2016 Title 24
High Performance Walls

Proposed U-factor = 0.05
- Continuous Insulation
- Staggered Stud Wall
- 2x6 construction
High Performance Walls that Enhance Energy Efficiency

2016 Title 24 Proposed
High Performance Wall Systems

- Double Walls
High Performance Walls that Enhance Energy Efficiency

2016 Title 24 Proposed

High Performance Wall Systems

- Staggered Studs

[Image of high performance wall system with staggered studs and insulation]
High Performance Walls that Enhance Energy Efficiency

2016 Title 24 Proposed High Performance Wall Systems
- Structural Insulated Panels (SIPs)
High Performance Walls that Enhance Energy Efficiency

2016 Title 24 Proposed High Performance Wall Systems
- Structural Insulated Panels (SIPs)
High Performance Walls that Enhance Energy Efficiency - 2x6 Advanced Framing
Phasing In 2x6 Advanced Framing

1. Switch to 2x6 studs to increase cavity insulation depth.

2. Change wall framing module from 16" o.c. to 24" o.c. (The use of double top plates avoids the need for inline framing.)

3. Incorporate other techniques:
   - Ladder blocking at intersecting wall
   - Energy efficient corners (begin with 3-stud corners)
   - Implement energy-efficient headers and
   - High Performance attic detailing
Ladder Blocking

Ladder Junction

Double top plate
3" x 6" x 0.036" galvanized steel plate
Interior wall
2x ladder blocking at 24"o.c.

Install blocking with wide face vertical for maximum backing to wall finish and for maximum insulation in exterior walls.
Energy Efficient Corners

Two-stud Corner
(with Drywall Clips)

Outside corner

Drywall clip
to hold drywall in place

Alternatives
2012 IRC,
Figure R602.3(2)
FRAMING DETAILS

Note: A third stud and/or partition backing stud shall be permitted to be omitted through the use of wood back-up cleats, metal drywall clips, or other approved devices that will serve as adequate backing for facing materials.
Energy Efficient Corners

Insulated Three-stud Corner (California Corner)

Traditional Corner

Outside corner

Difficult to insulate
Energy Efficient Corners

- Corner stud
- 2x Ladder Blocking at 24" o.c.

Outside corner

2x Ladder Blocking at 24" o.c.
Energy Efficient Headers

Conventional Headers Not Required

- Opening top plate may be doubled for openings wider than 8'
- Cripple studs as required
- Double top plate
- Opening in non-load-bearing wall
- Single opening top plate

Note: Use jack studs as required.
Energy Efficient Headers

Single Ply Headers

Outside of wall

Cavity insulation space

3-1/8" or 3-1/2" glued laminated timbers (glulams), or multiple-ply structural composite lumber (SCL), or sawn lumber header

Jack studs as required

2012 IRC Section R602.7.1
Energy Efficient Headers

Prefabricated Insulated Headers
Energy Efficient Headers

One-sided Wood Structural Panel Box Header

- Cripple studs on stud layout
- Min. 15/32 Performance Category wood structural panel
- Header top plate to complete rough opening at header
- Cavity insulation space (to full width of wall studs)
- Drywall interior finished
- Single stud at sides of rough openings to 48" wide, jack stud required span > 48"
Wood Structural Panel Box Header
Structural Systems that Enhance Energy Efficiency

2016 Title 24 Proposed High Performance Wall Systems
- 2x6 Studs
- 2x6 Advanced Framing
Air barriers

Air Infiltration = Energy Loss

- Air barrier should be continuous
- Joints need to be sealed (i.e. blocked panel edges)
- Need water resistive barrier
Structural Redundancy

Continuous Wood Structural Panels

- May decrease the amount of required hardware: nailing, hold downs, strapping
Structural Redundancy

Continuous Wood Structural Panels

- May decrease the amount of required hardware: nailing, hold downs, strapping
- Fewer callbacks
Structural Redundancy

Continuous Wood Structural Panels

- May decrease the amount of required hardware: nailing, hold downs, strapping
- Fewer callbacks
- Perforated shear walls enhance designer flexibility allowing narrower shear wall lengths while enhancing the wall strength and stiffness (per APA FTAO Research Report M410)
# Energy Efficient Headers

<table>
<thead>
<tr>
<th>FIBERGLASS BATT</th>
<th>R-VALUE/THICKNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1/2” low density fiberglass</td>
<td>R11</td>
</tr>
<tr>
<td>3-1/2” regular density fiberglass</td>
<td>R13</td>
</tr>
<tr>
<td>3-1/2” high density fiberglass</td>
<td>R15</td>
</tr>
<tr>
<td>6-1/4” low density fiberglass (R19 compressed to 5-1/2”)</td>
<td>R18</td>
</tr>
<tr>
<td>5-1/2” high density fiberglass</td>
<td>R21</td>
</tr>
</tbody>
</table>
Energy Enhancements:
- 2x6 at 16” oc
- 2 stud corners
- energy efficient intersecting walls
- Continuous structural rim
- Ducts in conditioned space
Case Studies
Case Studies

Roof and Attic

- Ample space for insulation and ventilation above conditioned

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

Sample of Green Features:

- Passive house performance
- Net positive energy goal. Power generation through PV and Wind turbine.
- High efficiency plumbing fixtures

- 100% high efficacy lighting
- High efficiency appliances
- Air sealing and moisture barrier provided with Liquid Membrane technology applied to the fully sheathed wood structural panel envelope
Case Studies

Energy Enhancements:
- Passive House
- Double wall
Case Studies

Energy Enhancements:

- Double roof: SIP with Radiant Barrier Sheathing below
- Ducts in conditioned space
Case Studies

Energy Enhancements:
- Air Barrier
- Weather Resistive Barrier
Questions?

Karyn Beebe, PE, LEED AP
(858) 668-7161
karyn.beebe@apawood.org