Design Examples for Shear Walls Resisting Wind Loads

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Learning Objectives

At the end of this program, participants will

- Identify and understand the basic shear wall system to resist wind loads
- Understand the difference between segmented and perforated shear wall design
- Understand hold-down design
- Be able to identify and analyze shear walls per the IRC, WFCM, and SDPWS and understand the differences between them
Outline

1. 2009 IRC Braced Walls
2. 2001 WFCM High Wind Guide
3. 2001 WFCM Prescriptive
4. 2001 WFCM Engineered
5. 2008 SDPWS
AWC Design Standards

2008 EDITION
ANSI/AF&PA SDPWS-2008
Approval Date: August 4, 2008

2005 EDITION
ANSI/AF&PA NDS-2005
(Revised Standard)
Approval Date: January 9, 2006

2001 EDITION
ANSI/AF&PA WFCM-2001
(New Standard)
Approval Date: October 11, 2001

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Wood Frame Construction Manual

2012 WFCM uses ASCE 7-10 wind design provisions
Assumptions

- 100 mph (3-second gust) Exposure B
- 5/12 roof pitch
- 2-story
- 8’ wall height
- 6’8” door height
- 4’ window height
- L=36’
- W=30’
- Wood Structural Panel Exterior Sheathing
- Vary interior walls – with and without gypsum
Design Example

Design first floor shear wall
1. 2009 IRC Braced Walls  
2. 2001 WFCM High Wind Guide  
3. 2001 WFCM Prescriptive  
4. 2001 WFCM Engineered  
5. 2008 SDPWS
NOTE:
• Prescriptive
• Application limits
  • Hurricane-prone < 100 mph
  • Elsewhere < 110 mph
## 2009 IRC Braced Walls

### Table R602.10.1.2(1) Continued

**BRACING REQUIREMENTS BASED ON WIND SPEED**

(as a function of braced wall line spacing)

<table>
<thead>
<tr>
<th>EXPOSURE CATEGORY B, 30 FT MEAN ROOF HEIGHT, 10 FT EAVE TO RIDGE HEIGHT, 10 FT WALL HEIGHT, 2 BRACED WALL LINES</th>
<th>MINIMUM TOTAL LENGTH (feet) OF BRACED WALL PANELS REQUIRED ALONG EACH BRACED WALL LINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Wind Speed (mph)</td>
<td>Story Location</td>
</tr>
<tr>
<td>10</td>
<td>4.5</td>
</tr>
<tr>
<td>20</td>
<td>8.5</td>
</tr>
<tr>
<td>30</td>
<td>12.0</td>
</tr>
<tr>
<td>40</td>
<td>15.5</td>
</tr>
<tr>
<td>50</td>
<td>19.0</td>
</tr>
<tr>
<td>60</td>
<td>22.5</td>
</tr>
</tbody>
</table>

$\leq$ 100 (mph)

**Intermittent Method & Continuous Sheathing**
### 2009 IRC Braced Walls - Height

#### TABLE R602.10.1.2(1)c

<table>
<thead>
<tr>
<th>SUPPORT CONDITION</th>
<th>5 ft or less</th>
<th>10 ft</th>
<th>15 ft</th>
<th>20 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof only</td>
<td>0.7</td>
<td>1.0</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Roof + floor</td>
<td>0.85</td>
<td>1.0</td>
<td>1.15</td>
<td>1.3</td>
</tr>
<tr>
<td>Roof + 2 floors</td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>NP</td>
</tr>
</tbody>
</table>

For a maximum 9-foot wall height, multiplying the table values by 0.95 shall be permitted. For a maximum 8-foot wall height, multiplying, the table values by 0.90 shall be permitted. For a maximum 12-foot wall height, the table values shall be multiplied by 1.1.

- **30' span with 5/12 roof pitch**
  - Eave-to-ridge height = 6.25' < 10'
  - Interpolate = 0.89
  - Intermittent Method (WSP) = 13'(0.89)(0.9) = 10.4'
  - Continuous Sheathing = 11'(0.89)(0.9) = 8.8'
2009 IRC Braced Walls – without interior Gypsum

TABLE R602.10.1.2(1)f

f. Bracing lengths are based on the application of gypsum board finish (or equivalent) applied to the inside face of a braced wall panel. When gypsum board finish (or equivalent) is not applied to the inside face of braced wall panels, the tabulated lengths shall be multiplied by the appropriate factor from the following table:

<table>
<thead>
<tr>
<th>BRACING METHOD</th>
<th>ADJUSTMENT FACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method LIB</td>
<td>1.8</td>
</tr>
<tr>
<td>Methods DWB, WSP, SFB, PBS, PCP, HPS</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Intermittent Method (WSP) = 10.4’ (1.4) = 14.6’

Continuous Sheathing = 8.8’ (1.4) = 12.3’
2009 IRC Braced Walls – Intermittent Method

Less than 3'     NG

16' > 10.4' with gypsum    OK
16' > 14.6' w/o gypsum      OK
2009 IRC Braced Walls – Continuous Sheathing

Less than 3'  NG  16' > 8.8' with gypsum  OK
16' > 12.3' w/o gypsum  OK
Assuming 2' panel on perpendicular wall at each corner – *no hold-downs required* (R602.10.1.4.1)
Outline

1. 2009 IRC Braced Walls
2. 2001 WFCM High Wind Guide
3. 2001 WFCM Prescriptive
4. 2001 WFCM Engineered
5. 2008 SDPWS
Segmented Shear Wall Method
EXAMPLES WILL NOT COVER

❖ Sill or Bottom Plate Connections
  ▪ Shear Loads
  ▪ Uplift Loads
  ▪ Lateral Loads

❖ Rafter/Truss Connections
  ▪ Shear Loads
  ▪ Uplift Loads
  ▪ Lateral Loads

❖ Suction
  ▪ Sheathing size
  ▪ Nail spacing

❖ Force Transfer Around Openings
NOTE:
• WFCM HWG 90-130 mph Exp. B
• Prescriptive with Engineering Basis
• Assumes Perforated Shear Walls
• Allowable Stress Design
• Other Application Limits

Free Download
http://www.awc.org/standards/wfcm.php
4.3 EXTERIOR WALL SHEATHING

Exterior Wall Sheathing. Exterior walls shall be sheathed with a minimum of 7/16" wood structural panel sheathing or 1/2" cellulosic fiberboard sheathing and attached per Table 2 (page 7) when studs are spaced 16" o.c. or less. When studs are spaced greater than 16" o.c., 15/32" or greater wood structural panel sheathing shall be used. The minimum required percentage of full-height sheathing in the wall lines is provided in Tables 10 and 11 (pages 18 and 19). To meet the requirements for percentage full-height sheathing, a full-height wall segment shall not be less than 27-1/2" in an 8' wall, 31" in a 9' wall, or 34" in a 10' wall (aspect ratio ≤ 3-1/2:1). Exterior sheathing shall be continuous from the bottom plate to the upper top plate, with all panel edges over framing.

Assumes Perforated Shear Wall (PSW)
Here are “standard” assembly details for shear wall panels from 2001 WFCM 3.4.4.2

8d common nails @ 6” OC on panel perimeter

8d common nails @ 12” OC in field

7/16” wood structural panel continuous height over wall plates

5d cooler nails @ 7” OC on panel perimeter

5d cooler nails @ 10” OC in field

1/2” gypsum wallboard on interior

PANEL EXTERIOR

PANEL INTERIOR

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2001 WFCM High Wind Guide – 100 mph Exp. B

\( \frac{L}{W} = \frac{36}{30} = 1.2 \)

Interpoliate = 48.6%
2001 WFCM High Wind Guide - 100 mph Exp. B

36' x 48.6% = 17.5' < 21'  OK

2'-3½" min. width
PSW requires hold-downs at ends and fully sheathed wall
Hold-downs = 4,360 lbs*

- Need to combine with top floor hold-down requirements
- Based on capacity of SW
- Does not include DL
Outline

1. 2009 IRC Braced Walls
2. 2001 WFCM High Wind Guide
3. 2001 WFCM Prescriptive
4. 2001 WFCM Engineered
5. 2008 SDPWS
NOTE:
• WFCM 85-150 mph Exp. B & C
• Segmented & Perforated Shear Walls
• Prescriptive & Engineered
• Other Application Limits
### 2001 WFCM Prescriptive Segmented

#### Table 3.17B

**Segmented Shearwall Sidewall Sheathing Requirements for Wind - Exposure B**

(Wind Parallel to Ridge)

<table>
<thead>
<tr>
<th>Three Second Gust Wind Speed (mph)</th>
<th>85</th>
<th>90</th>
<th>100</th>
<th>110</th>
<th>120</th>
<th>130</th>
<th>140</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shear Wall Line Beneath</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof, Ceiling, &amp; 1 Floor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>3.3</td>
<td>3.7</td>
<td>4.6</td>
<td>5.6</td>
<td>6.6</td>
<td>7.8</td>
<td>9.0</td>
<td>10.3</td>
</tr>
<tr>
<td>24</td>
<td>4.0</td>
<td>4.5</td>
<td>5.5</td>
<td>6.7</td>
<td>7.9</td>
<td>9.3</td>
<td>10.8</td>
<td>12.4</td>
</tr>
<tr>
<td>28</td>
<td>4.6</td>
<td>5.2</td>
<td>6.4</td>
<td>7.8</td>
<td>9.2</td>
<td>10.9</td>
<td>12.6</td>
<td>14.5</td>
</tr>
<tr>
<td>32</td>
<td>5.3</td>
<td>5.9</td>
<td>7.3</td>
<td>8.9</td>
<td>10.6</td>
<td>12.4</td>
<td>14.4</td>
<td>16.5</td>
</tr>
<tr>
<td>36</td>
<td>6.0</td>
<td>6.7</td>
<td>8.3</td>
<td>10.0</td>
<td>11.9</td>
<td>14.0</td>
<td>16.2</td>
<td>18.6</td>
</tr>
<tr>
<td>40</td>
<td>6.6</td>
<td>7.4</td>
<td>9.2</td>
<td>11.1</td>
<td>13.2</td>
<td>15.5</td>
<td>18.0</td>
<td>20.6</td>
</tr>
<tr>
<td>50</td>
<td>8.3</td>
<td>9.3</td>
<td>11.5</td>
<td>13.9</td>
<td>16.5</td>
<td>19.4</td>
<td>22.5</td>
<td>25.8</td>
</tr>
<tr>
<td>60</td>
<td>10.0</td>
<td>11.1</td>
<td>13.8</td>
<td>16.7</td>
<td>19.8</td>
<td>23.3</td>
<td>27.0</td>
<td>31.0</td>
</tr>
<tr>
<td>70</td>
<td>11.6</td>
<td>13.0</td>
<td>16.1</td>
<td>19.4</td>
<td>23.1</td>
<td>27.1</td>
<td>31.5</td>
<td>36.1</td>
</tr>
<tr>
<td>80</td>
<td>13.3</td>
<td>14.9</td>
<td>18.4</td>
<td>22.2</td>
<td>26.4</td>
<td>31.0</td>
<td>36.0</td>
<td>41.3</td>
</tr>
</tbody>
</table>

- interpolate = 6.9'
WFCM Prescriptive

2001 WFCM Prescriptive Segmented –
interpolate = 6.9'

Segmented shear wall  4’ + 4’ = 8’ > 6.9’ OK
### Table 3.17D: Shearwall Assembly Shear Capacities, Maximum Shearwall Segment Aspect Ratios, and Sheathing Type Adjustments

<table>
<thead>
<tr>
<th>Exterior Wall Sheathing</th>
<th>Nails and Spacing Requirements</th>
<th>Linear Shear Capacity of Wall Assembly (plf)</th>
<th>Maximum Shearwall Segment Aspect Ratio</th>
<th>Sheathing Type Adjustment Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Wind</td>
<td>Seismic</td>
<td>Wind</td>
</tr>
<tr>
<td><strong>7/16” or Thicker Wood Structural Panels (Blocked)</strong></td>
<td>8d common nails - 6” Edge spacing</td>
<td>336</td>
<td>240</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
<tr>
<td>No Sheathing or Non-Rated Sheathing</td>
<td></td>
<td>336</td>
<td>240</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
<tr>
<td><strong>(\frac{1}{2}” Gypsum Wallboard (Unblocked))</strong></td>
<td>5d cooler nails - 7” edge spacing</td>
<td>436</td>
<td>240</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
<tr>
<td><strong>(\frac{1}{2}” Gypsum Wallboard (Unblocked))</strong></td>
<td>5d cooler nails - 4” edge spacing</td>
<td>461</td>
<td>240</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
<tr>
<td>Diagonal Lumber Sheathing</td>
<td>8d common nails - 2 per support</td>
<td>636</td>
<td>240</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
<tr>
<td><strong>7/16” or Thicker Wood Structural Panels (Blocked)</strong></td>
<td>8d common nails - 6” Edge spacing</td>
<td>672</td>
<td>480</td>
<td>3(\frac{1}{2}:1)</td>
</tr>
</tbody>
</table>

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What if we don’t count the gypsum on interior?

\[-6.9' \times 1.3 = 9'\]
Segmented shear wall – assuming no interior gypsum

4’ + 2.5’ + 2.5’ + 4’ = 13’ > 9’  OK
2001 WFCM Prescriptive Segmented — Hold-downs

With Gypsum

Segmented shear wall — requires hold-downs on each segment
Segmented shear wall – requires hold-downs on each segment
% Full-height sheathing
6.9' / 36' = 19%
Interpolated = 1.94
6.9'(1.94) = 13.4'
w/ gypsum

9' / 36' = 25%
Interpolated = 1.82
9'(1.82) = 16.4'
w/o gypsum

21' Full-height sheathing > 16.4'
PSW requires fully sheathed wall
PSW requires hold-downs only at the ends
2001 WFCM Prescriptive – Hold-downs

Hold-downs* = 3,488 lbs w/ gypsum

3,488 / 1.3 = 2,683 lbs w/o gypsum

Table 3.17F **Segmented and Perforated** Shearwall Holddown Capacity Requirements

<table>
<thead>
<tr>
<th>Wall Height (ft.)</th>
<th>Wind</th>
<th>Seismic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3488</td>
<td>1920</td>
</tr>
<tr>
<td>9</td>
<td>3924</td>
<td>2160</td>
</tr>
<tr>
<td>10</td>
<td>4360</td>
<td>2400</td>
</tr>
<tr>
<td>12</td>
<td>5232</td>
<td>2880</td>
</tr>
<tr>
<td>14</td>
<td>6104</td>
<td>3360</td>
</tr>
<tr>
<td>16</td>
<td>6976</td>
<td>3840</td>
</tr>
<tr>
<td>18</td>
<td>7848</td>
<td>4320</td>
</tr>
<tr>
<td>20</td>
<td>8720</td>
<td>4800</td>
</tr>
</tbody>
</table>

• Need to combine with top floor hold-down requirements
• Based on capacity of first shear wall panel
• Does not include dead load
Outline

1. 2009 IRC Braced Walls
2. 2001 WFCM High Wind Guide
3. 2001 WFCM Prescriptive
4. 2001 WFCM Engineered
5. 2008 SDPWS
2001 WFCM Engineered

\[ w_{\text{roof}} = 82 \text{ plf} \]
\[ w_{\text{floor}} = 103 \text{ plf} \]
\[ w_{\text{total}} = 185 \text{ plf} \]

\[ 185(30')/2 = 2,775 \text{ lbs} \]

Assumes 8’ wall height
# Table 3C  Shear Capacities for Shearwall Assemblies

<table>
<thead>
<tr>
<th>Sheathing Material</th>
<th>Minimum Sheathing Thickness (in.)</th>
<th>Nail Size</th>
<th>Framing Species $G &gt; 0.50$</th>
<th>Framing Species $0.50 &gt; G &gt; 0.42$</th>
<th>Framing Species $0.42 &gt; G &gt; 0.35$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Structural I</td>
<td>5/16</td>
<td>6d</td>
<td>200</td>
<td>300</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>3/8</td>
<td>8d</td>
<td>230(^4)</td>
<td>360(^4)</td>
<td>460(^4)</td>
</tr>
<tr>
<td></td>
<td>7/16</td>
<td>8d</td>
<td>255(^4)</td>
<td>395(^4)</td>
<td>505(^4)</td>
</tr>
<tr>
<td></td>
<td>15/32</td>
<td>8d</td>
<td>280</td>
<td>430</td>
<td>550(^3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d</td>
<td>340</td>
<td>510</td>
<td>665(^3)</td>
</tr>
<tr>
<td>Structural Sheathing, Plywood Siding(^7)</td>
<td>5/16</td>
<td>6d</td>
<td>180</td>
<td>270</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>3/8</td>
<td>6d</td>
<td>200</td>
<td>300</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8d</td>
<td>220(^4)</td>
<td>320(^4)</td>
<td>410(^4)</td>
</tr>
<tr>
<td></td>
<td>7/16</td>
<td>8d</td>
<td>240(^4)</td>
<td>350(^4)</td>
<td>450(^4)</td>
</tr>
</tbody>
</table>
Required Capacity = 2,775 lbs
7/16” WSP Capacity = 240 plf

240(1.4) = 336 plf (Footnote 1)
Gypsum = 100 plf (Table 3C)
Total = 436 plf

2,775/436 = 6.4' (w/ gypsum)
2,775/336 = 8.3' (w/o gypsum)
WFCM Engineered

2001 WFCM Engineered - Segmented

2,775 lbs

4' + 4' = 8' > 6.4' assuming interior gypsum  OK
4’ + 2.5’ + 2.5’ + 4’ = 13’ > 8.3’ assuming NO int. gypsum OK
Supplement Table 3B

<table>
<thead>
<tr>
<th>V</th>
<th>v (w/ gypsum)</th>
<th>v (w/o gypsum)</th>
<th>%FHS</th>
<th>Interpolated Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,775 lbs</td>
<td>436 plf</td>
<td>336 plf</td>
<td>21’ / 36’ = 58%</td>
<td>0.62</td>
</tr>
</tbody>
</table>

\[
436 \times 0.62 = 270 \text{ plf}
\]
\[
2,775 / 270 = 10.3' \text{ (w/ gypsum)}
\]

\[
336 \times 0.62 = 208 \text{ plf}
\]
\[
2,775 / 208 = 13.3' \text{ (w/o gypsum)}
\]
2001 WFCM Engineered - PSW

21' Full-height sheathing > 17.9'  OK
2001 WFCM Engineered – Hold-downs

\[ T = v \cdot h \]

\[ v = 436 \text{ plf (w/ gypsum)} \]

\[ v = 336 \text{ plf (w/o gypsum)} \]

\[ h = 8' \]

\[ T = 436(8') = 3,488 \text{ lbs} \]

\[ T = 336(8') = 2,688 \text{ lbs} \]

- Need to combine with top floor hold-down requirements
- Based on capacity of first shear wall panel
- Can account for dead load (2.2.4)
Outline

1. 2009 IRC Braced Walls
2. 2001 WFCM High Wind Guide
3. 2001 WFCM Prescriptive
4. 2001 WFCM Engineered
5. 2008 SDPWS
2008 SDPWS

- Engineered
- Res and Non-Res
- ASD & LRFD
- Efficiencies in designs
### 2008 SDPWS – WSP Capacity

#### Table 4.3A Nominal Unit Shear Capacities for Wood-Frame Shear Walls

<table>
<thead>
<tr>
<th>Sheathing Material</th>
<th>Minimum Nominal Panel Thickness (in.)</th>
<th>Minimum Fastener Penetration in Framing Member or Blocking (in.)</th>
<th>Fastener Type &amp; Size</th>
<th>Panel Edge Fastener Spacing (in.)</th>
<th>A - SEISMIC</th>
<th>B - WIND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wood Structural Panels - Structural 1,2</td>
<td>5/16</td>
<td>1-1/4</td>
<td>5d</td>
<td>OSB</td>
<td>400</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>3/8</td>
<td>7/16</td>
<td>1-1/4</td>
<td>PLY</td>
<td>600</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>7/16</td>
<td>1-1/2</td>
<td>8d</td>
<td>OSB</td>
<td>510</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>15/32</td>
<td>1-1/2</td>
<td>8d</td>
<td>PLY</td>
<td>560</td>
<td>14</td>
</tr>
<tr>
<td>Wood Structural Panels - Sheathing 1,2</td>
<td>5/16</td>
<td>2-3/8</td>
<td>6d</td>
<td>OSB</td>
<td>660</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>3/8</td>
<td>7/16</td>
<td>1-3/8</td>
<td>PLY</td>
<td>1020</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>15/32</td>
<td>1-1/2</td>
<td>10d</td>
<td>OSB</td>
<td>950</td>
<td>14</td>
</tr>
</tbody>
</table>

**ASD Capacity = 670/2 = 335 plf**
### ASD Capacity

\[
\text{ASD Capacity} = \frac{200}{2} = 100 \text{ plf}
\]
2008 SDPWS – Gypsum Capacity

Required Capacity = 2,775 lbs
WSP = 335 plf
Gypsum = 100 plf
Total = 435 plf

\[ \frac{2,775}{435} = 6.4' \text{ (w/ gypsum)} \]
\[ \frac{2,775}{335} = 8.3' \text{ (w/o gypsum)} \]
2008 SDPWS – Segmented Shear Wall

SDPWS

2,775 lbs
Shear Capacity Adjustment Factor

\[ C_o = \left( \frac{r}{3 - 2r} \right) \frac{L_{tot}}{\sum L_i} \]

\[ r = \frac{1}{1 + \frac{A_o}{h \sum L_i}} \]

\[ h = 8' \]
\[ L_i = 21' \]
\[ L_{tot} = 36' \]
\[ A_o = 4(4')(2.5') + (5')(6.67') = 73.4 \text{ ft}^2 \]
\[ r = 0.80 \]
\[ C_o = 0.98 \]
2008 SDPWS – Perforated Shear Wall

\[ C_0 = 0.98 \]

w/ gypsum

\[
435 \times 0.98 = 426 \\
2,775/426 = 6.5' 
\]

w/o gypsum

\[
335 \times 0.98 = 328 \\
2,775/328 = 8.5' 
\]

21' Full-height sheathing > 8.5' OK
2008 SDPWS – Perforated Shear Wall

2,775 lbs
2008 SDPWS – Hold-downs* (Segmented)

\[ T = v \cdot h \]

\[ v = \frac{2,775}{8'} = 347 \text{ plf} \]

\[ h = 8' \]

\[ T = 347(8') = 2,775 \text{ lbs}* \]

- Need to combine with top floor hold-down requirements
- Based on loads
- Can account for dead load (4.3.6.4.2)
2008 SDPWS – Hold-downs* (PSW)

\[ V = 2,775 \text{ lbs} \]
\[ h = 8' \]
\[ C_o = 0.98 \]
\[ L_i = 21' \]

\[ T = C = \frac{Vh}{C_o \sum L_i} \quad (4.3-8) \]

where:

- \( T \) = shear capacity adjustment factor from Table 4.3.3.5
- \( V \) = induced shear force in perforated shear wall, lbs
- \( \Sigma L_i \) = sum of perforated shear wall segment lengths, ft

- Need to combine with top floor hold-down requirements
- Based on loads
- Can account for dead load (4.3.6.4.2)
### Design Example - Summary

1st of 2 Story; 30' span; 5/12 pitch; 100 mph Exp. B

<table>
<thead>
<tr>
<th>Code/Standard</th>
<th>Wall Length</th>
<th>Wall Length</th>
<th>Hold-downs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 IRC Braced Walls</td>
<td>Intermittent 10.4' (14.6')</td>
<td>Continuous 8.8' (12.3')</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segmented</td>
<td>Perforated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001 WFCM High Wind Guide</td>
<td>n/a</td>
<td>17.5'</td>
<td>4,360 lbs</td>
</tr>
<tr>
<td>2001 WFCM Prescriptive</td>
<td>6.9' (9')</td>
<td>13.4' (16.4')</td>
<td>3,488 (2,683) lbs</td>
</tr>
<tr>
<td>2001 WFCM Engineered</td>
<td>6.4' (8.3')</td>
<td>10.3' (13.3')</td>
<td>3,488 (2,688) lbs</td>
</tr>
<tr>
<td>2008 SDPWS</td>
<td>6.4' (8.3')</td>
<td>6.5' (8.5')</td>
<td>2,775 lbs 1,079 lbs (PSW)</td>
</tr>
</tbody>
</table>

Parenthetical values assume NO interior gypsum
Resources

http://www.awc.org/standards/wfcm.php
Resources


Resources

www.apawood.org
Resources

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