

Two-Story Stacked-On Concrete Foundations

Simpson Strong-Tie offers a complete stacked-wall solution for two-story applications. This Steel Strong-Wall® Shearwall option combines simplified installation with superior performance.

- Some of the highest loads in the industry and design procedures that account for cumulative overturning, see pp. 54–55 for more information.
- Complete concrete-anchorage designs for two-story applications (*foundation design by designer*)
- No bearing plates to install, walls can now be placed flush against a corner.
- Uses the same anchor bolt template as single-story installation.
- Compression loads transferred by nut/rod — reducing wood crushing under load.

Material & Finish: See p. 41.

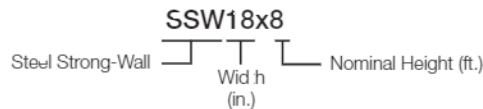
Codes: ICC-ES ESR-1679;

City of LA Building Code Supplement;

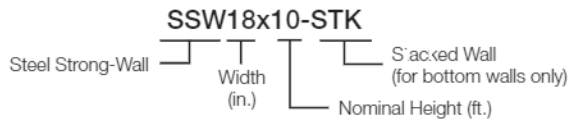
State of Florida FL5113

Top Wall:

Naming Legend



Bottom Wall:



Suggested Example Specification: SSW18x8 over SSW18x10-STK

Two-Story Stacked-Wall Product Data — Bottom Walls

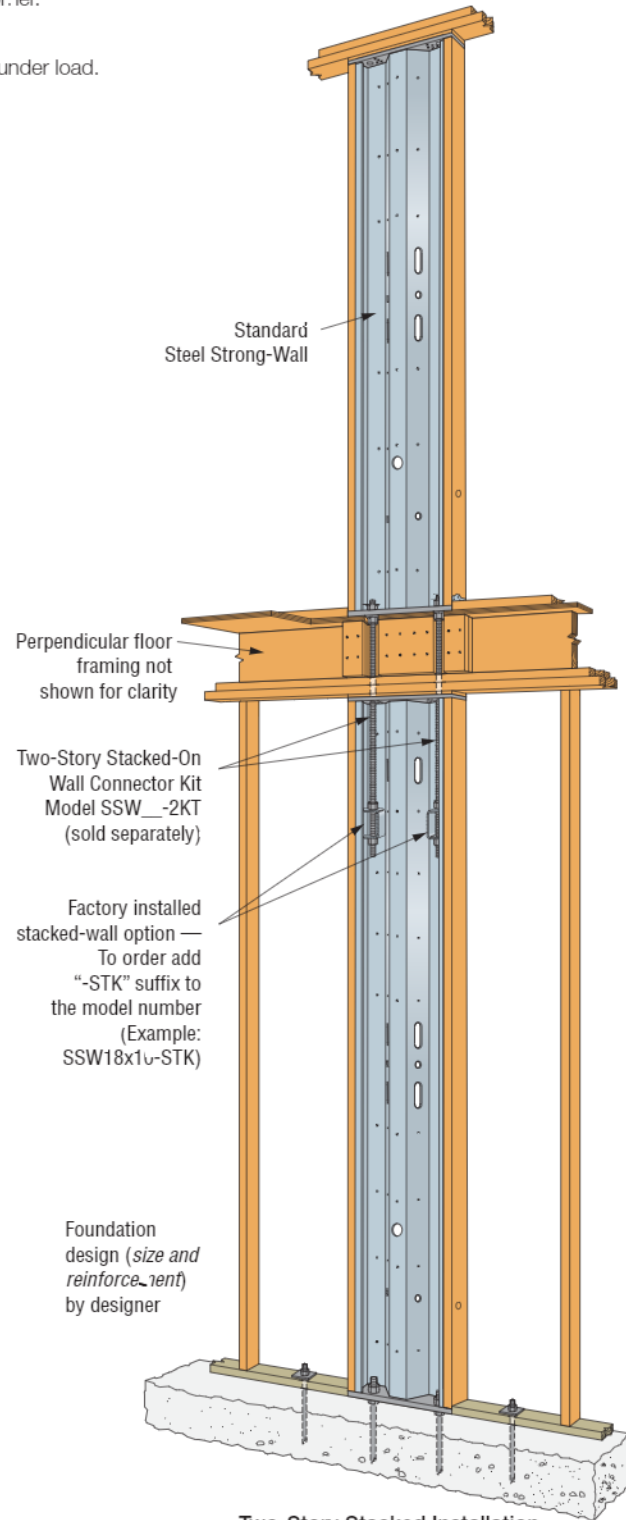
Model No.	W ¹ (in.)	H (ft.)	T (in.)	Anchor Bolts		Number of Screws in Top of Wall
				Qty.	Dia. (in.)	
SSW15x8-STK	15	93 1/4	3 1/2	2	1	6
SSW18x8-STK	18	93 1/4	3 1/2	2	1	9
SSW21x8-STK	21	93 1/4	3 1/2	2	1	12
SSW24x8-STK	24	93 1/4	3 1/2	2	1	14
SSW15x9-STK	15	105 1/4	3 1/2	2	1	6
SSW18x9-STK	18	105 1/4	3 1/2	2	1	9
SSW21x9-STK	21	105 1/4	3 1/2	2	1	12
SSW24x9-STK	24	105 1/4	3 1/2	2	1	14
SSW15x10-STK	15	117 1/4	3 1/2	2	1	6
SSW18x10-STK	18	117 1/4	3 1/2	2	1	9
SSW21x10-STK	21	117 1/4	3 1/2	2	1	12
SSW24x10-STK	24	117 1/4	3 1/2	2	1	14
SSW15x11-STK	15	129 1/4	5 1/2	2	1	6
SSW18x11-STK	18	129 1/4	5 1/2	2	1	9
SSW21x11-STK	21	129 1/4	5 1/2	2	1	12
SSW24x11-STK	24	129 1/4	5 1/2	2	1	14
SSW15x12-STK	15	141 1/4	5 1/2	2	1	6
SSW18x12-STK	18	141 1/4	5 1/2	2	1	9
SSW21x12-STK	21	141 1/4	5 1/2	2	1	12
SSW24x12-STK	24	141 1/4	5 1/2	2	1	14
SSW18x13-STK	18	153 1/4	5 1/2	2	1	9
SSW21x13-STK	21	153 1/4	5 1/2	2	1	12
SSW24x13-STK	24	153 1/4	5 1/2	2	1	14

¹ See p. 42 for product data on top wall.

Two-Story Stacked-Wall Connection Kit

Wall Width (in.)	Model No.	Contents
15	SSW15-2KT	(1) Shear-Transfer Plate (with #14 self-drilling screws)
18	SSW18-2KT	(2) 1" x 48" Threaded Rods F1554
21	SSW21-2KT	Grade 30
24	SSW24-2KT	(6) Heavy Hex Nuts Installation Instructions

1. Two heavy hex nuts included with each wall.



Two-Story Stacked Installation

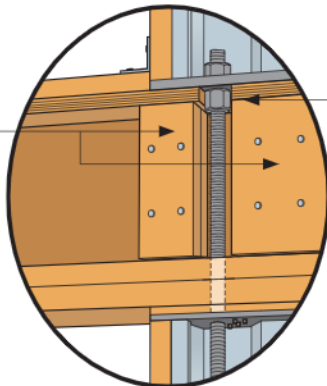
US Patents 8,281,551; 8,689,516
Canadian Patent 2,489,645

Two-Story Stacked-On Concrete Foundations

Installation Notes

- Do not cut the Steel Strong-Wall® or enlarge existing holes, doing so will compromise the performance of the wall.
- Do not use an impact wrench to tighten nuts on the anchor bolts.
- Maximum shim thickness between the Steel Strong-Wall and top plates is $\frac{7}{8}$ " using Simpson Strong-Tie® Strong-Drive® $\frac{1}{4}$ " x $3\frac{1}{2}$ " SDS Heavy-Duty Connector screws. For additional shim thicknesses, see detail 5/SSW2 on p. 69 and detail 9/SSW2 on p. 73.

Solid blocking under center and each end of wall



Blocking/Connection Detail

(See detail 8/SSW2 on p. 72 for perpendicular blocking where required)

Drill/notch subfloor to allow nut to sit flush with underside of wall (notching of rim joist may also be required)

Perpendicular floor framing not shown for clarity

Use SSW_-2K1 connection kit to attach standard wall above to "-STK" model below

Shim as necessary for tight fit

Attach to top plates with SDS $\frac{1}{4}$ " x $3\frac{1}{2}$ " screws (provided)

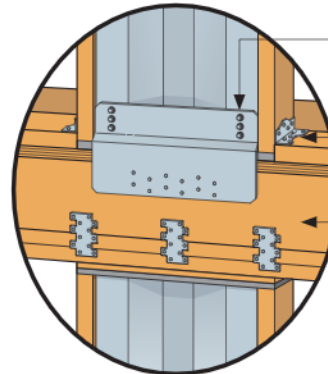
Shear-Transfer Plate Fasteners

Strong-Wall Width	Fastener Quantity	
	#14 Screws	10d Nails
15" Wall	4	10
18" Wall	6	12
21" Wall	6	16
24" Wall	7	18

SSW Shear-Transfer Plate installs with 0.148" x 3" nails into the rim joist and #14 self-drilling screws into the Strong-Wall® (sold separately with SSW_-2KT)

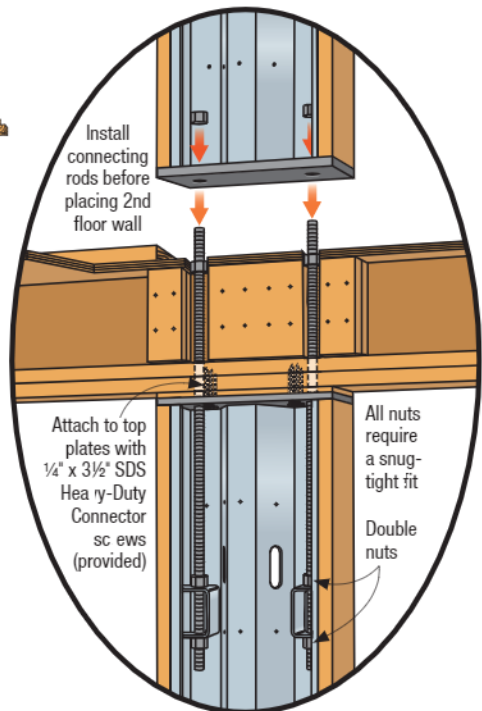
Simpson Strong-Tie® A34 each side (sold separately)

Rim joist



Exterior view of Shear-Transfer Plate

Install connecting rods before placing 2nd floor wall

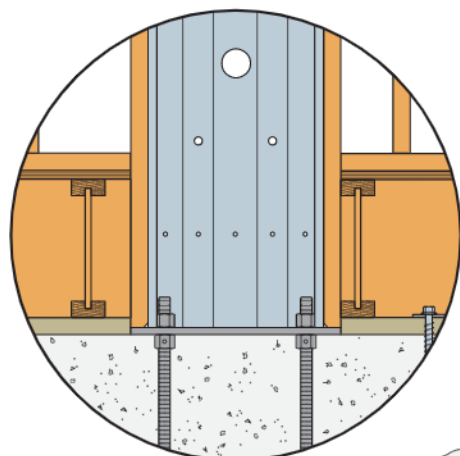


Attach to top plates with $\frac{1}{4}$ " x $3\frac{1}{2}$ " SDS Heavy-Duty Connector screws (provided)

All nuts require a snug-tight fit

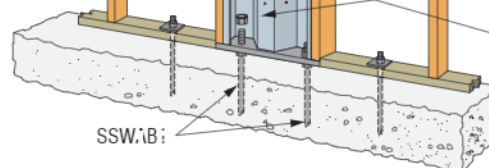
Double nuts

Two-Story Stacked-Wall Connection Detail



First-Story Installation with Wood Floor System

See detail 7/SSW2 on p. 72. Height modification options available, contact Simpson Strong-Tie.



SSW-1B

Place Steel Strong-Wall over the anchor bolts and secure with heavy hex nuts (provided). Snug-tight fit required, do not use an impact wrench. - 15# wrench/socket required for 1" nut

Two-Story Stacked Installation

US Patents 8,281,551; 8,689,518
Canadian Patent 2,489,845

Two-Story Stacked-On Concrete Foundations

Second-Story Walls⁶

Second-Story Wall Models	Seismic ²		Wind	
	Allowable ASD Shear Load V ⁸ (lb.)	Drift at Allowable Shear (in.)	Allowable ASD Shear Load V ⁸ (lb.)	Drift at Allowable Shear (in.)
SSW15x7	600	0.21	600	0.21
SSW18x7	1,210	0.24	1,390	0.28
SSW21x7	1,735	0.23	1,815	0.24
SSW24x7	2,330	0.22	2,330	0.22
SSW15x8	550	0.26	550	0.26
SSW18x8	1,130	0.32	1,315	0.37
SSW21x8	1,625	0.30	1,715	0.32
SSW24x8	2,050	0.26	2,050	0.26
SSW15x9	510	0.31	510	0.31
SSW18x9	1,070	0.39	1,220	0.45
SSW21x9	1,520	0.36	1,520	0.36
SSW24x9	1,815	0.30	1,815	0.30
SSW15x10	470	0.37	470	0.37
SSW18x10	1,010	0.47	1,095	0.51
SSW21x10	1,365	0.39	1,365	0.39
SSW24x10	1,630	0.35	1,630	0.35
SSW15x11	440	0.43	440	0.43
SSW18x11	960	0.55	995	0.57
SSW21x11	1,235	0.46	1,235	0.46
SSW24x11	1,480	0.39	1,480	0.39
SSW15x12	405	0.50	405	0.50
SSW18x12	900	0.63	910	0.64
SSW21x12	1,130	0.52	1,130	0.52
SSW24x12	1,355	0.43	1,355	0.43
SSW18x13	830	0.68	840	0.69
SSW21x13	1,045	0.57	1,045	0.57
SSW24x13	1,250	0.48	1,250	0.48

1. Allowable base moment and anchor tension are applicable to installation on concrete foundations with minimum $f'_c = 2,500$ psi using the ASD basic (Section 1605.3.1) or the alternative basic (Section 1605.3.2) load combinations. Load values include evaluation of anchor rod compression at second story and bearing stresses at foundation.
2. For seismic designs based on the 2018 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.
3. Two-story stacked-wall installations may consist of any height-combination of equal width wall models listed in these tables.
4. Loads are based on a 1,000 lb. maximum uniformly distributed total axial load acting on the second-story panel and a 2,000 lb. maximum uniformly distributed total axial load acting on the first-story panel in combination with the tabulated shear load and base moment.
5. The designer must verify that the cumulative overturning moment at the base of the first-story Steel Strong-Wall® does not exceed the allowable base moment capacity. See design example on p. 55 for procedure.
6. The allowable second-story shear loads assume a maximum floor joist depth of 14". For allowable shear load with up to 18" joists, multiply second-story allowable shear loads by 0.98 for SSW15x models and by 0.94 for other SSW widths. For bottom wall shims greater than $\frac{3}{8}$ " thick, see detail 9/SSW2 on p. 73.
7. Allowable shear, drift, and base moment values may be interpolated for intermediate heights.
8. Minimum ASTM F1554 Grade 36 threaded rods are required at the second-story wall anchorage.
9. High-strength anchor bolts are required at the first-story wall for anchor tension forces exceeding the allowable load for standard-strength bolts tabulated on pp. 60–61. See pp. 60–67 for SSWAB anchor bolt information and anchorage solutions.
10. Tabulated anchor tension loads assume no resisting axial load. For anchor tension loads at design shear values and including the effect of axial load, refer to the Strong-Wall Selector web application or use the equations on p. 46. Drifts at lower design shear or base moment may be linearly reduced.

First-Story Walls on Concrete Foundations^{5,9}

First-Story Wall Models	Seismic ²			Wind		
	Allowable ASD Base Moment (ft.-lb.)	Drift at Allowable Base Moment (in.)	Anchor Tension at Allowable Base Moment ¹⁰ (lb.)	Allowable ASD Base Moment (ft.-lb.)	Drift at Allowable Base Moment (in.)	Anchor Tension at Allowable Base Moment ¹⁰ (lb.)
SSW15x8-STK	9,665	0.35	11,385	9,665	0.35	11,385
SSW19x8-STK	19,270	0.41	13,520	22,690	0.49	24,875
SSW21x8-STK	27,665	0.39	23,330	30,775	0.43	27,240
SSW24x8-STK	37,905	0.37	27,435	39,670	0.39	28,370
SSW15x9-STK	9,490	0.37	11,130	9,490	0.38	11,130
SSW18x9-STK	18,815	0.47	18,890	22,695	0.57	24,870
SSW21x9-STK	27,585	0.46	23,265	31,310	0.52	27,970
SSW24x9-STK	37,585	0.44	27,215	40,390	0.47	30,150
SSW15x10-STK	9,225	0.45	10,755	9,225	0.45	10,755
SSW19x10-STK	18,175	0.53	18,030	22,585	0.65	24,630
SSW21x10-STK	29,750	0.50	25,905	31,485	0.55	28,210
SSW24x10-STK	37,470	0.50	27,100	40,925	0.55	30,740
SSW15x11-STK	9,025	0.50	10,475	9,025	0.50	10,475
SSW18x11-STK	17,610	0.58	17,295	22,115	0.73	23,880
SSW21x11-STK	26,765	0.58	22,325	30,860	0.67	27,355
SSW24x11-STK	37,430	0.57	27,030	40,260	0.6	30,005
SSW15x12-STK	8,675	0.57	9,990	8,675	0.57	9,990
SSW18x12-STK	17,070	0.63	16,605	21,600	0.80	23,030
SSW21x12-STK	26,015	0.63	21,490	30,195	0.73	26,475
SSW24x12-STK	37,080	0.63	26,710	39,545	0.67	29,235
SSW18x13-STK	17,050	0.68	16,580	21,155	0.85	22,315
SSW21x13-STK	25,350	0.68	20,735	29,505	0.79	25,530
SSW24x13-STK	36,140	0.68	25,790	38,795	0.73	28,450

See footnotes above.

Two-Story Stacked-On Concrete Foundations

Two-Story Design Example

Example: Standard Two-Story Wall Design

Given:

Wind, $f_c = 2,500$ psi

$V_{2nd\ story\ wall} = 650$ lb.

$V_{1st\ story\ wall} = 650$ lb.

$V_{total} = 650\text{ lb.} + 650\text{ lb.} = 1,300\text{ lb.}$

$M_{allow} = \text{Allowable ASD Base Moment (ft.-lb.)}$
 (See Two-Story Stacked Tables)

$V_{allow} = \text{Allowable ASD Shear Load V (lb.)}$
 (See Two-Story Stacked Tables)

Step 1 – Select First-Story Wall (See tables on p. 58)

$M_{base} = (650\text{ lb.} \times 18\text{ ft.}) + (650\text{ lb.} \times 9\text{ ft.}) = 17,550\text{ ft.-lb.}$

Using First-Story Wall Table, select a 9-foot wall with $M_{allow} \geq M_{base}$

Select SSW18x9-STK

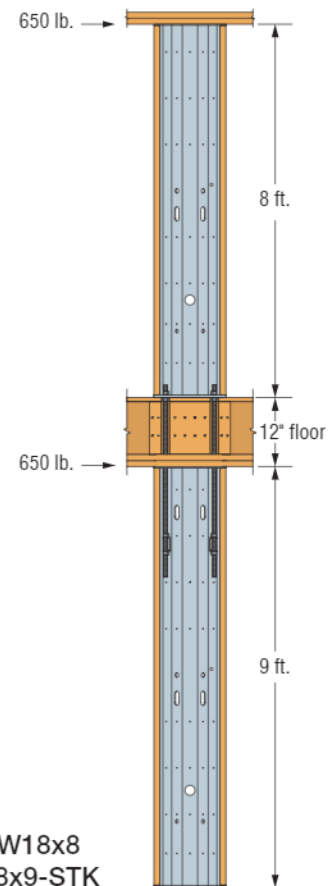
$M_{allow} = 22,685\text{ ft.-lb.} > 17,550\text{ ft.-lb.}$ **OK**

Step 2 – Check Second-Story Wall

Using the Second-Story Wall Table on p. 58, check the capacity of an 8-foot wall with the same width as the First-Story Wall selected in Step 1:

Select SSW18x8

$V_{allow} = 1,315\text{ lb.} > 650\text{ lb.}$ **OK**



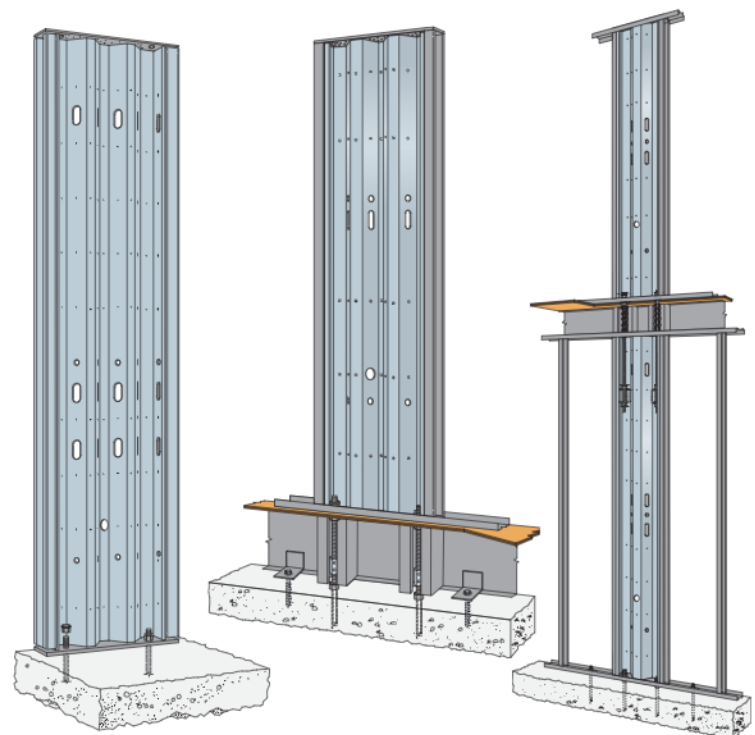
**>>> Use SSW18x8
over SSW18x9-STK**

Cold-Formed Steel on Concrete Foundations

The Steel Strong-Wall® provides high-capacity, narrow-wall solutions for cold-formed steel (CFS) framing. Wall models for this application, designated by the S/SSW model prefix, install easily in CFS framing, and preattached steel studs allow easy attachment of interior and exterior finishes. Simpson Strong-Tie offers Steel Strong-Wall solutions for standard CFS applications on concrete, first-story floor systems, and two-story stacked applications on concrete.

Cold-Formed Steel Connectors

All of the design, specification and installation information you need on our Steel Strong-Wall for CFS applications can be found at strongtie.com/cfs.



Cold-Formed Steel Applications
 (Standard, Raised Floor and Two-Story)