model No.	Trimmed Panel Height (in.)	H Curb (in.)	Rough Opening Height (in.)
WSWH12x7	78	5½	6'-11½" ¹
WSWH18x7		6	7'-0" ¹
WSWH24x7			
WSWH12x8	85½	0	7'-1½"
WSWH18x8	93¼	5½	8'-2¾" ²
WSWH24x8		6	8'-3¼" ²

1. If required rough opening height exceeds table value, specify next taller panel and trim as necessary. The Strong-Wall high-strength wood shearwalls may be trimmed to a minimum height of 74 1/2".
2. Furring down garage header may be required for correct rough opening height.

Installation

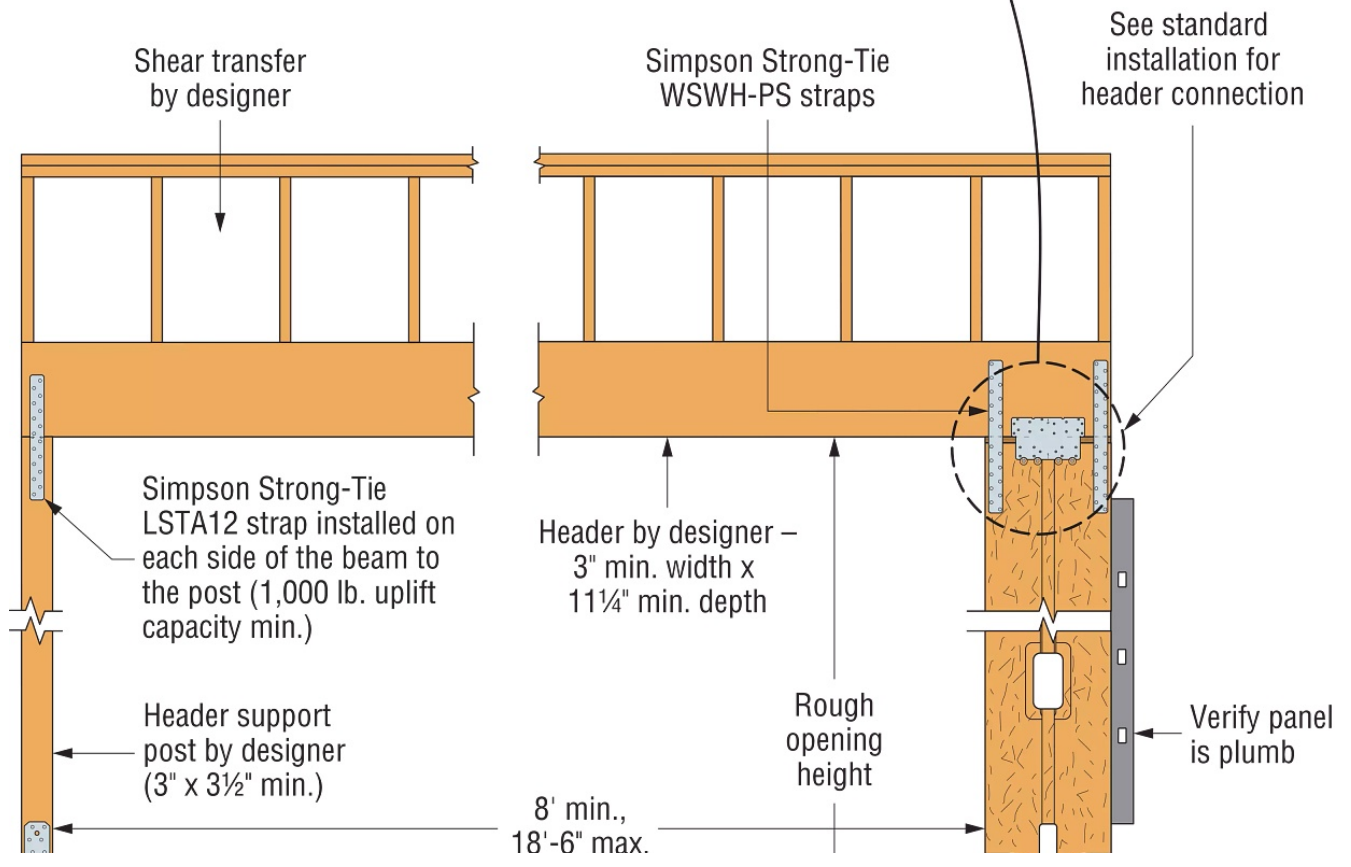
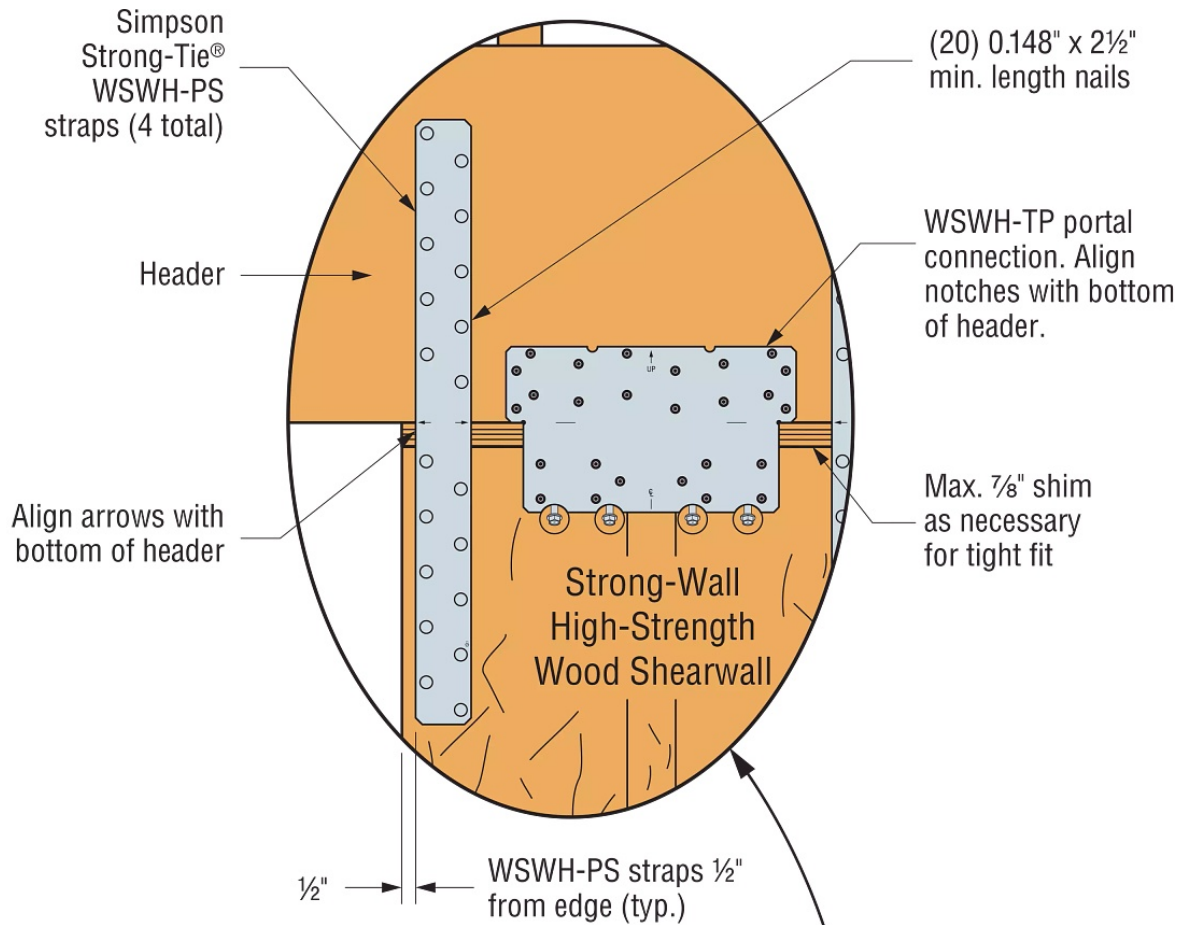
- Portal-frame connection kit is required for portal-frame applications.
- All panels may be trimmed to a minimum of 74 1/2". Trim height from top of panel only, do not trim from sides or bottom. Drilling holes in the Strong-Wall high-strength wood shearwalls is not allowed [except as shown](#).

- Anchor bolt nuts should be finger tight plus 1/2 turn.
- Maximum shim thickness between Strong-Wall high-strength wood shearwalls and the top plates or header is 7/8".
- Top connection installs with a combination of 1/4" x 6" SDS Heavy-Duty Connector screws and SWS16150 Strong-Wall screws.
- Walls may also be used in 2x6 wall framing. Install the panel flush to the outside face of the framing and add furring to the opposite side.
- Walls may be installed with solid or multi-ply headers, see details [3, 4, 5, 6/WSWH4](#) for fastening and furring requirements.

Portal Frame Connection Kit

Model No.	Contents
WSWH-PK	4 (10-gauge) WSWH-PS straps

Portal-frame connection kit comes with panels that are 100" or less in height. The kit must be ordered separately for panels over 100" tall.



Single Portal Installation

US Patent 10,711,477

Portal Design Information

A portal frame under lateral loads causes the portal header to experience internal stresses in addition to those created by the primary loads (live, dead and snow). These additional stresses are called induced forces and must be considered when designing portal headers. To account for the induced forces from lateral loads, a concentrated end moment equal to the top-of-panel moment must be placed at the end of the header that is connected to the WSWH panel. For the WSWH12, WSWH18 and WSWH24, the moment induced into the portal header must be taken as 20%, 10% and 0%, respectively, of the total lateral moment at the base. The total lateral moment is calculated as the design shear times the panel height. For headers with typical residential uniform loads, the induced moment and shear forces from a portal-frame system do not control the design. This is due to the 1.60 load duration factor (CD) used in design when wind and seismic loads are included. The lateral and vertical loads for portal frames assume that the header size falls within the portal-frame parameters listed in the table below.

Strong-Wall High-Strength Wood Shearwall Portal Header Design Parameters

Header Design Parameter	Allowable Range
Width	3" – 5 ½"
Depth	11¼" – 18"
Clear Span	8' – 18' 6"
K	90 lb./in. – 4,000 lb./in.

1. Single- or multi-ply header members may be used.
2. Maximum clear span for multi-ply 2x DF/SP header shall be limited to 16'-4".
3. Secondary moment, shear and axial forces shall be considered in header design.
4. Header design shall be by designer and assume gravity loads only induce simple span moments in beam.
5. Header stiffness (K) for use in WSWH portal system may be determined using the following equation:

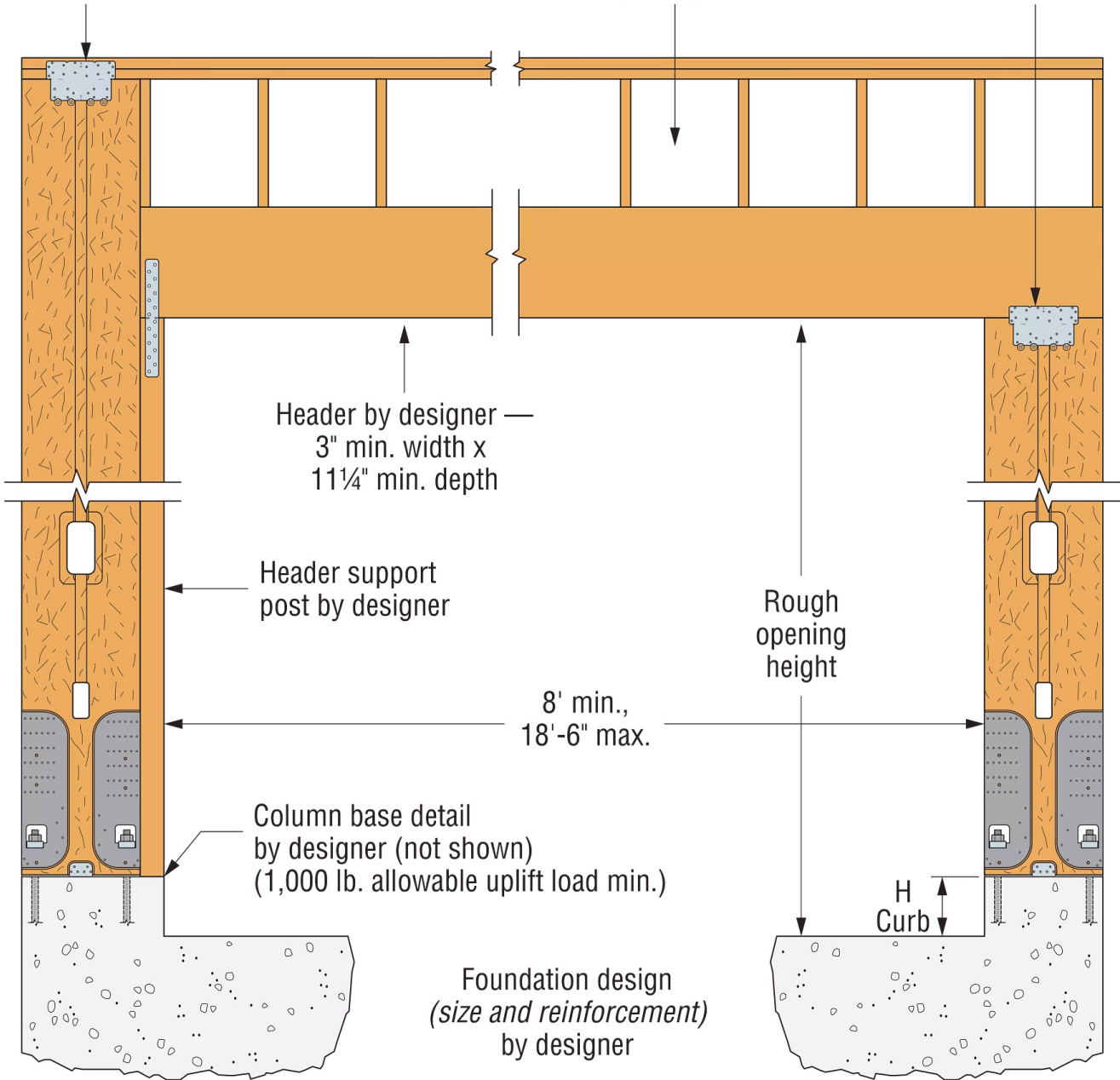
$K = (E \times b \times d^3) / 12L^3$ where:

- E = Header modulus of elasticity (psi)
- b = Header width (in.)
- d = Header depth (in.)
- L = Header clear span (in.)

See standard application for top plate connection

Shear transfer by designer

See standard connection for header connection



Alternate Garage Front Option 1

Alternate Garage Front Option 2

Alternative Garage Front Options

These alternative garage-front options may be used for applications when the Strong-Wall high-strength wood shearwall is installed at the full height (option 1) or without the additional Portal-Frame Kit (option 2), when higher allowable load or reduced concrete anchorage is not needed. [Refer to the Standard Application on Concrete Foundations for product data and allowable load values.](#)

For Garage Wall Option 2, the designer shall design for:

1. Shear transfer
2. Out-of-plane loading effect
3. Increased overturning and drift due to additional height

Single-Wall Garage Portal System on Concrete Foundation

Strong-Wall High-Strength Wood Shearwall Model No. ⁷	Panel Evaluation Height, H _e (in.) ⁷	Allowable Vertical Load, P (lb.) ⁵	2,500 psi Concrete						3,000 psi Concrete					
			Seismic ³			Wind			Seismic ³			Wind		
			Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.) ⁸	Anchor Tension at Allowable Shear, T (lb.) ¹¹	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.) ⁸	Anchor Tension at Allowable Shear, T (lb.) ¹¹	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.) ⁸	Anchor Tension at Allowable Shear, T (lb.) ¹¹	Allowable ASD Shear Load, V (lb.)	Drift at Allowable Shear, Δ (in.) ⁸	Anchor Tension at Allowable Shear, T (lb.) ¹¹
WSWH12x7	78	1,000	1,780	0.39	14,550	2,285	0.53	18,715	1,780	0.39	14,550	2,285	0.53	18,715
		4,000	1,780	0.39	14,550	2,285	0.53	18,715	1,780	0.39	14,550	2,285	0.53	18,715
		7,500	1,780	0.39	14,550	2,285	0.53	18,715	1,780	0.39	14,550	2,285	0.53	18,715
WSWH18x7	78	1,000	3,980	0.38	22,345	4,580	0.47	25,715	3,980	0.38	22,345	4,580	0.47	25,715
		4,000	3,980	0.38	22,345	4,580	0.47	25,715	3,980	0.38	22,345	4,580	0.47	25,715
		7,500	3,980	0.38	22,345	4,580	0.47	25,715	3,980	0.38	22,345	4,580	0.47	25,715
WSWH24x7	78	1,000	7,450	0.30	33,210	7,950	0.35	35,430	7,450	0.30	33,210	8,260	0.36	36,815
		4,000	7,450	0.30	33,210	7,565	0.33	33,715	7,450	0.30	33,210	8,260	0.36	36,815
		7,500	7,115	0.28	31,715	7,115	0.31	31,715	7,450	0.30	33,210	8,260	0.36	36,815
WSWH12x8	85.5	1,000	1,590	0.42	14,280	2,065	0.57	18,520	1,590	0.42	14,280	2,065	0.57	18,520
		4,000	1,590	0.42	14,280	2,065	0.57	18,520	1,590	0.42	14,280	2,065	0.57	18,520
		7,500	1,590	0.42	14,280	2,065	0.57	18,520	1,590	0.42	14,280	2,065	0.57	18,520
WSWH18x8	85.5	1,000	3,550	0.41	21,845	4,580	0.56	28,185	3,550	0.41	21,845	4,580	0.56	28,185
		4,000	3,550	0.41	21,845	4,425	0.54	27,245	3,550	0.41	21,845	4,580	0.56	28,185
		7,500	3,550	0.41	21,845	4,110	0.50	25,285	3,550	0.41	21,845	4,580	0.56	28,185
WSWH24x8	85.5	1,000	6,425	0.33	31,385	7,250	0.41	35,430	6,425	0.33	31,385	7,535	0.43	36,815
		4,000	6,425	0.33	31,385	6,900	0.39	33,715	6,425	0.33	31,385	7,535	0.43	36,815
		7,500	6,425	0.33	31,385	6,490	0.37	31,715	6,425	0.33	31,385	7,535	0.43	36,815
WSWH12x8	93.25	1,000	1,435	0.45	14,050	1,860	0.60	18,190	1,435	0.45	14,050	1,860	0.60	18,190
		4,000	1,435	0.45	14,050	1,860	0.60	18,190	1,435	0.45	14,050	1,860	0.60	18,190
		7,500	1,435	0.45	14,050	1,860	0.60	18,190	1,435	0.45	14,050	1,860	0.60	18,190
WSWH18x8	93.25	1,000	3,170	0.44	21,290	4,130	0.60	27,735	3,170	0.44	21,290	4,130	0.60	27,735
		4,000	3,170	0.44	21,290	4,060	0.59	27,245	3,170	0.44	21,290	4,130	0.60	27,735
		7,500	3,170	0.44	21,290	3,765	0.55	25,285	3,170	0.44	21,290	4,130	0.60	27,735
WSWH24x8	93.25	1,000	6,240	0.37	33,240	6,650	0.43	35,430	6,240	0.37	33,240	6,910	0.45	36,815
		4,000	6,240	0.37	33,240	6,330	0.41	33,715	6,240	0.37	33,240	6,910	0.45	36,815
		7,500	5,950	0.35	31,715	5,950	0.38	31,715	6,240	0.37	33,240	6,910	0.45	36,815

1. Allowable shear loads are applicable to installations on concrete with specified compressive strengths as listed using the ASD basic (IBC Section 1605.3.1) or the alternative basic (IBC Section 1605.3.2) load combinations.

2. Load values include evaluation of bearing stresses on concrete foundations and do not require further evaluation by the designer. For installations on masonry foundations, bearing capacity shall be evaluated by the designer.
3. Seismic design based on 2021 IBC using $R = 6.5$. For other codes, use the seismic coefficients corresponding to light-frame bearing walls with wood structural panels or sheet-steel panels.
4. Allowable values shown apply to single-wall garage portal systems. The allowable shear load for a double-wall garage portal system, which consists of two walls with a header continuous across both panels, may be taken as twice the table value.
5. Allowable vertical load denotes the total maximum concentric vertical load permitted on the panel acting in combination with the allowable shear loads.
6. Allowable shear, drift and anchor tension values may be interpolated for intermediate height or vertical loads. For panels 74 1/2–78" tall, use the values for a 78"-tall panel.
7. To achieve required WSWH panel evaluation height, trim next tallest full-height panel defined in the [Product Data table](#).
8. Drifts at lower design shear may be linearly reduced.
9. [See allowable out-of-plane and axial capacities.](#)
10. High-strength anchor bolts are required for anchor tension forces exceeding the allowable load for standard-strength bolts.
[See WSWH-AB anchor bolt information and anchorage solutions.](#)
11. Tabulated anchor tension values assume no resisting vertical load. Anchor tension loads at design shear values and including the effect of vertical load may be determined using the following equation:

$$T = [(k \times V \times H) / B] - P/2$$
, where:
 - T = Anchor tension load (lb.)
 - V = Design shear load (lb.)
 - P = Applied vertical load (lb.)
 - H = Panel height (in.)
 - B = Moment arm (in.); 7 5/8 for WSWH12, 12 1/2" for WSWH18 and 17 1/2" for WSWH24
 - k = Portal factor; 0.80 for WSWH12 panels 93 1/4" or less in height,
 - 0.90 for WSWH18 panels 93 1/4" or less in height,
 - 1.00 for all other panels.