

DESIGN EXAMPLE

DESIGN NOTES

Specify:

The Designer will need to determine the holddown loads required at each floor. Use the charts provided to pick the appropriate Anchor Tiedown System (ATS) run based on the number of floors and the capacity. The ATS will provide only the tension part of the shearwall; the Designer will need to determine the compression shear edge nailing schedule, horizontal drift, and meet all other requirements in accordance with the applicable building code.

For simplicity during installation the Designer may want to designate and group similar runs.

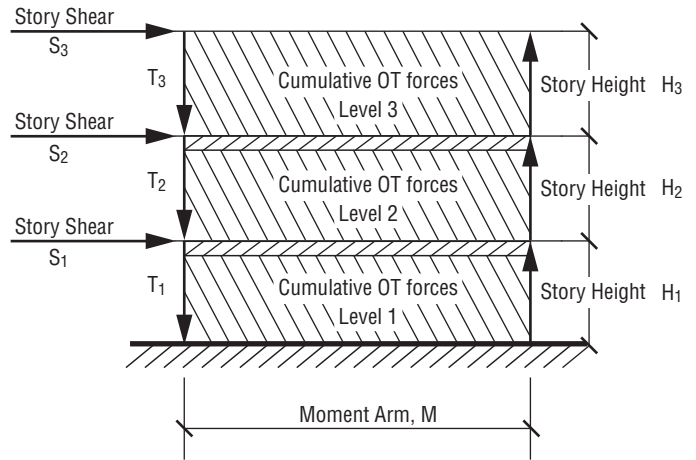
Given: IBC 2000 (AISC 9th Ed.), $\frac{1}{3}$ steel stress increase applies
 8' plate height
 4" nominal wall thickness
 Douglas Fir-Larch studs and wall plates

Given Overturning (OT) Forces

Level	Incremental OT Forces (lbs)	ASD Cumulative OT Tension Forces (lbs)	ASD Cumulative OT Compression Forces (lbs)
3	6000	6000	8000
2	7000	13000	16000
1	8000	21000	25000

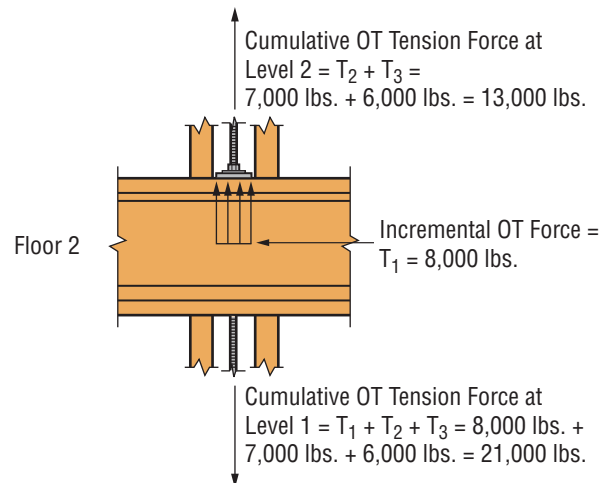
1. The structural design overturning forces listed above are arbitrary and intended only for this design example. Simpson Strong-Tie is not responsible for structural design of the building or derivation of the structural forces.

2. The incremental OT Forces are the difference between the cumulative OT Forces at each level.



Example for Derivation of Forces at Level 1:

- Note that Moment Arm, M , is the distance between the centerline of compression members to centerline of tension members.
- Incremental OT Force = $T_1 = \frac{S_1(H_1)}{M} = 8,000$ lbs. The incremental OT Force is calculated at each level. $T_2 = 7,000$ lbs. $T_3 = 6,000$ lbs.
 The incremental OT Forces are typically the incremental bearing forces.
- Cumulative OT Tension Force at level 1 = $T_1 + T_2 + T_3 = 6,000$ lbs. + $7,000$ lbs. + $8,000$ lbs. = $21,000$ lbs.
- See sketch at right for additional information.
- Cumulative OT Compression Forces are higher than Cumulative OT Tension Forces due to the addition of code required dead loads.



Rod Length Calculation = Plate height plus floor system plus 12" rounded up in 1 foot increments.

Rod Length Example:

1 - 2x Plates	=	1.50
2 x 12 Floor System	=	11.25
$\frac{3}{4}$ " Floor	=	0.75
		<hr/>
		13.50"

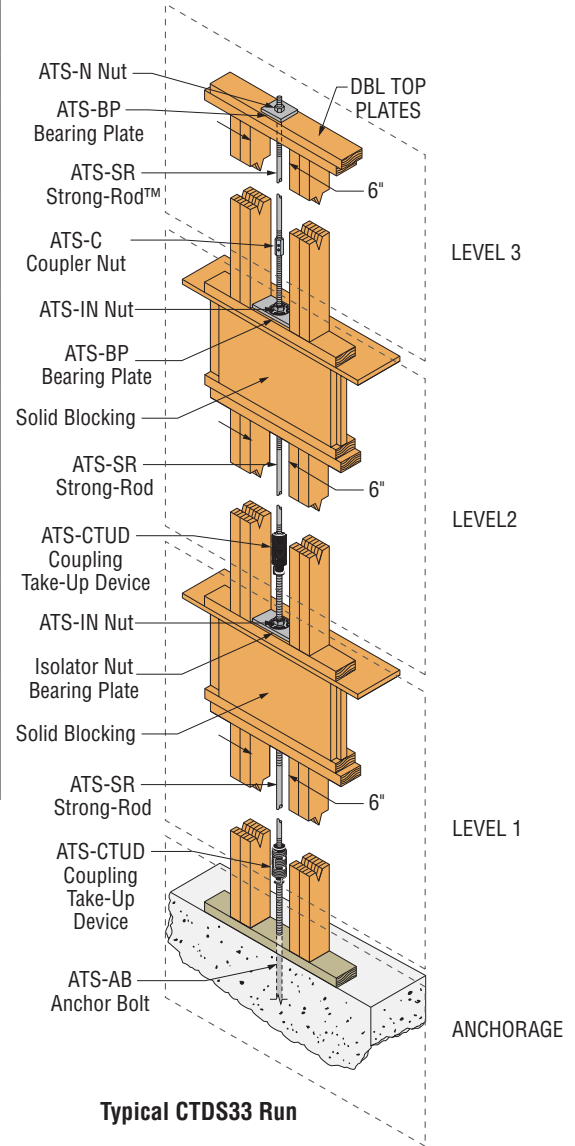
8' Plate Height + $13\frac{1}{2}$ " + 8" Takeup Clearance = $9'-9\frac{1}{2}"$ = Rod Length 10'
 Actual rod length will be 2' longer than the plate height for all floors except the top floor, in this example.

DESIGN EXAMPLE

Step 1: Check Incremental and Cumulative ASD OT Forces against capacities.

Level	Load Components	CTDS33		Component	Demand Forces	
		Capacity			Incremental OT Force (lbs)	Cumulative OT Tension Force (lbs)
		DF	SP			
Three	Incremental Bearing Capacity (lb)	10540	9530	ATS-N7 ATS-BP5-3X5.5	6000	—
	Allowable Tension Capacity (100/133) (lb)	6075 / 8100		ATS-SR5 ATS-C75	—	6000
Two	Incremental Bearing Capacity (lb)	10280	9280	ATS-IN7 ATS-BP7-3X5.5	7000	—
	Allowable Tension Capacity (100/133) (lb)	11905 / 15875		ATS-SR7 ATS-CTUD97	—	13000
One	Incremental Bearing Capacity (lb)	9950	8995	ATS-IN9 ATS-BP9-3X5.5	8000	—
	Allowable Tension Capacity (100/133) (lb)	19680 / 26240		ATS-SR9 ATS-CTUD99	—	21000
Anchorage	Anchor Bolt Grade and Size	See page 17 for minimum embedment and edge distance		ATS-SR9	—	—

1. The Designer is responsible for verifying that the building drift is within acceptable limitations and code limitations.



Step 2: Use Compression Member Selection Tables to Select Compression Members

Level	Cumulative OT Compression Forces (lbs)		8' D. Fir-L 4x Stud Compression Capacity (lbs)	Compression Members Each Side of ATS Rod
3	8000	<	10938	(1) 3x4
2	16000	<	21875	(2) 3x4
1	25000	<	31719	(1) 4x8

- See page 36 for 8-foot D.Fir-L compression capacity.
- 8'-0" plate height and 1.33 load duration factor used.
- Calculations based on 2005 NDS.
- Example only reviews compression case for the lumber species, plate height, and loads provided. Designer must review compression post and size for any additional loads, load combinations, variation in species, variation in lumber grade, or unsupported heights as specified in the code.

Step 3: The Solution

CTDS33 AND COMPRESSION MEMBERS SHOWN.

To identify the most economical design, download the ATS Selector software at www.strongtie.com