

# STEEL STRONG-WALL®: Two-Story Stacked on Concrete Foundations

A complete stacked-wall solution for two-story applications. Now there is a Steel Strong-Wall® option for two-story installations that combines simplified installation with superior performance.

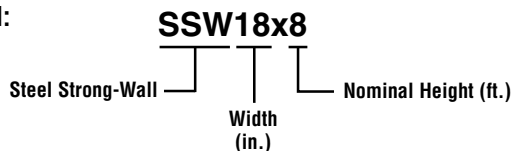
- Some of the highest loads in the industry, and design procedures that account for cumulative overturning, see pages 23-24 for more information.
- Complete concrete-anchorage designs for two-story applications (*foundation design by Designer*)
- No bearing plates to install, walls can now be placed 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 page 10

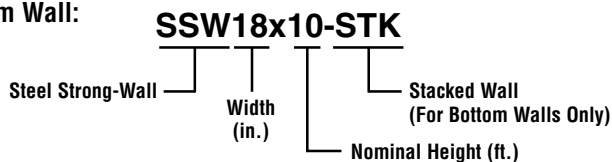
**CODE:** ICC-ES ESR-1679  
State of Florida FL5113

## NAMING SCHEME

Top Wall:



Bottom Wall:



## TWO-STORY STACKED-WALL PRODUCT DATA – BOTTOM WALLS

Model No.	W (in)	H (in)	T (in)	Anchor Bolts		Number of Screws in Top of Wall
				Qty.	Dia. (in)	
SSW15x8-STK	15	93¼	3½	2	1	6
SSW18x8-STK	18	93¼	3½	2	1	9
SSW21x8-STK	21	93¼	3½	2	1	12
SSW24x8-STK	24	93¼	3½	2	1	14
SSW15x9-STK	15	105¼	3½	2	1	6
SSW18x9-STK	18	105¼	3½	2	1	9
SSW21x9-STK	21	105¼	3½	2	1	12
SSW24x9-STK	24	105¼	3½	2	1	14
SSW15x10-STK	15	117¼	3½	2	1	6
SSW18x10-STK	18	117¼	3½	2	1	9
SSW21x10-STK	21	117¼	3½	2	1	12
SSW24x10-STK	24	117¼	3½	2	1	14
SSW15x11-STK	15	129¼	5½	2	1	6
SSW18x11-STK	18	129¼	5½	2	1	9
SSW21x11-STK	21	129¼	5½	2	1	12
SSW24x11-STK	24	129¼	5½	2	1	14
SSW15x12-STK	15	141¼	5½	2	1	6
SSW18x12-STK	18	141¼	5½	2	1	9
SSW21x12-STK	21	141¼	5½	2	1	12
SSW24x12-STK	24	141¼	5½	2	1	14
SSW18x13-STK	18	153¼	5½	2	1	9
SSW21x13-STK	21	153¼	5½	2	1	12
SSW24x13-STK	24	153¼	5½	2	1	14

1. See page 11 for product data on top wall.

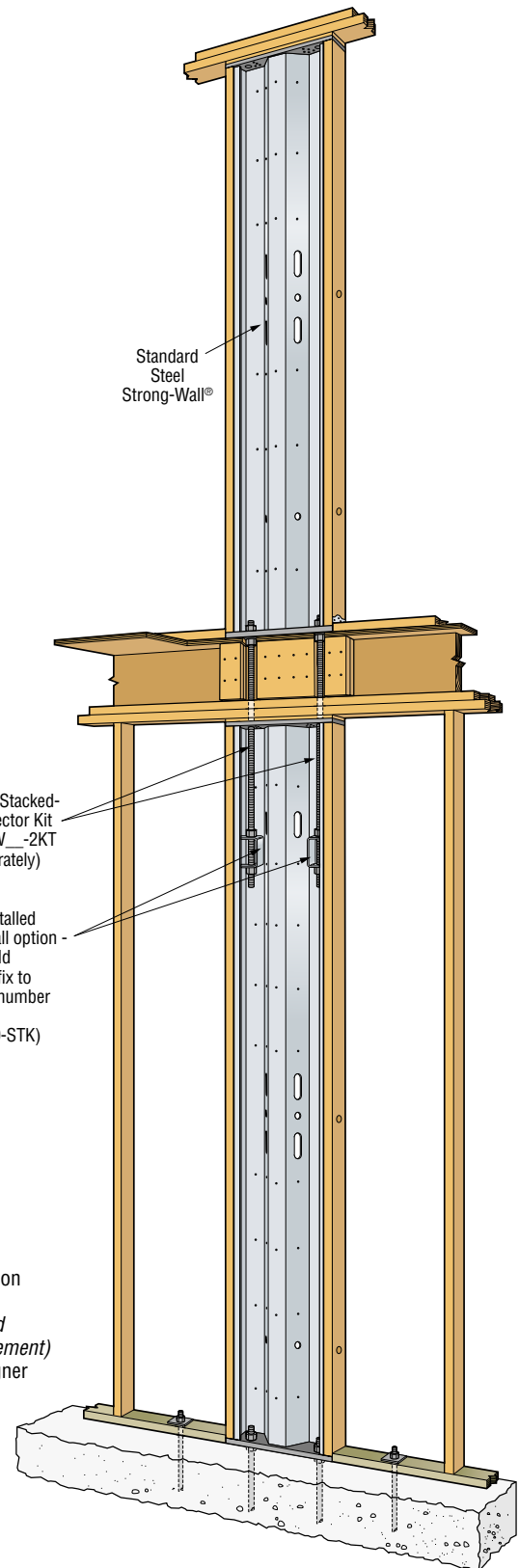
## TWO-STORY STACKED-WALL CONNECTION KIT

Wall Width (in)	Model No.	Contents
15	SSW15-2KT	(1) Shear-Transfer Plate (with #14 self-drilling screws)
18	SSW18-2KT	(2) 1"x48" Threaded Rods F1554 Grade 36
21	SSW21-2KT	(6) Heavy Hex Nuts
24	SSW24-2KT	Installation Instructions

1. Two heavy hex nuts included with each wall.



For a complete set of wall profile drawings, see page 10.



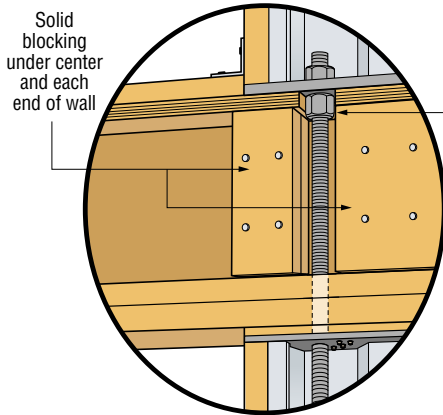
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## INSTALLATION

- 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 7/8" using Simpson Strong-Tie® Strong-Drive® 1/4"x3 1/2" screws (SDS). For additional shim thicknesses, see detail 5/SSW2 on page 57 and detail 9/SSW2 on page 61.
- Drill or notch the subfloor to allow the compression nut to sit flush with the underside of the 2nd-story wall (notching of the rim joist may also be required).

## SHEAR-TRANSFER PLATE FASTENERS

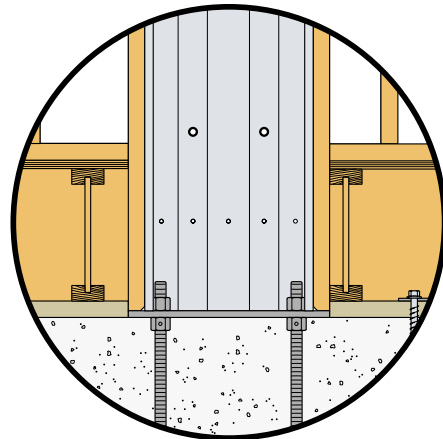
Strong-Wall Width	Fastener Quantity	
	#14 Screws	10d Nails
15" Wall	4	10
18" Wall	6	12
21" Wall	6	16
24" Wall	7	18



### BLOCKING/CONNECTION DETAIL

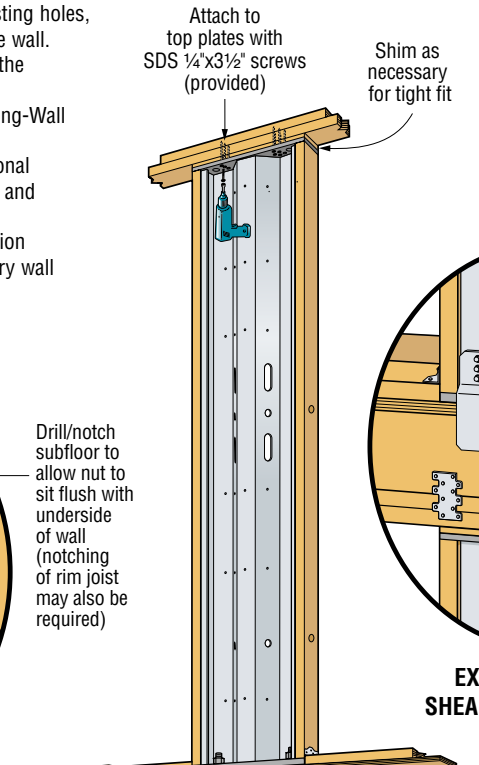
(See detail 8/SSW2 on page 60 for perpendicular blocking where required)

Use SSW\_-2KT connection kit to attach standard wall above to "-STK" model below

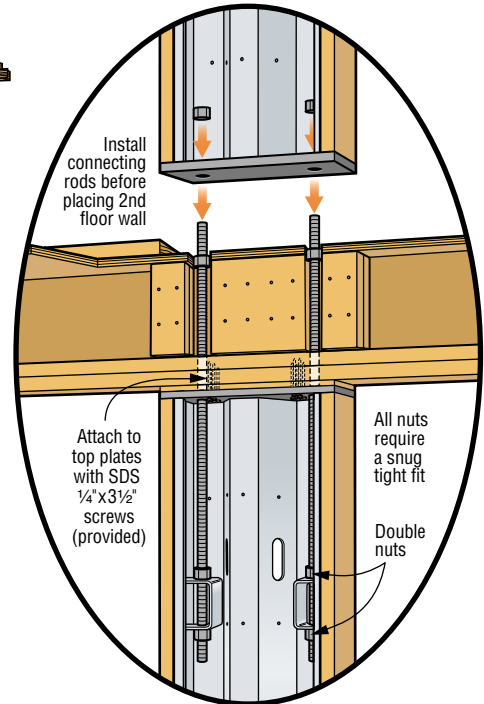


### 1ST-STORY INSTALLATION WITH WOOD FLOOR SYSTEM

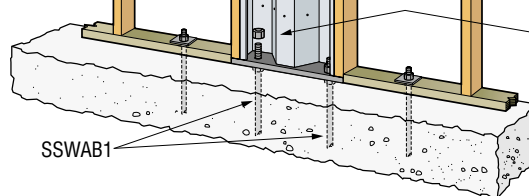
See detail 7/SSW2 on page 60. Height modification options available, contact Simpson Strong-Tie.



### EXTERIOR VIEW OF SHEAR-TRANSFER PLATE



### TWO-STORY STACKED-WALL CONNECTION DETAIL



Place Steel Strong-Wall® panel over the anchor bolts and secure with heavy hex nuts (provided). Snug tight fit required, do not use an impact wrench.

- 1 5/8" wrench/socket required for 1" nut

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## SECOND-STORY WALLS<sup>6</sup> – 2006 INTERNATIONAL BUILDING CODE®

Second-Story Wall Models	Seismic <sup>2</sup>		Wind	
	Allowable ASD Shear Load V (lbs)	Drift at Allowable Shear (in)	Allowable ASD Shear Load V (lbs)	Drift at Allowable Shear (in)
SSW15x7	600	0.21	600	0.21
SSW18x7	1210	0.24	1390	0.28
SSW21x7	1735	0.23	1815	0.24
SSW24x7	2330	0.22	2330	0.22
SSW15x8	550	0.26	550	0.26
SSW18x8	1130	0.32	1315	0.37
SSW21x8	1625	0.30	1715	0.32
SSW24x8	2050	0.26	2050	0.26
SSW15x9	510	0.31	510	0.31
SSW18x9	1070	0.39	1220	0.45
SSW21x9	1520	0.36	1520	0.36
SSW24x9	1815	0.30	1815	0.30
SSW15x10	470	0.37	470	0.37
SSW18x10	1010	0.47	1095	0.51
SSW21x10	1365	0.39	1365	0.39
SSW24x10	1630	0.35	1630	0.35
SSW15x11	440	0.43	440	0.43
SSW18x11	960	0.55	995	0.57
SSW21x11	1235	0.46	1235	0.46
SSW24x11	1480	0.39	1480	0.39
SSW15x12	405	0.50	405	0.50
SSW18x12	900	0.63	910	0.64
SSW21x12	1130	0.52	1130	0.52
SSW24x12	1355	0.43	1355	0.43
SSW18x13	830	0.68	840	0.69
SSW21x13	1045	0.57	1045	0.57
SSW24x13	1250	0.48	1250	0.48

1. Allowable base moment and anchor uplifts are applicable to installation on concrete foundations with minimum  $f'_c = 2500$  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 2006 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 1000 lbs. maximum uniformly distributed total axial load acting on the second-story panel and a 2000 lbs. 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 page 28 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 page 61.
7. Allowable shear, drift, and base moment values may be interpolated for intermediate heights.
8. Minimum ASTM F 1554 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 (uplift) forces exceeding the allowable load for standard-strength bolts tabulated on pages 32-33. See pages 32-33 for SSWAB anchor bolt information and anchorage solutions.
10. Tabulated anchor tension (uplift) 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™ software or use the equations on page 15. Drifts at lower design shear or base moment may be linearly reduced.

## FIRST-STORY WALLS ON CONCRETE FOUNDATIONS<sup>5,9</sup> – 2006 INTERNATIONAL BUILDING CODE®

First-Story Wall Models	Seismic <sup>2</sup>			Wind		
	Allowable ASD Base Moment (ft-lbs)	Drift at Allowable Base Moment (in)	Uplift at Allowable Base Moment <sup>10</sup> (lbs)	Allowable ASD Base Moment (ft-lbs)	Drift at Allowable Base Moment (in)	Uplift at Allowable Base Moment <sup>10</sup> (lbs)
SSW15x8-STK	9665	0.35	11385	9665	0.35	11385
SSW18x8-STK	19270	0.41	19520	22690	0.49	24875
SSW21x8-STK	27665	0.39	23360	30775	0.43	27240
SSW24x8-STK	37805	0.37	27435	39670	0.39	29370
SSW15x9-STK	9490	0.37	11130	9490	0.38	11130
SSW18x9-STK	18815	0.47	18890	22685	0.57	24870
SSW21x9-STK	27585	0.46	23265	31310	0.52	27970
SSW24x9-STK	37585	0.44	27215	40390	0.47	30150
SSW15x10-STK	9225	0.45	10755	9225	0.45	10755
SSW18x10-STK	18175	0.53	18030	22585	0.65	24690
SSW21x10-STK	29750	0.50	25905	31485	0.55	28210
SSW24x10-STK	37470	0.50	27100	40925	0.55	30740
SSW15x11-STK	9025	0.50	10475	9025	0.50	10475
SSW18x11-STK	17610	0.58	17295	22115	0.73	23880
SSW21x11-STK	26765	0.58	22325	30860	0.67	27355
SSW24x11-STK	37430	0.57	27060	40260	0.61	30005
SSW15x12-STK	8675	0.57	9990	8675	0.57	9990
SSW18x12-STK	17070	0.63	16605	21600	0.80	23030
SSW21x12-STK	26015	0.63	21490	30195	0.73	26475
SSW24x12-STK	37080	0.63	26710	39545	0.67	29235
SSW18x13-STK	17050	0.68	16580	21155	0.85	22315
SSW21x13-STK	25350	0.68	20765	29505	0.79	25590
SSW24x13-STK	36140	0.68	25790	38795	0.73	28450

See footnotes above.

## STEEL STRONG-WALL® TWO-STORY DESIGN EXAMPLE

## Example: Standard Two-Story Wall Design

**Given:**

2006 IBC, Wind,  $f'_c = 2500$  psi

$V_{2\text{nd-story wall}} = 650$  lbs.

$V_{1\text{st-story wall}} = 650$  lbs.

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

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

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

**STEP 1 – Select First-Story Wall** (See tables on page 27)

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

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

Select SSW18x9-STK

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

**STEP 2 – Check Second-Story Wall**

Using the Second-Story Wall Table on page 27, check the capacity of an 8-foot wall with the same width as the First-Story Wall selected in Step 1:

Select SSW18x8

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

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