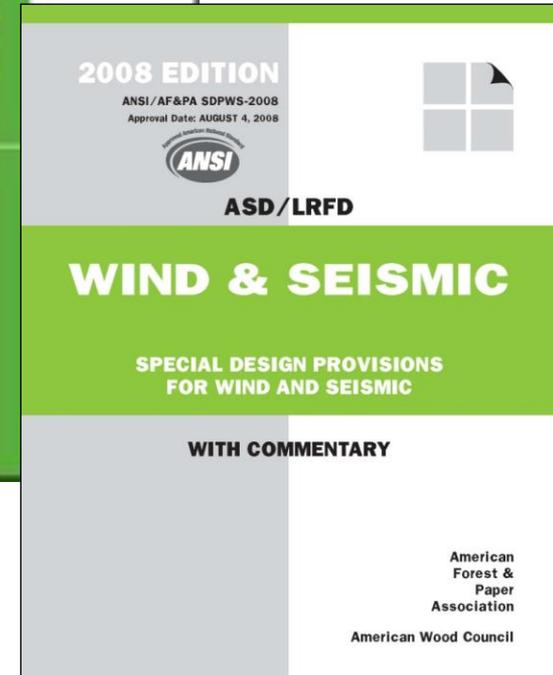
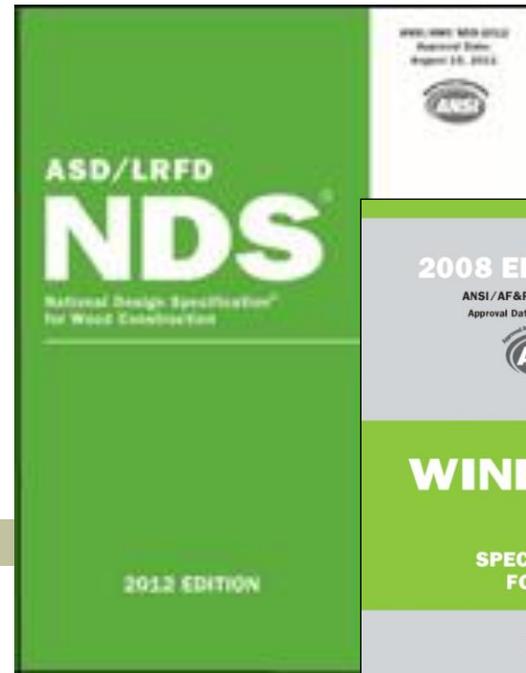




CBIA and Energy Commission 2016 Standards Forum, April 4, 2014



Presented by:
Dennis Richardson, PE, CBO, CASp
SW Regional Manager, Codes and Standards
drichardson@awc.org

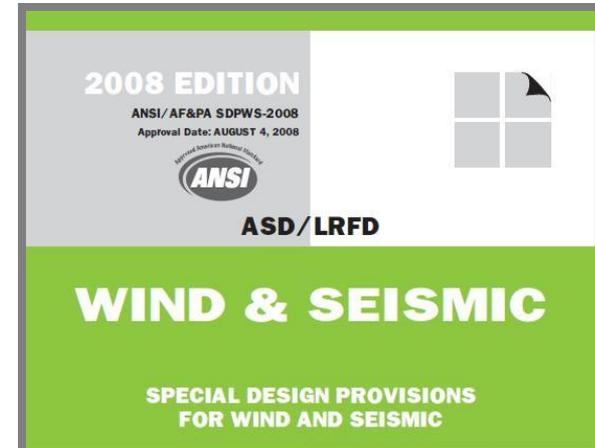
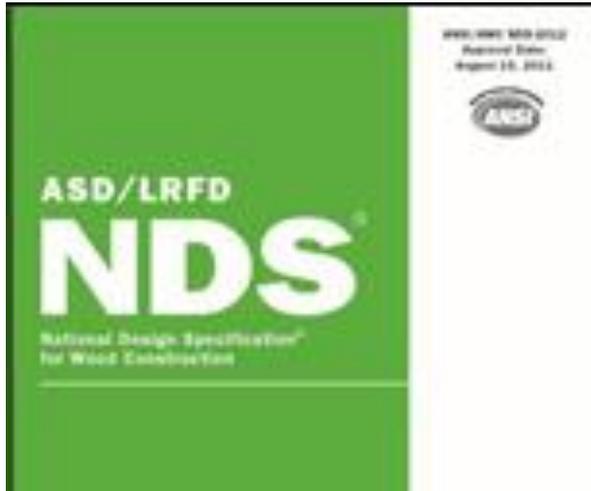
Outline



- Good Public Policy = No Unintended Consequences
 - 2x4 vs. 2x6 ?
 - Seismic Design
 - Building Configuration
 - Moisture
- Summary



American Wood Council



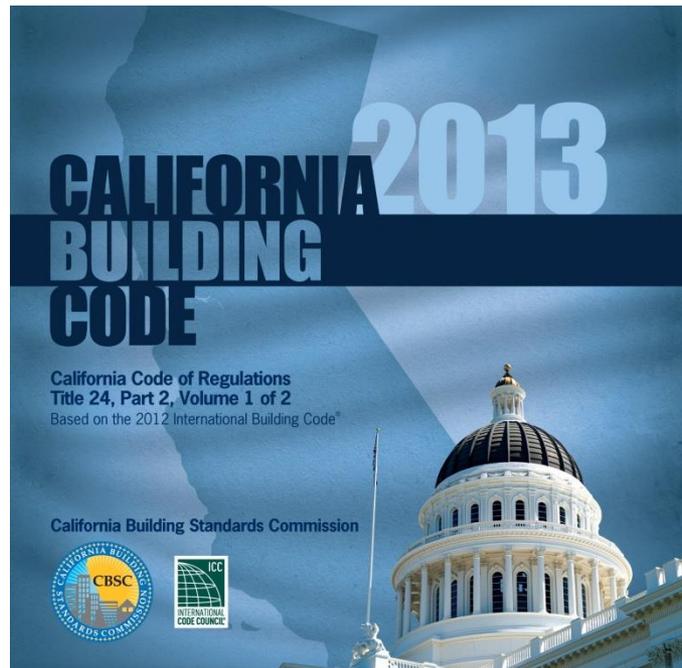
The **American Wood Council (AWC)** provides wood design and construction information to assist building industry professionals, develops structural and fire performance data on a wide range of traditional and engineered wood products, and engages in long-term research.

AWC is an ANSI accredited standards developer. .



American Wood Council

**NDS and SDPWS are both referenced
In the 2012 IBC and 2013 CBC**



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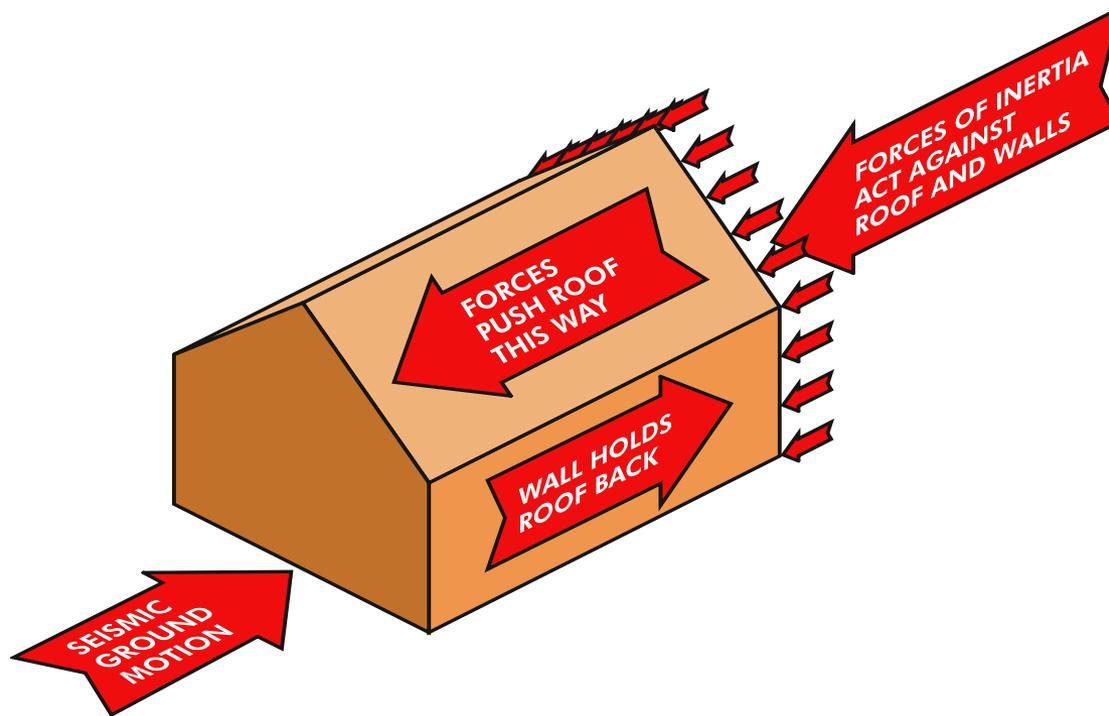


2x4 vs. 2x6 construction:





Seismic Design:



Minimum Design Loads

- ASCE 7-10 Minimum Design Loads for Buildings and Other Structures



14.5.1 Reference Documents

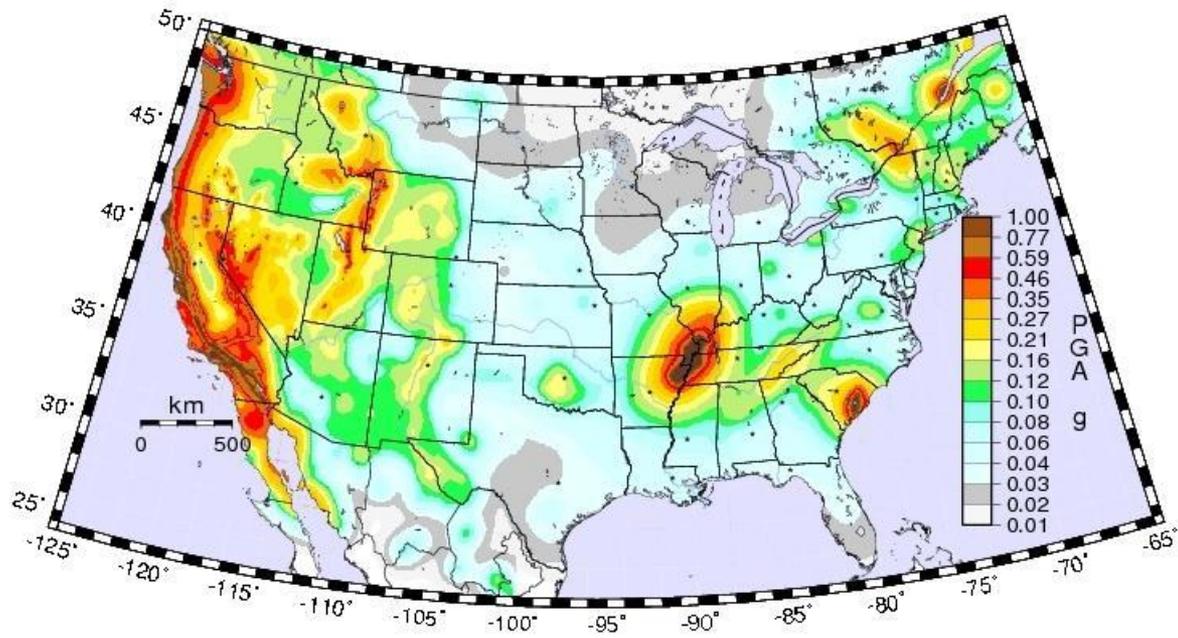
The quality, testing, design, and construction of members and their fastenings in wood systems that resist seismic forces shall conform to the requirements of the applicable following reference documents,:

1. AF&PA NDS
2. AF&PA SDPWS

Lateral Loads: National Issue

Earthquake Hazard

PGA with 2% in 50 year PE. BC rock. 2008 USGS



USGS website: <http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/us/5hzSA.5in50.usa.jpg>

Lateral Loads: Local Faults and Soil

Modified Mercalli Intensity Damage Level



Source: ABAG , 1995 "On Shaky Ground" Website: <http://www.abag.ca.gov>

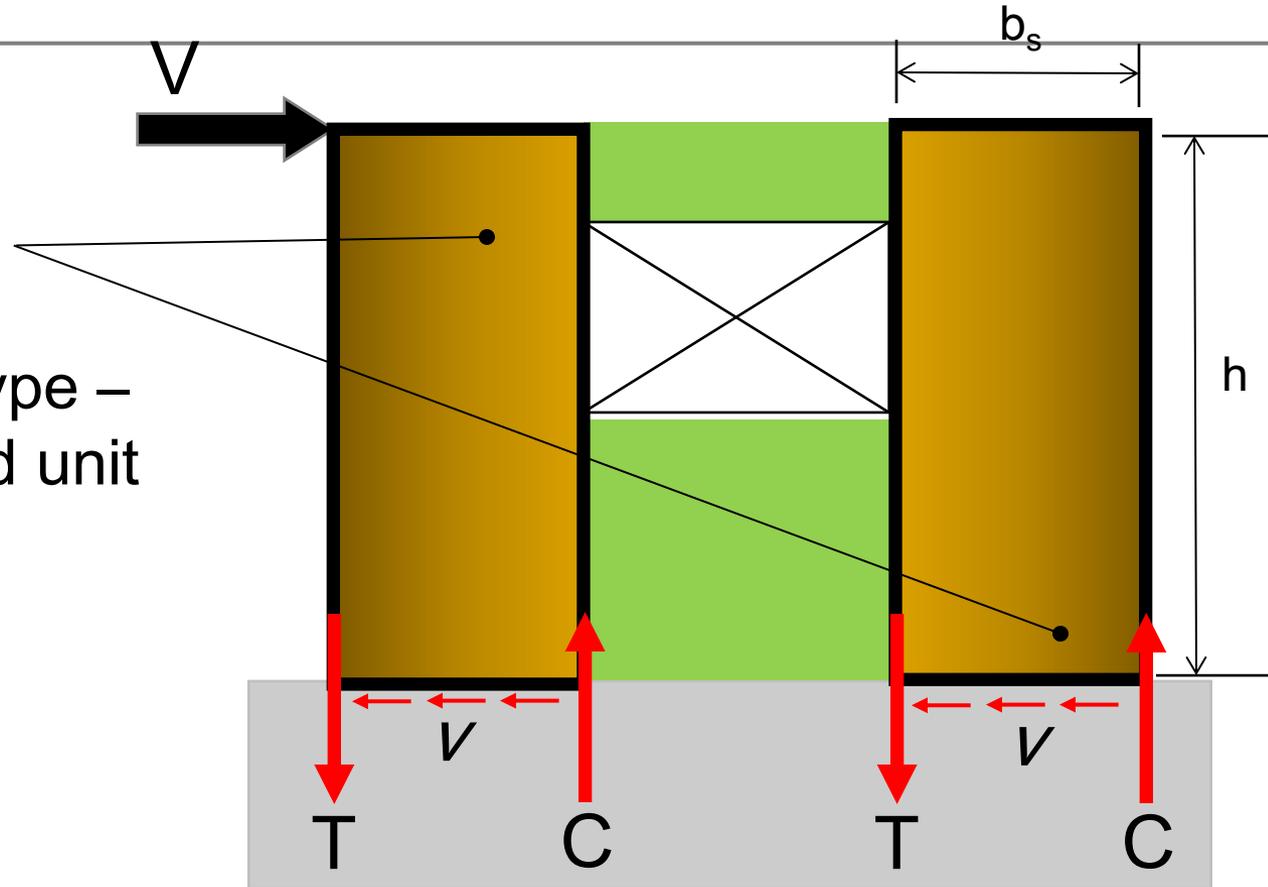
Wood Frame Shear Walls

- **Shear walls**
 - Elements of a shear wall
 - Strength and stiffness
 - Detailing and limitations



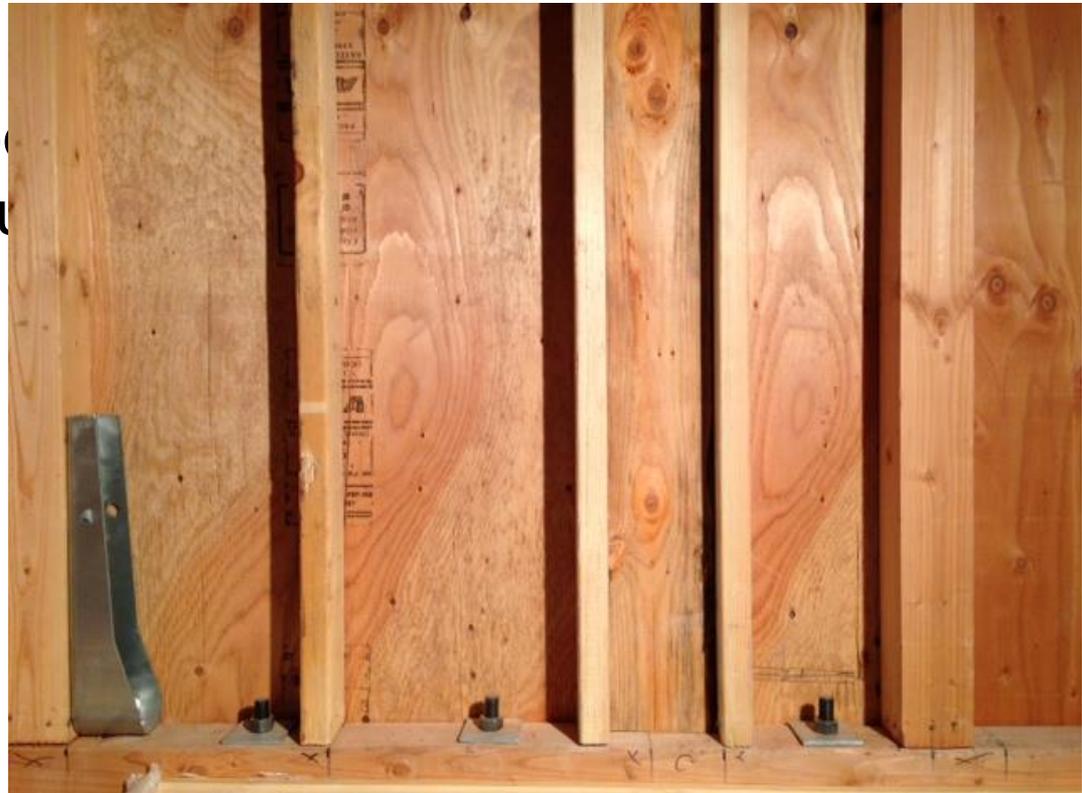
Full-height Wood Shear Walls

- Only full height segments are considered
- Reference wall type – basis of tabulated unit shear values



Full-height Wood Shear Walls

- Only full height segments are considered
- Reference wall type on basis of tabulated shear values



3x at Adjoining Panel Edge

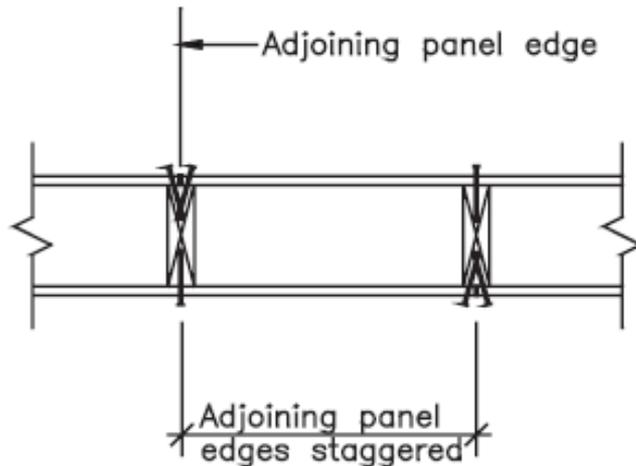
- Section 4.3.7.1(4). 3x framing also required at adjoining panel edges where:
 - Nail spacing of 2 in. o.c.
 - 10d common nails having penetration of more than 1-1/2 in. at 3 in. o.c. or less
 - Nominal unit shear capacity on either side exceeds 700 plf in SDC D, E, or F.
- **Exception:** (2) 2x framing permitted in lieu of (1) 3x where fastened in accordance with the NDS to transfer the induced shear between members.



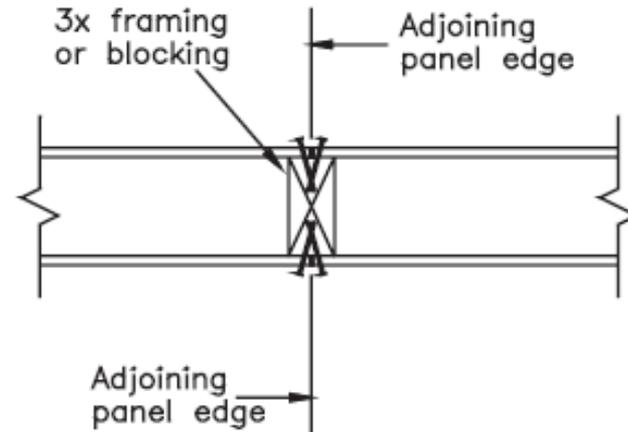
3x at Adjoining Panel Edge

- Table 4.3A footnote 6. 3x framing required to reduce potential for splitting at adjoining panel edge where WSP is nailed on each face and nail spacing is less than 6 in.

Figure C4.3.3 Detail for Adjoining Panel Edges where Structural Panels are Applied to Both Faces of the Wall



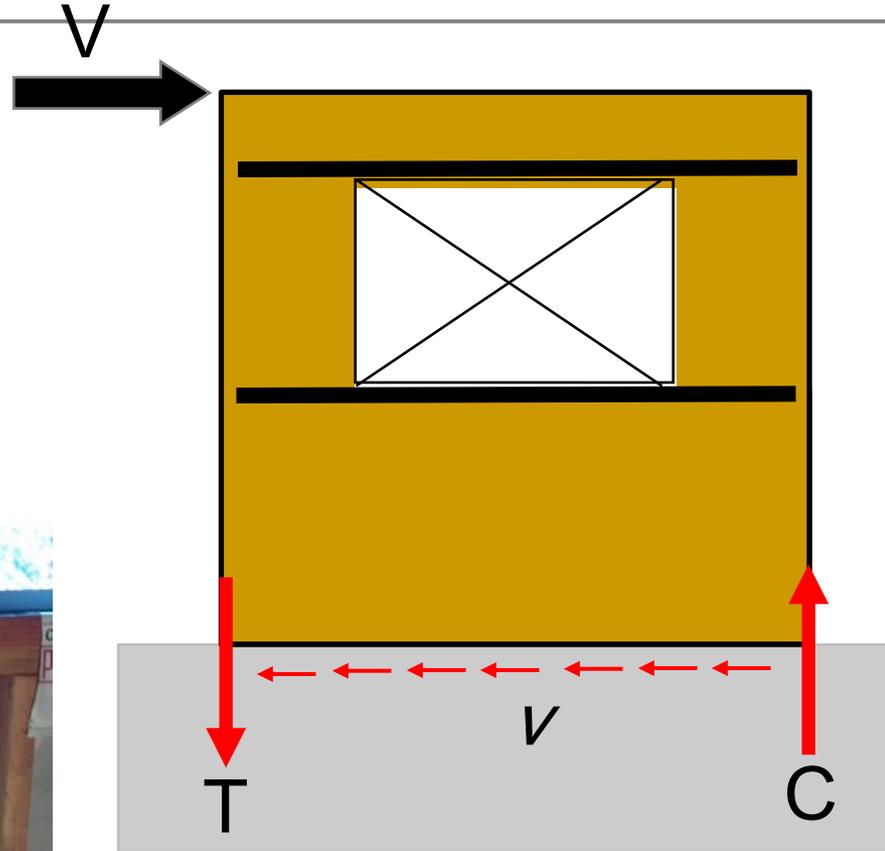
a. Adjoining panel edges staggered



b. Adjoining panel edges not staggered

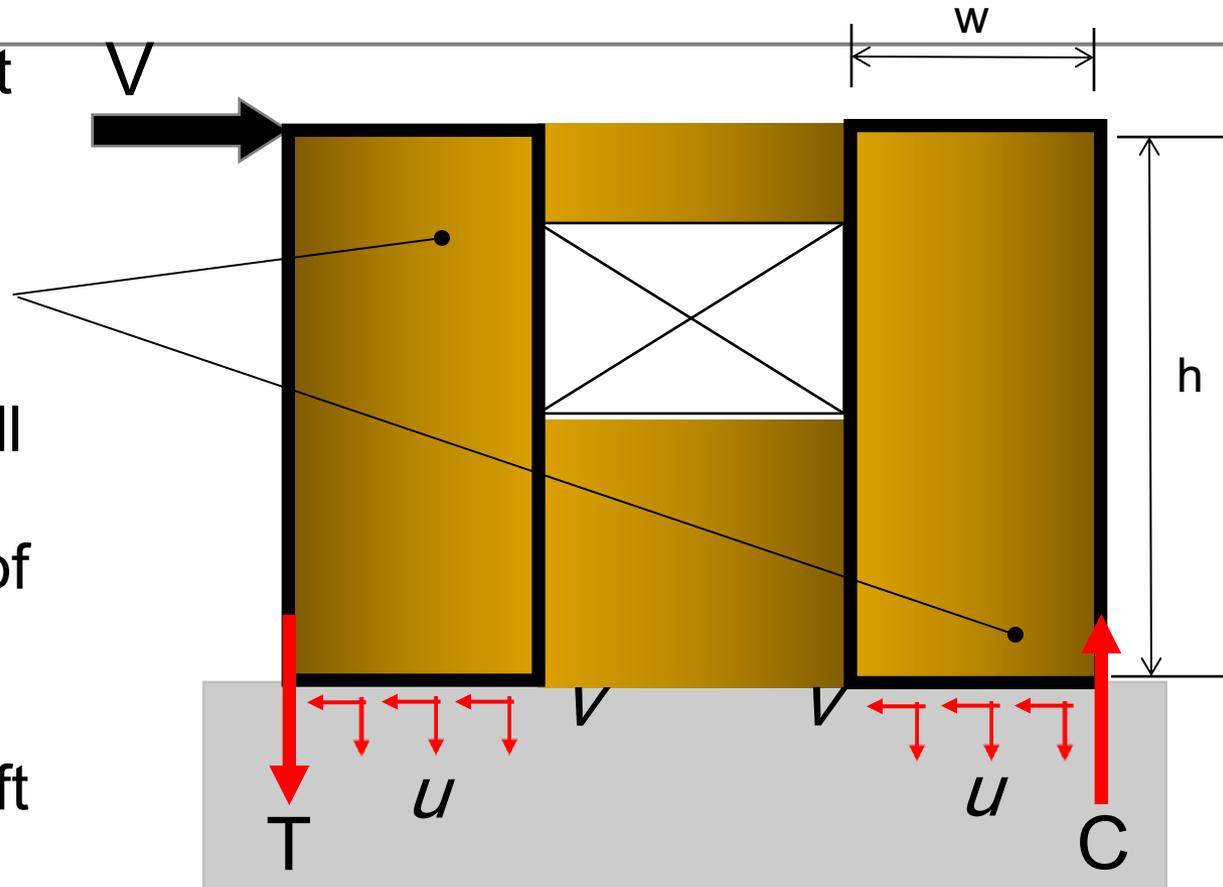
Force Transfer Around Opening

- Hold-downs typically only at ends
- Extra calculations and added construction details (connections & blocking)



Perforated Shear Walls

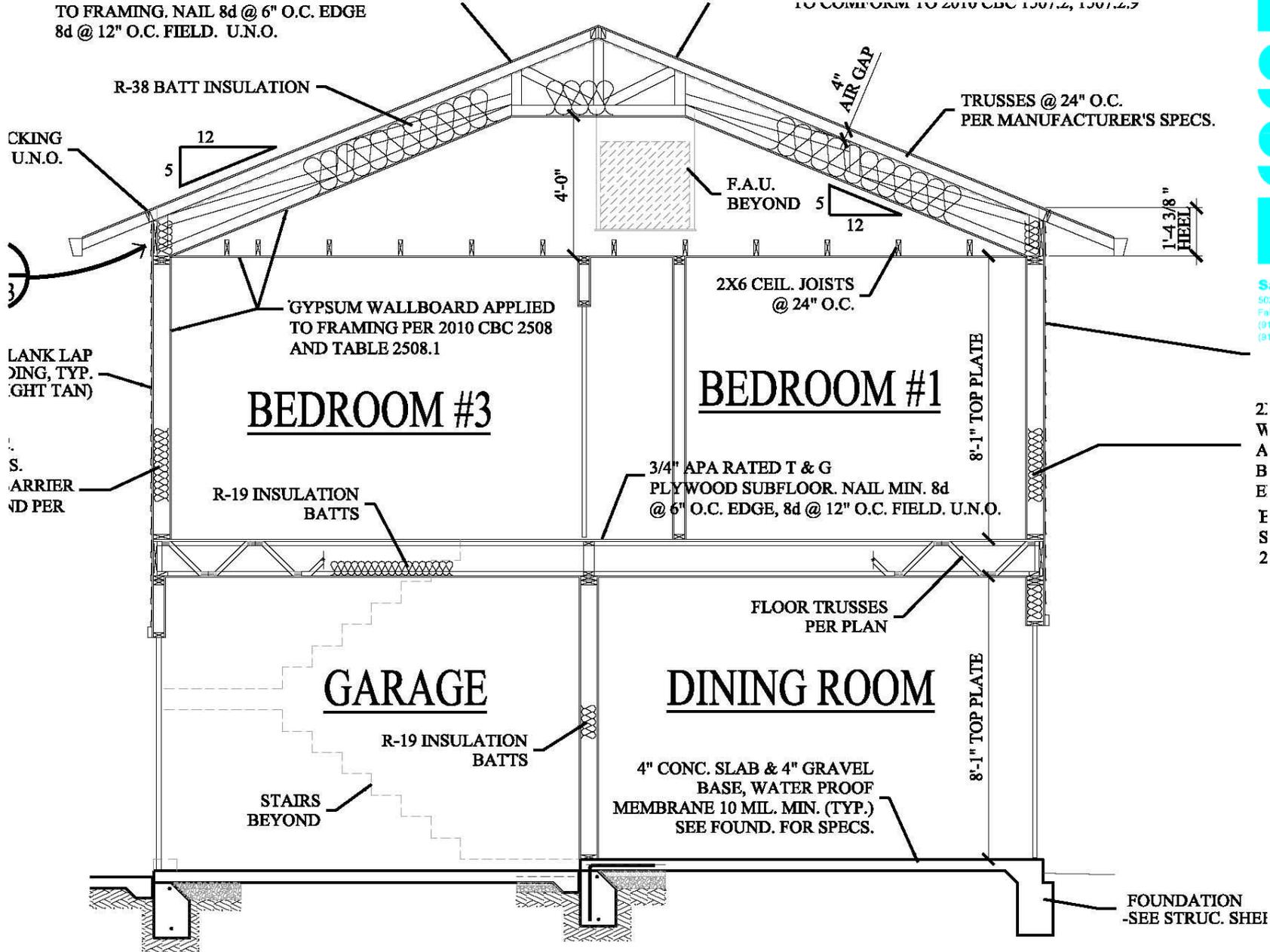
- Hold-downs only at ends
- Empirically based strength and stiffness reduction factor applied to full height panels to account for effect of opening
- Bottom plate attachment for uplift
- Uses reference design values



SEAOC 2013 Excellence in Structural Engineering Awards

The home has been completed and occupied for eleven months, resulting in zero net energy usage.

Net Zero Energy Home for Habitat for Humanity – Sustainable Design Category



ormar
cheel
truct
ngine
Sacramento O
5022 Sunrise Blvd,
Fair Oaks, CA 95628
(916) 536-9585
(916) 536-0260 (fax)

Meticulously Detailed Plans are Required

ROOF AND ATTIC

- Ample space for insulation and ventilation above conditioned space.
- Mechanical equipment has space for optimum positioning of ducts.
- Flexibility in placement of interior partition walls (new and future).



The structural Components of the building are designed for maximum flexibility and adaptability.

WoodWorks Web Program on Moisture:

WoodWorks Webinar – February 12, 2014

Building Enclosure Design and Moisture Performance

Sam Glass, Ph.D.

USDA Forest Products Laboratory
Madison, Wisconsin



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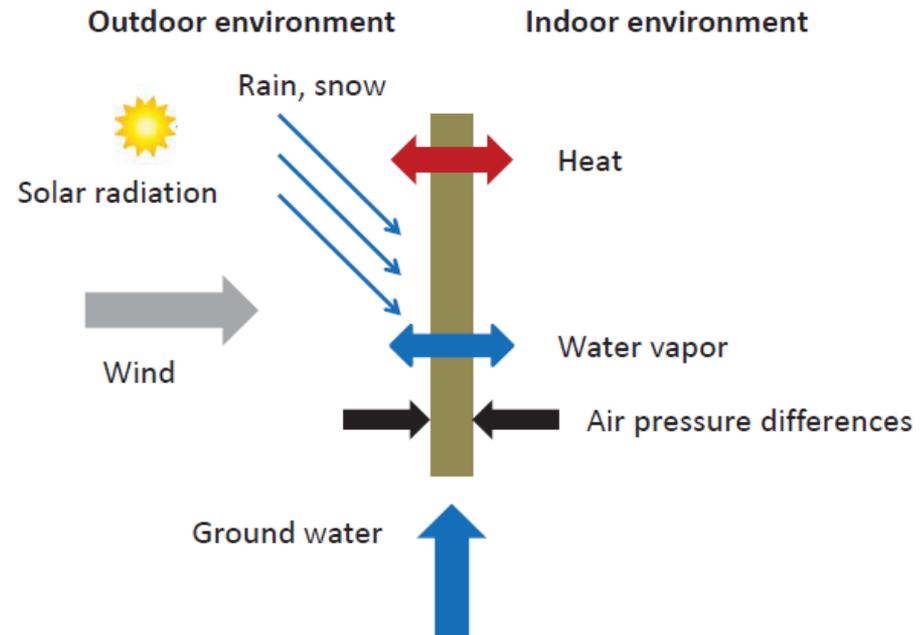


**Forest Products
Laboratory**
Research Working For You



Moisture Loads to Walls

Loads

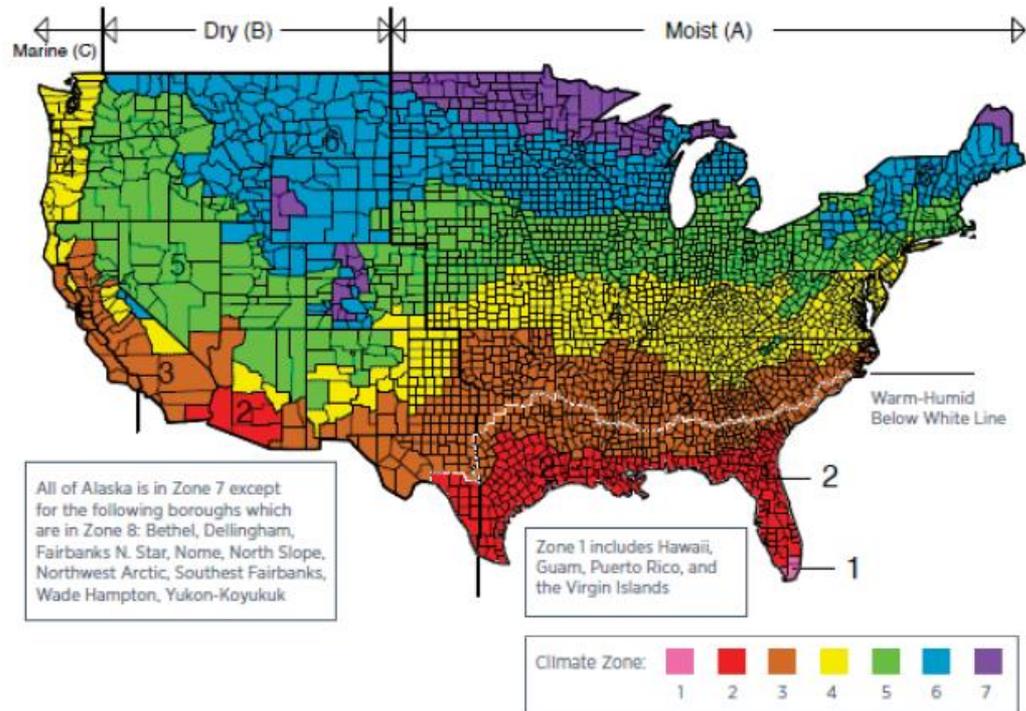


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Climate Zone Effect on Moisture

ASHRAE/DOE/IECC climate zones



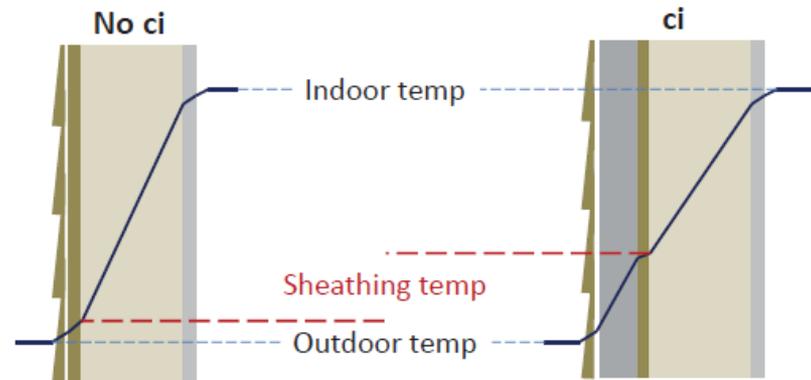
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Effect on Moisture Accumulation

Temperature effect – ci

- exterior ci reduces risk of cold weather moisture accumulation by warming interior materials such as wood structural sheathing



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Available May, 2014



Building
Solutions





In Summary:

Considerable care is incorporated in the design / construction of high performance building envelope systems. Be careful of unintended consequences during the learning curve.

There needs to be flexibility regarding potential effects of the energy code on: public safety and seismic design as well as building configuration.

Moisture movement through structural materials is the subject of ongoing research affected by many factors so there is no “one size fits all” solution.



Thank-you!

- www.awc.org
- info@awc.org
- (202) 463-4713

The screenshot shows the American Wood Council website homepage. At the top is a navigation bar with the logo and menu items: Home, Mobile, Green Building, Env. Reg., Code & Stds., Membership, News, Help, Links, and About AWC. Below the navigation bar is a banner with four images: a wooden truss structure, a modern interior with wood, a wooden frame, and a bridge. A date indicator shows '2 SEP'. Below the banner is a 'Quick Links' section with links to NDS, WFCM, Fire, Deck Guide, Span Tables, Green Building, and Environmental Reg. To the right is a 'User Groups' section with links for Engineer, Architect, Building Official, Builder, Educator, Industry, and FireFighter. The main content area features a 'Welcome to the American Wood Council' heading, followed by an 'About the American Wood Council' section with a 'Convert to Mobile!' link and a paragraph describing the organization. Below that is a 'New iPhone App' section for the 'SPAN' app. On the right side, there is a 'Quick Search' box with a search button and radio buttons for 'Google' and 'Only AWC'. Below the search box is a 'Headlines' section with a list of news items, and an 'Issues' section with three icons representing Building Codes & Standards, Green Building, and Environmental Regulation. At the bottom is a footer with links for Home, Contact Us, Site Map, Copyright & Disclaimer, and Shop.

AMERICAN WOOD COUNCIL

Home Mobile Green Building Env. Reg. Code & Stds. Membership News Help Links About AWC

Quick Links
NDS | WFCM | Fire | Deck Guide | Span Tables | Green Building | Environmental Reg.

User Groups
Engineer | Architect | Building Official | Builder | Educator | Industry | FireFighter

Welcome to the American Wood Council

About the American Wood Council

[Convert to Mobile!](#)

The American Wood Council (AWC) is the voice of North American traditional and engineered wood products, representing over 60% of the industry. From a renewable resource that absorbs and sequesters carbon, the wood products industry makes products that are essential to everyday life and employs 360,000 men and women in well-paying jobs. AWC's engineers, technologists, scientists, and building code experts develop state-of-the-art engineering data, technology, and standards on structural wood products for use by design professionals, building officials, and wood products manufacturers to assure the safe and efficient design and use of wood structural components. [More.](#)

New iPhone App

AWC is pleased to announce the release of the Span Calculator for Wood Joists and Rafters (Span Calc) for the iPhone. Find out more in the [iTunes store.](#)

Quick Search

 Google Only AWC

Headlines:

- Support from Members of Congress for Expanding Sustainable Forest Certification Could Stimulate Market for Forest Products.
- American Wood Council - Working Together for a Successful, Stable Future for Wood Products.
- AFBPA and AWC Appeal to EPA for Changes to Boiler MACT Proposed Rule.
- AWC Recognizes High-Performance Building Week.
- Wood Building Products Companies Pledge to Help Haiti Rebuild.

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