

# High Performance Walls: Advanced Framing Walls Systems and Insulated Headers



**Karyn Beebe, PE, LEED AP**

# 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

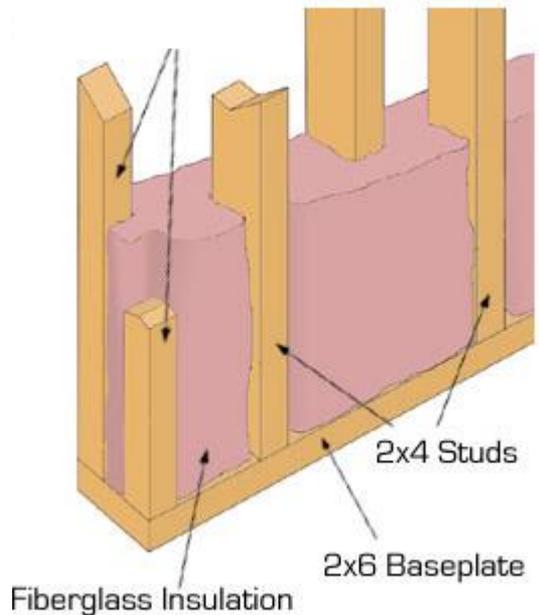
- Double Walls



# High Performance Walls that Enhance Energy Efficiency

## 2016 Title 24 Proposed High Performance Wall Systems

- Staggered Studs



# High Performance Walls that Enhance Energy Efficiency

## 2016 Title 24 Proposed High Performance Wall Systems

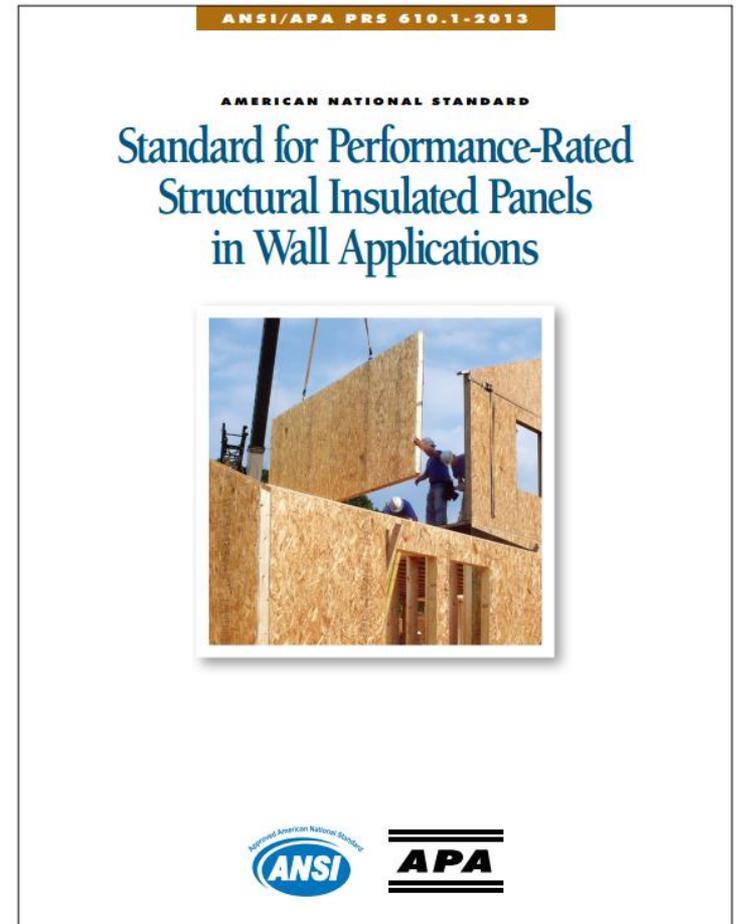
- Structural Insulated Panels (SIPs)



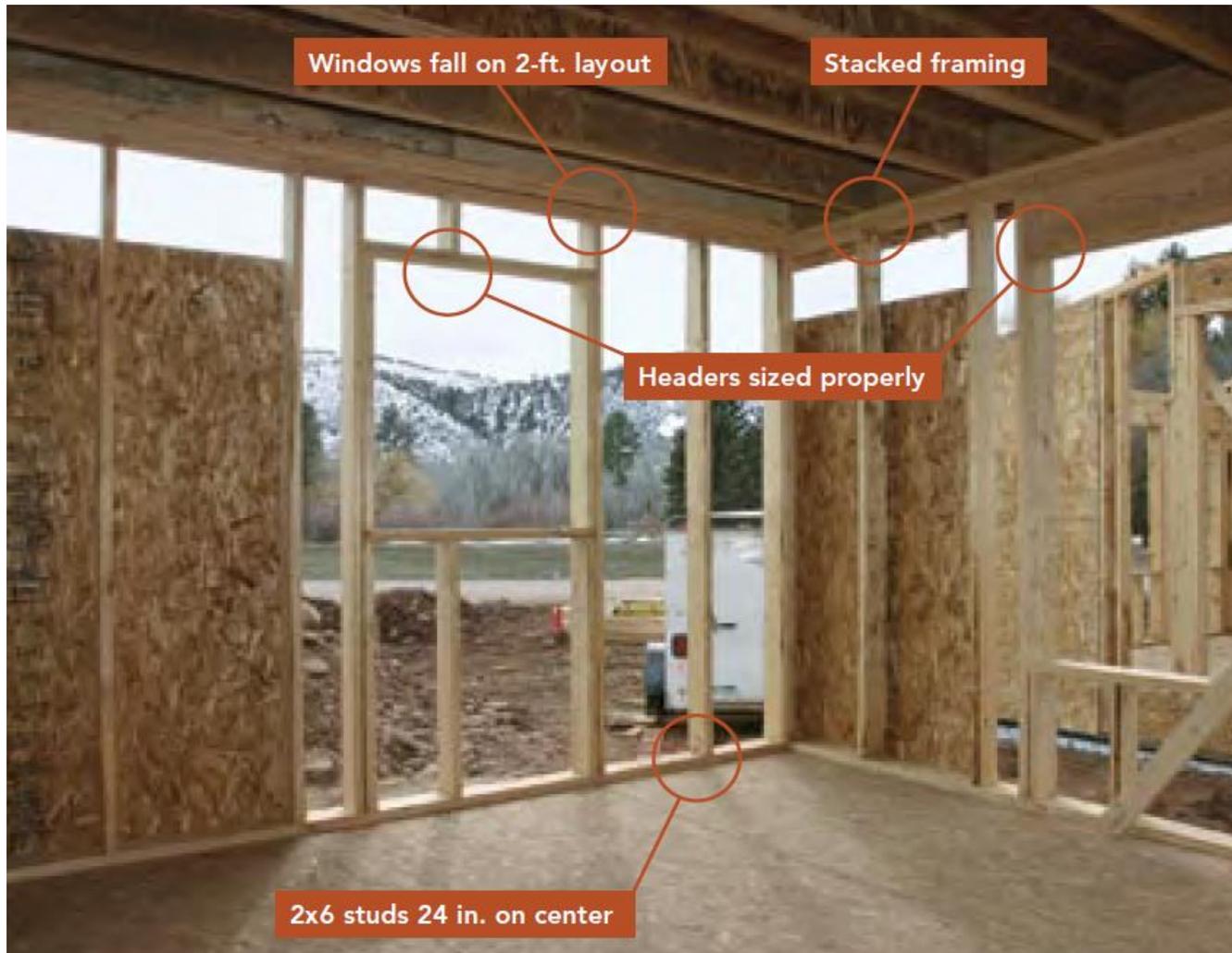
# High Performance Walls that Enhance Energy Efficiency

## 2016 Title 24 Proposed High Performance Wall Systems

- **Structural Insulated Panels (SIPs)**



# High Performance Walls that Enhance Energy Efficiency - 2x6 Advanced Framing

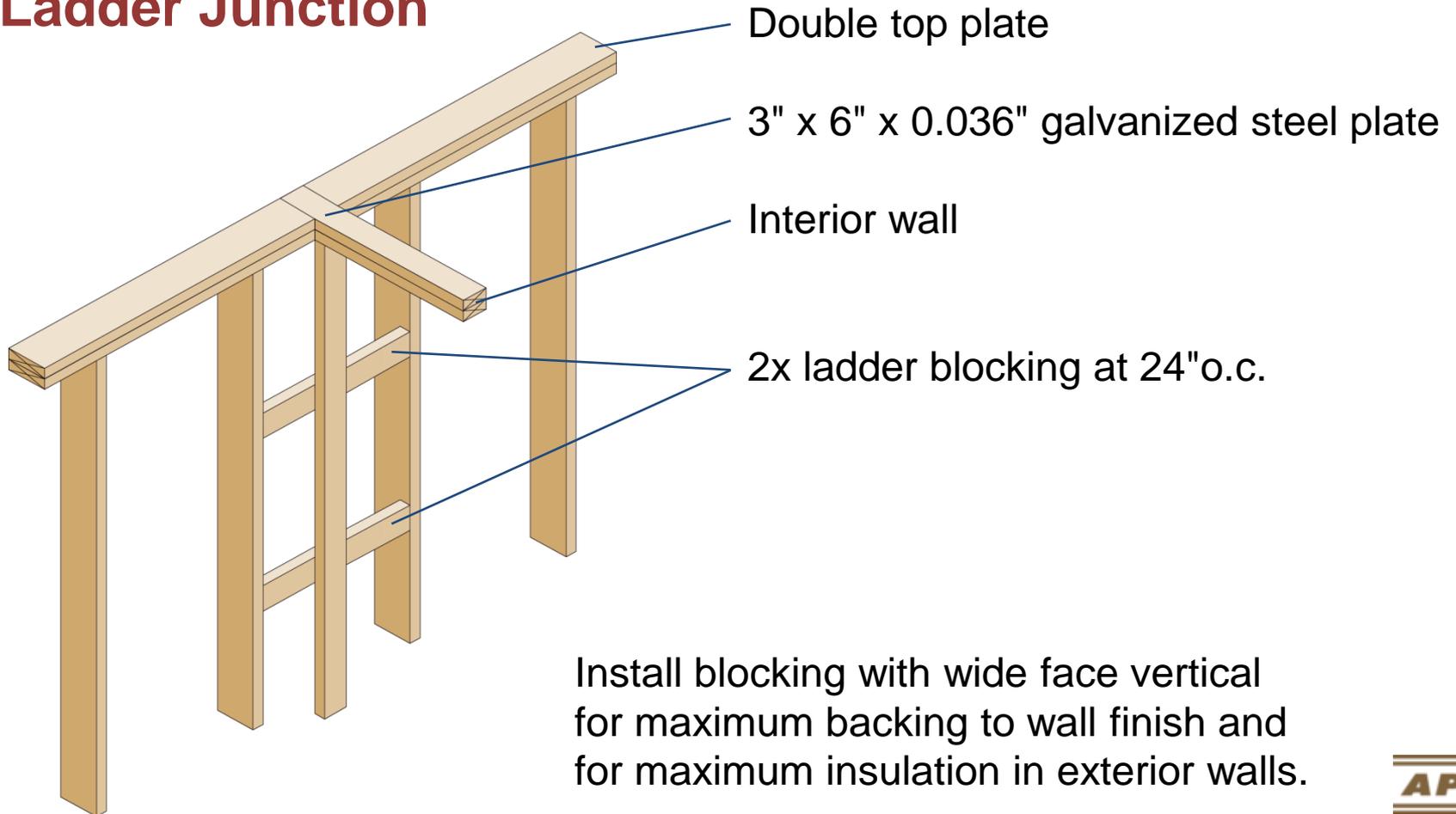


# Phasing In 2x6 Advanced Framing

- 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 in-line 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

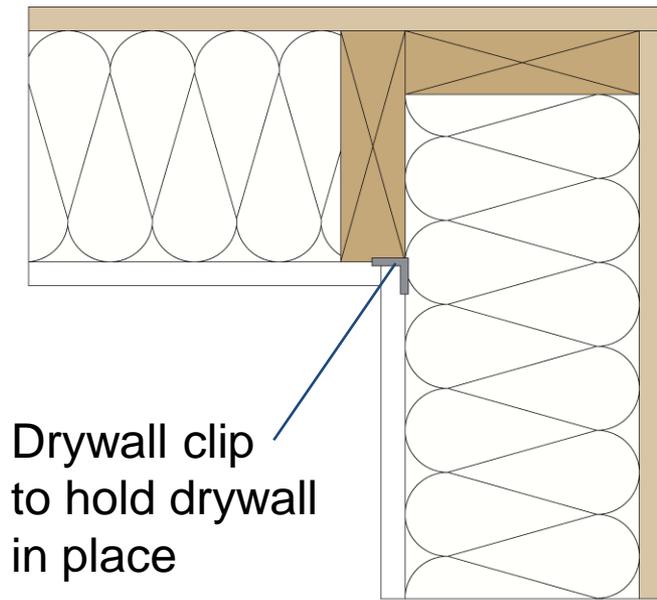
## Ladder Junction



# Energy Efficient Corners

## Two-stud Corner (with Drywall Clips)

Outside corner

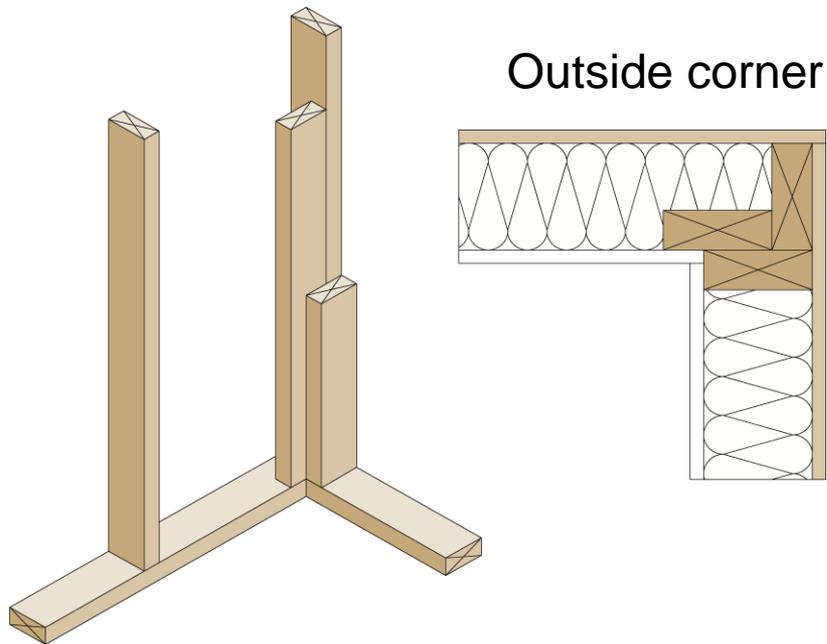


## Alternatives 2012 IRC, Figure R602.3(2) FRAMING DETAILS

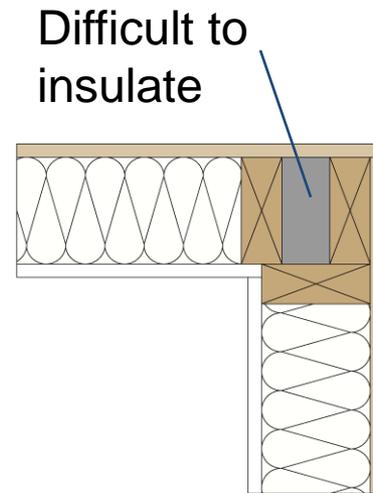
**Note:** A third stud and/or partition backing stud shall be permitted to be omitted through the use of wood back-up cleats, metal drywall clips, or other approved devices that will serve as adequate backing for facing materials.

# Energy Efficient Corners

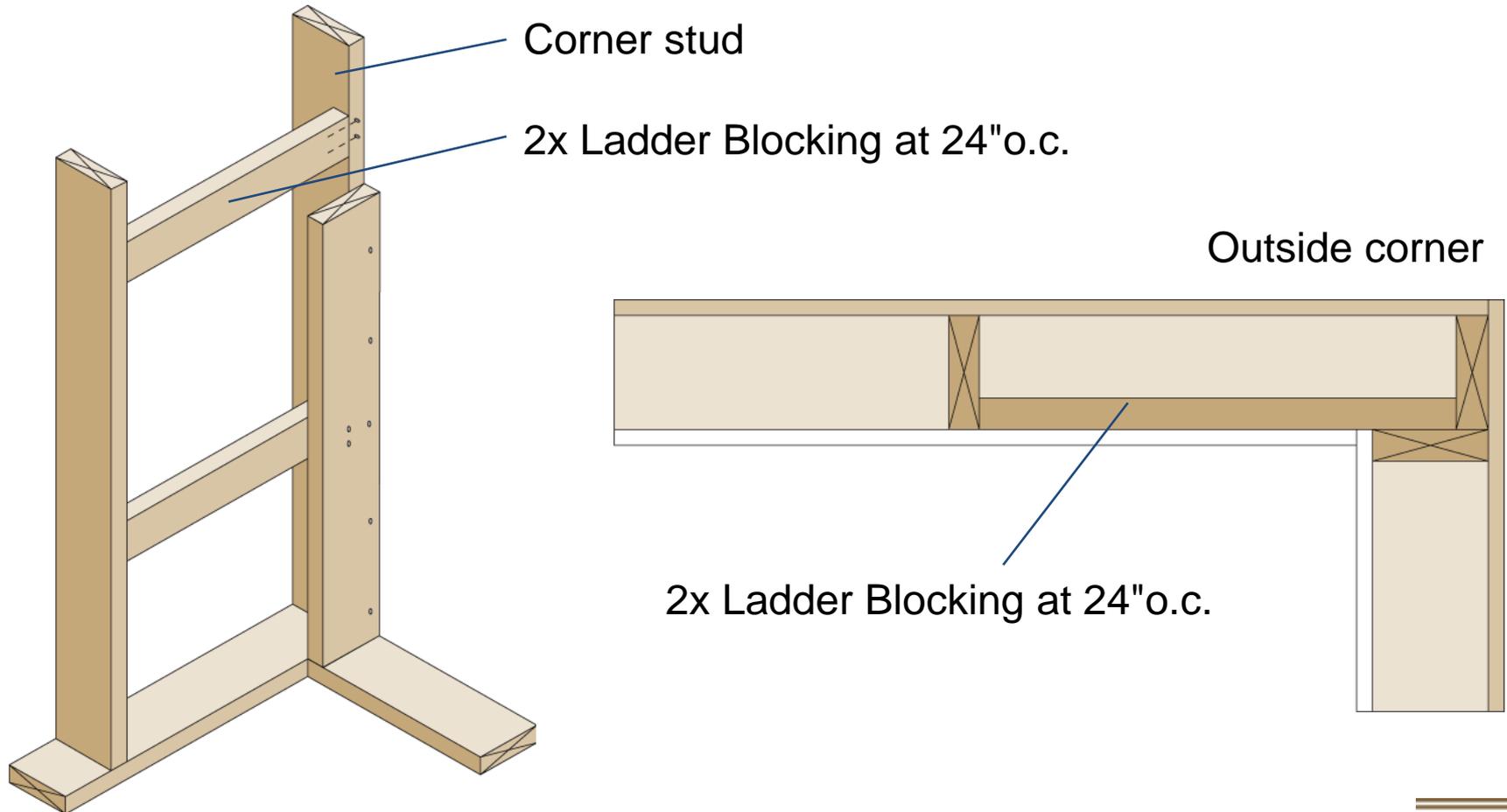
## Insulated Three-stud Corner (California Corner)



## Traditional Corner

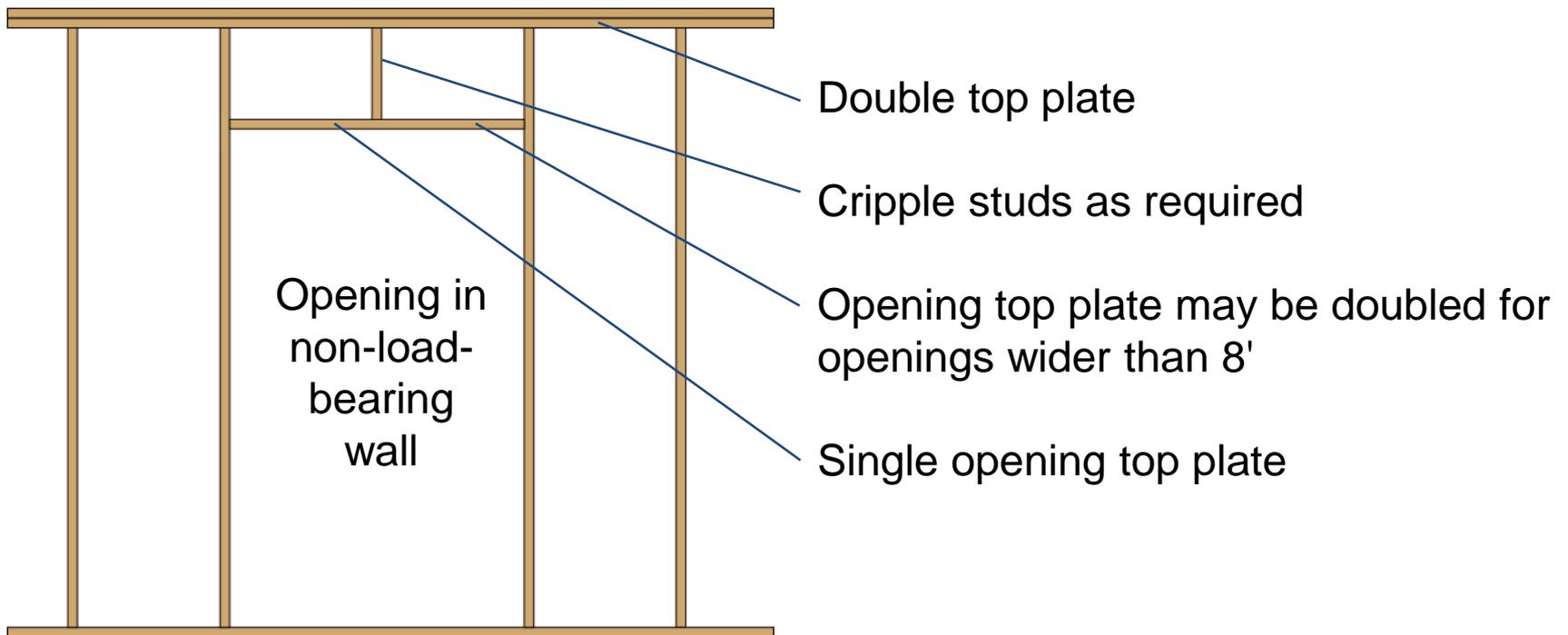


# Energy Efficient Corners



# Energy Efficient Headers

## Conventional Headers Not Required

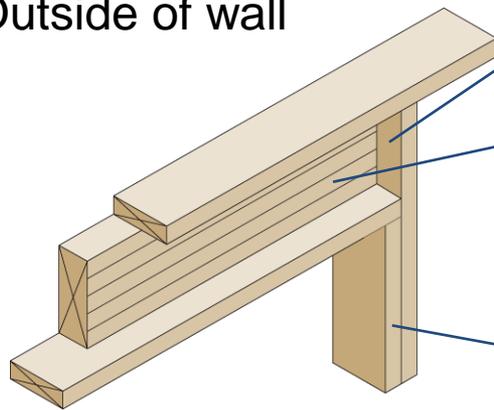


Note: Use jack studs as required.

# 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

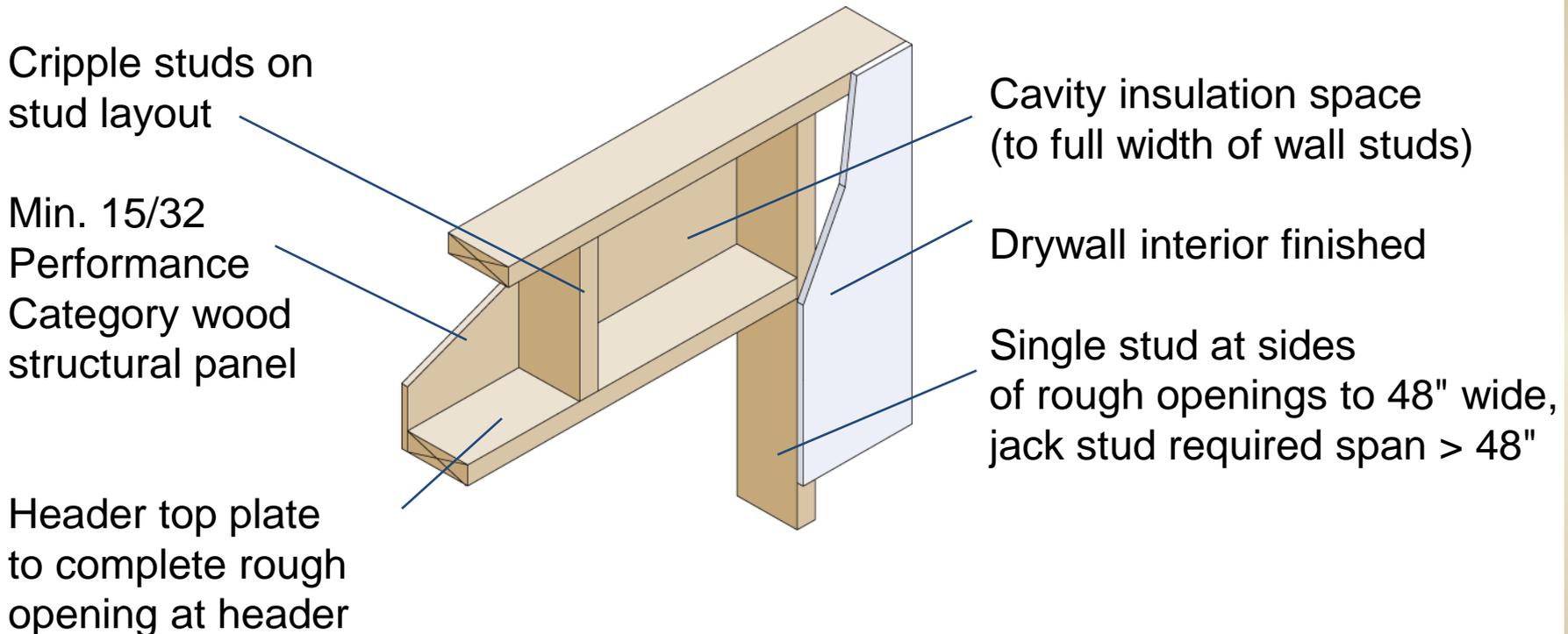
# Energy Efficient Headers

## Prefabricated Insulated Headers



# Energy Efficient Headers

## One-sided Wood Structural Panel Box Header



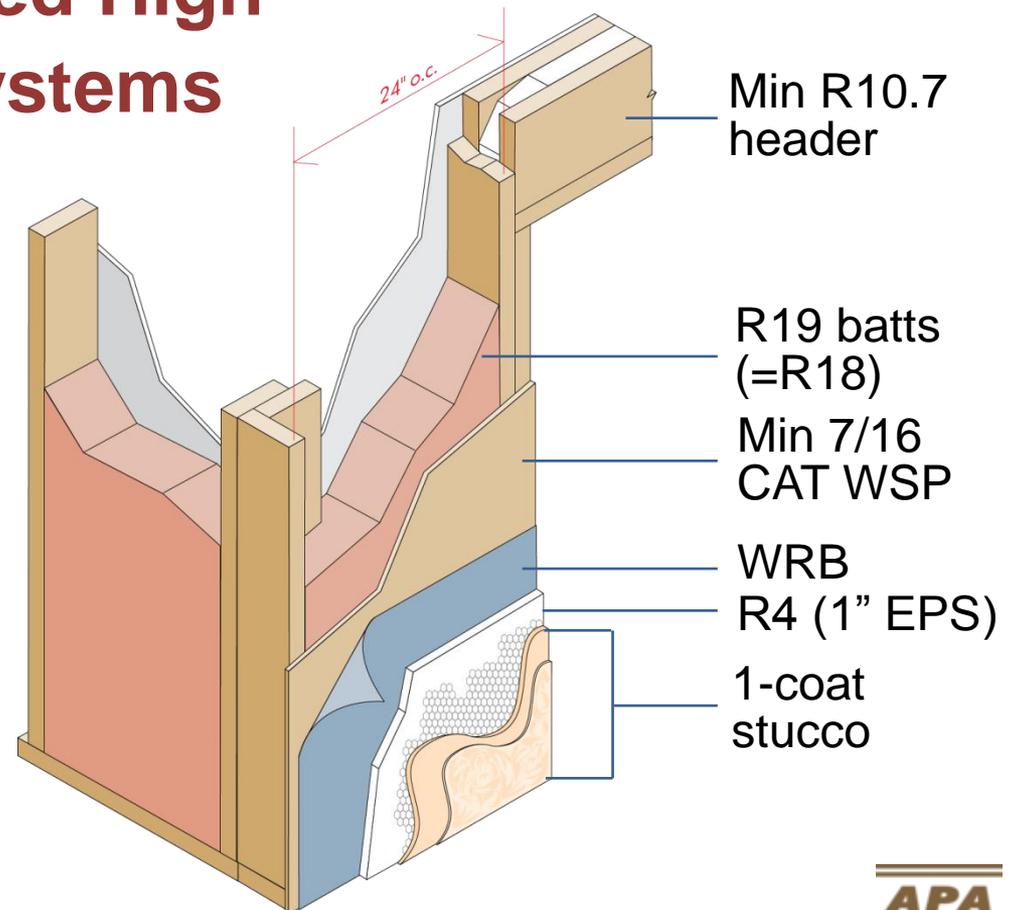
# Wood Structural Panel Box Header



# Structural Systems that Enhance Energy Efficiency

## 2016 Title 24 Proposed High Performance Wall Systems

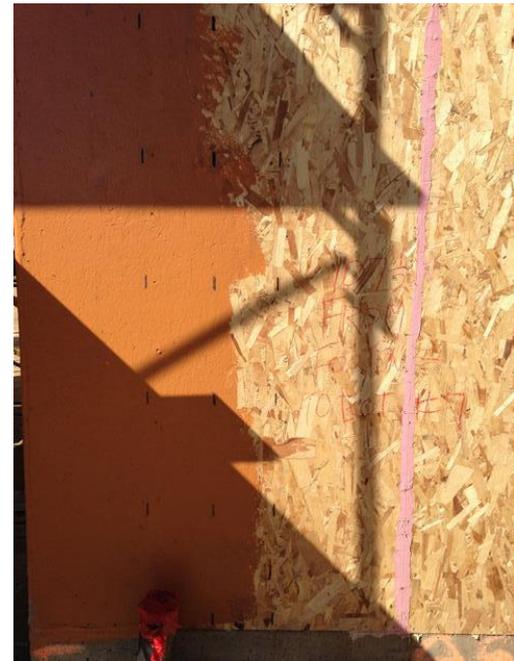
- 2x6 Studs
- 2x6 Advanced Framing



# 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

FIBERGLASS BATT	R-VALUE/THICKNESS
3-1/2" low density fiberglass	R11
3-1/2" regular density fiberglass	R13
3-1/2" high density fiberglass	R15
6-1/4" low density fiberglass (R19 compressed to 5-1/2")	R18
5-1/2" high density fiberglass	R21

# Case Studies

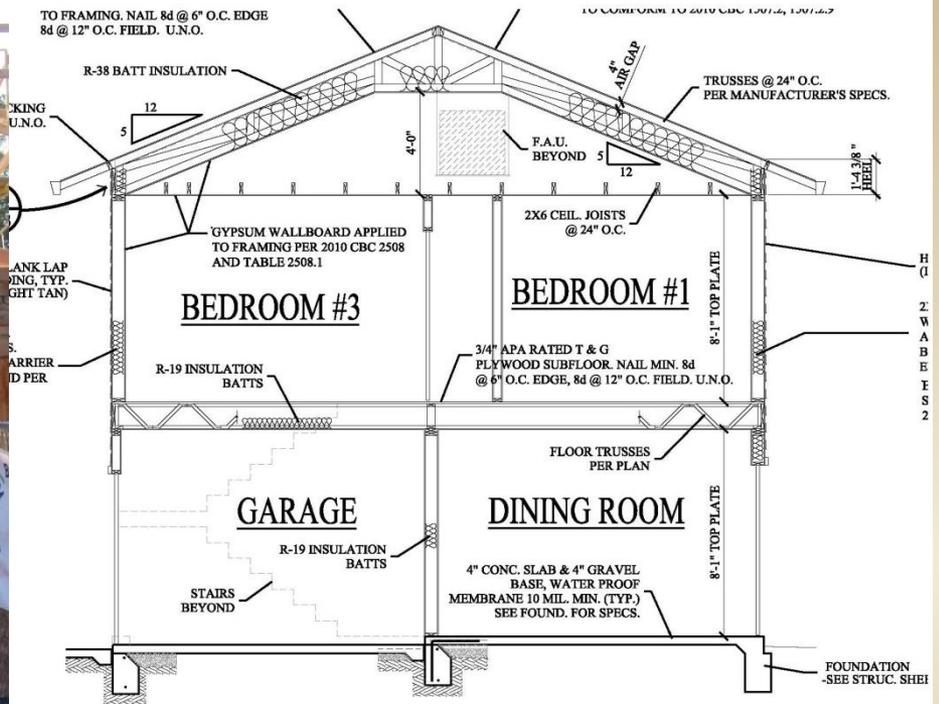
## NET-ZERO Home



## 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:

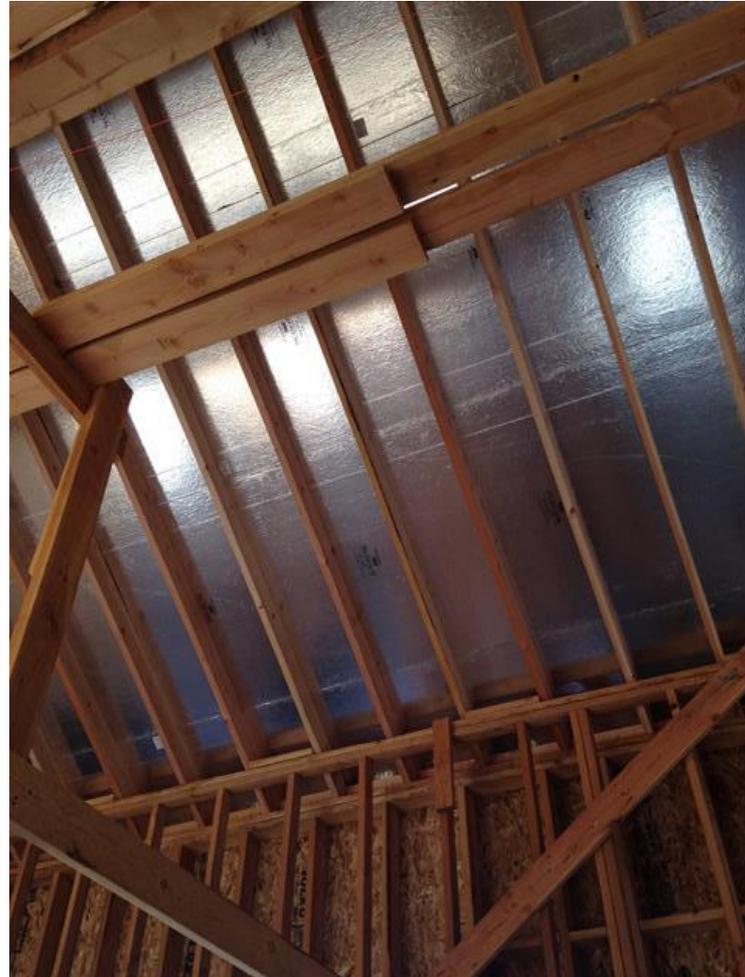
- **Passive House**
- **Double wall**



# 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?

The logo for APA (Association of Professional Arborists) features the letters "APA" in a bold, black, sans-serif font. The text is centered and flanked by two thick, horizontal black bars above and below it. The background of the slide is a scenic photograph of a forested mountain valley with evergreen trees in the foreground and misty hills in the distance.

**APA**

**Karyn Beebe, PE, LEED AP**  
**(858) 668-7161**  
**[karyn.beebe@apawood.org](mailto:karyn.beebe@apawood.org)**