



NextGen Advanced Framing for High Performance Homes

Integrated System Solutions

Vladimir Kochkin, Division Director
Applied Engineering
Home Innovation Research Labs

High Performance Home

- Efficient
- Comfortable
- Durable
 - Structural performance
 - Moisture performance
 - Other (UV, etc)
- **Cost-effective as a system**

Value

Quality

A System's Approach

- Don't simply add the new to the old
- Find efficiencies in the new system
 - Offset cost increases
- Combine tried-and-true with new
- A system solution = find *derivative* benefits

Result: Performance and added value

NextGen Advanced Framing

- High heel truss
- Integrated rim header
- Continuous drywall at interior partitions

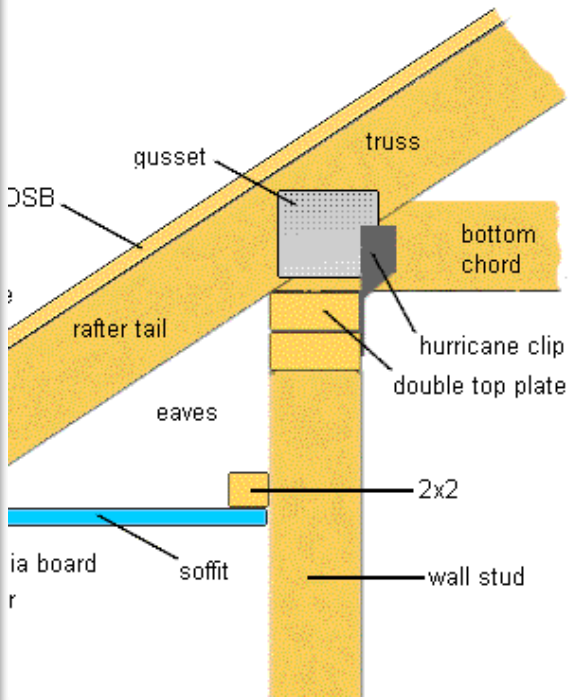


Performance Goals

- Improve thermal performance of the building enclosure
- Reduce the cost of energy efficient construction
- Simplify construction process

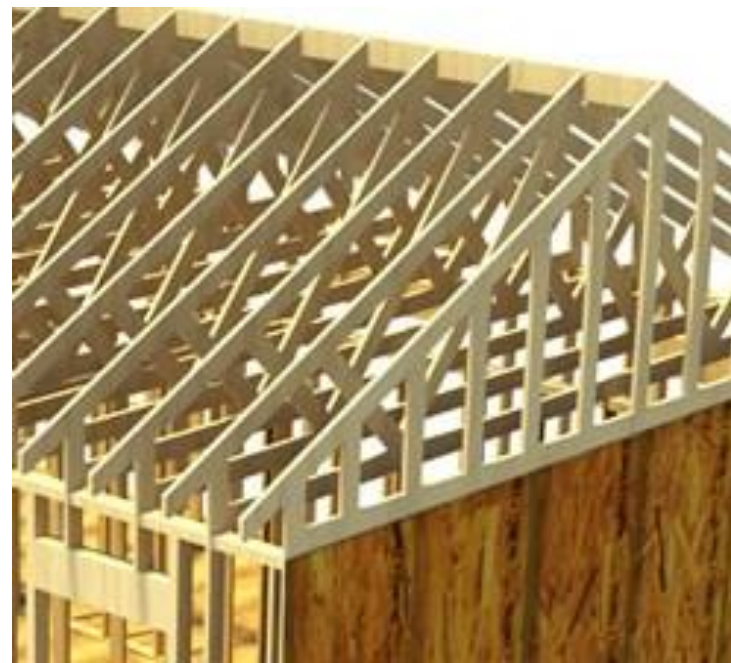
Roof Heel Joint (Eave)

Conventional



Low Heel $H \leq 9.25''$

High Heel



High Heel $H > 9.25''$

Insulation
Air sealing
Ventilation
Wind washing

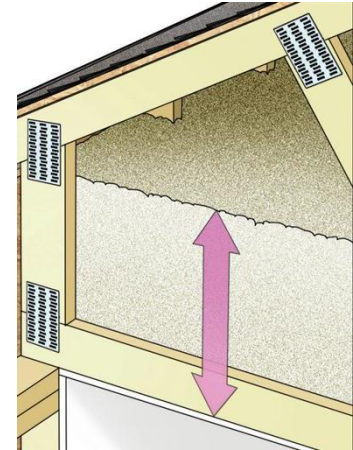


Raised Heel Truss

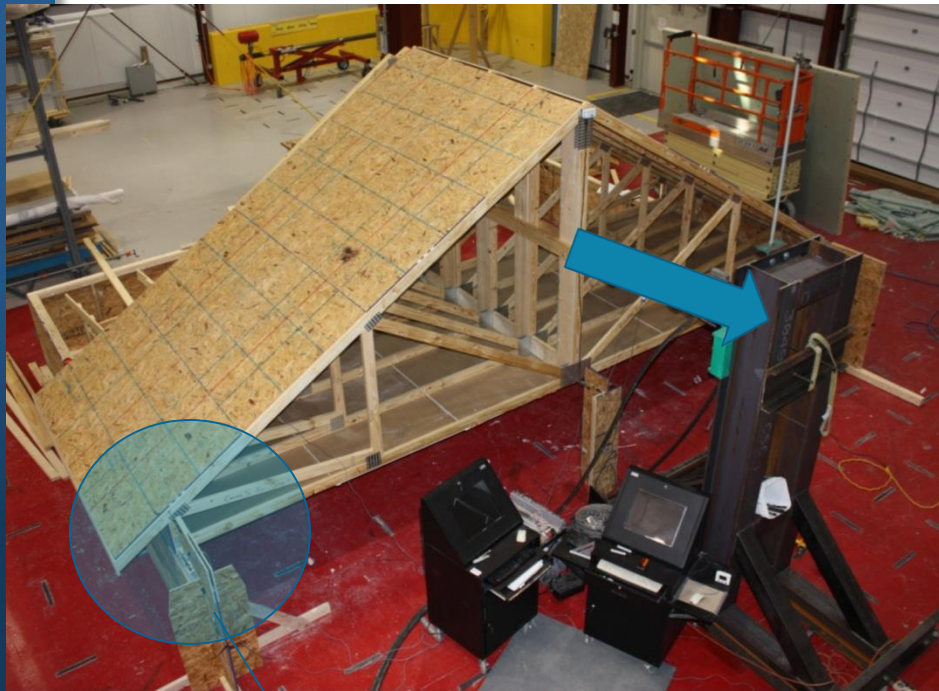
- Reduced thermal bridging
- Improved durability

BUT

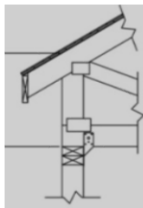
- Reduced structural stability
- 2009/2012 IRC blocking provisions
- Labor intensive
- Diminishes value



Roof Testing at Home Innovation Research Labs



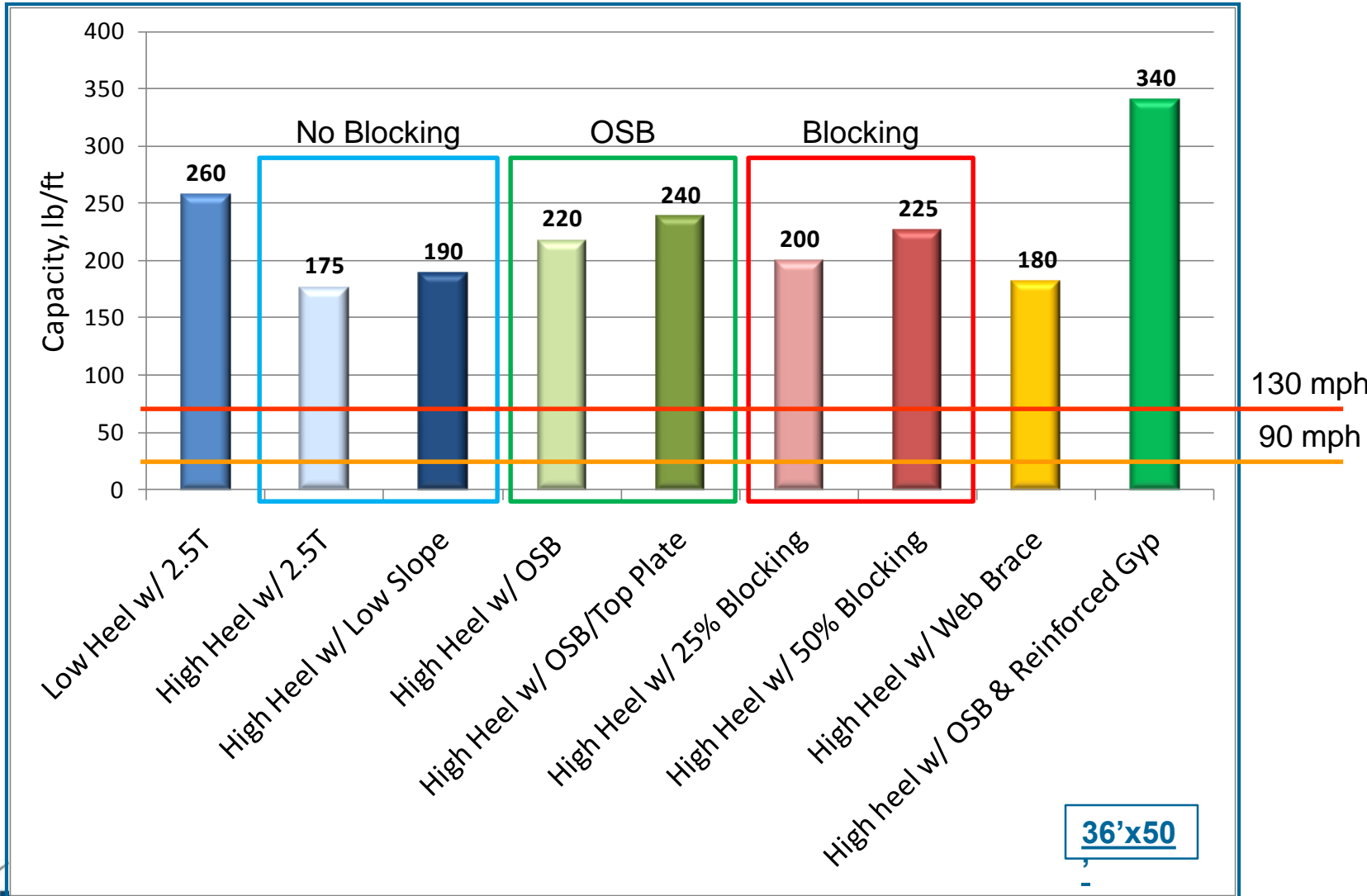
Heel Joint



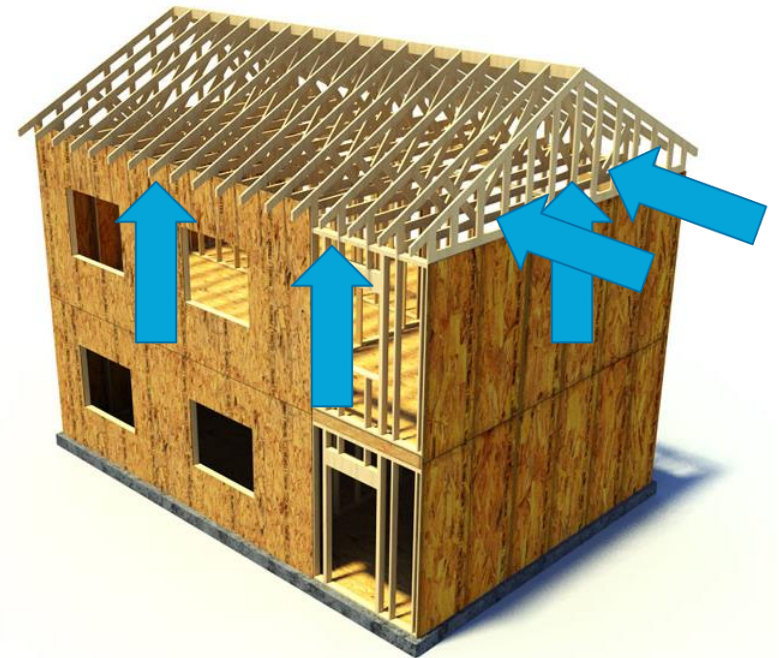
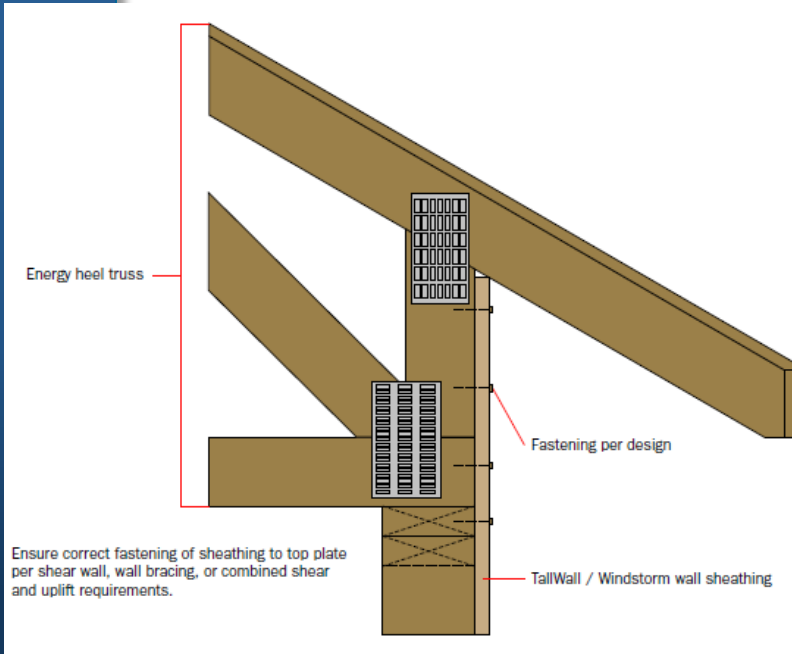
- Low heel - *benchmark*
- High heel unblocked
- High heel blocked - *code*
- OSB sheathing - *simple*



Test Results

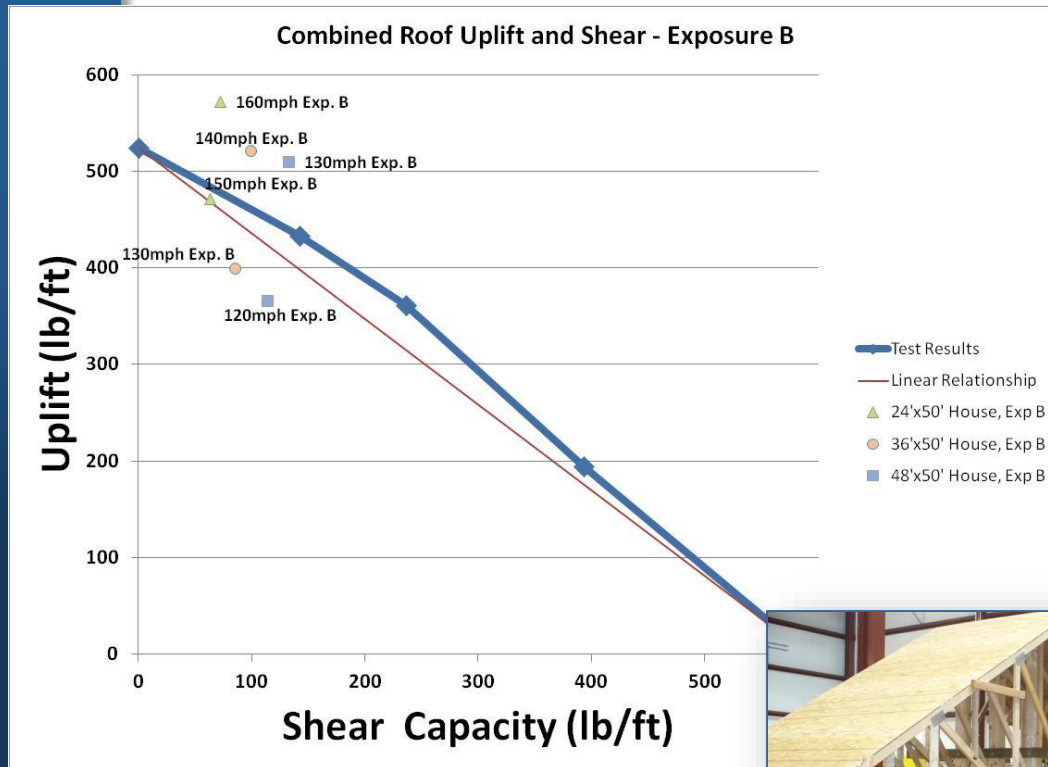


Extended Wall Sheathing



Extended Wall Sheathing

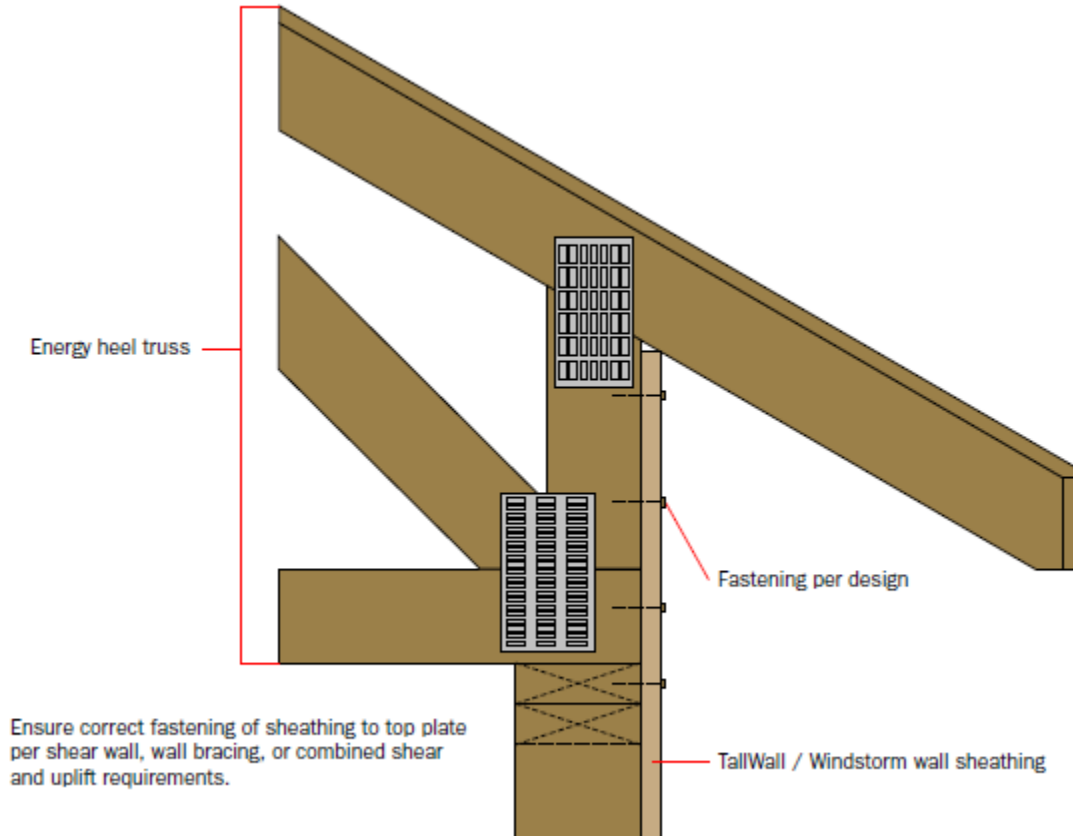
Test Results: Interaction Curve



- Results can be used for any building configuration
- Evaluation based on wind speed and house size
- IRC code change
- Prescriptive solutions and Product Reports (APA)



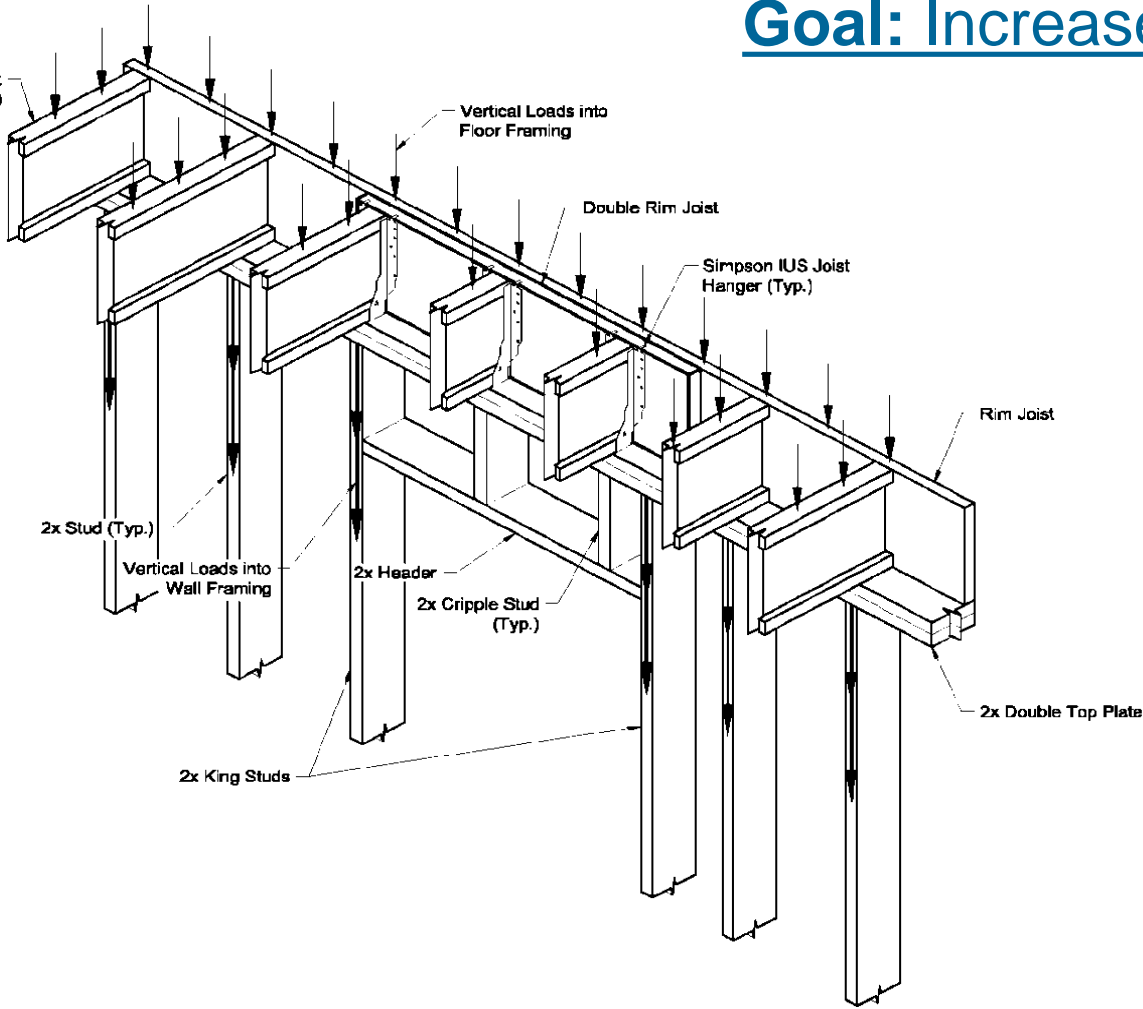
Extended Wall Sheathing



- Simplified and optimized
- Multiple functions
 - High heel bracing
 - Roof-to-wall connection
 - No blocking
 - No thermal bridging
 - No wind washing
 - Simplified air sealing
 - Attic ventilation
- System solution across several performance attributes
- Tested

Integrated Rim Header

Goal: Increase Wall System R-value



- Part of 2x6 package
- Eliminates header
- Minimize jack/king studs

Features:

- Double rim member at openings
- Joist hangers at openings
- King studs carry gravity load and wind loading
- Engineered wood rim or solid sawn lumber or trusses

Lab Tested & Field Evaluated

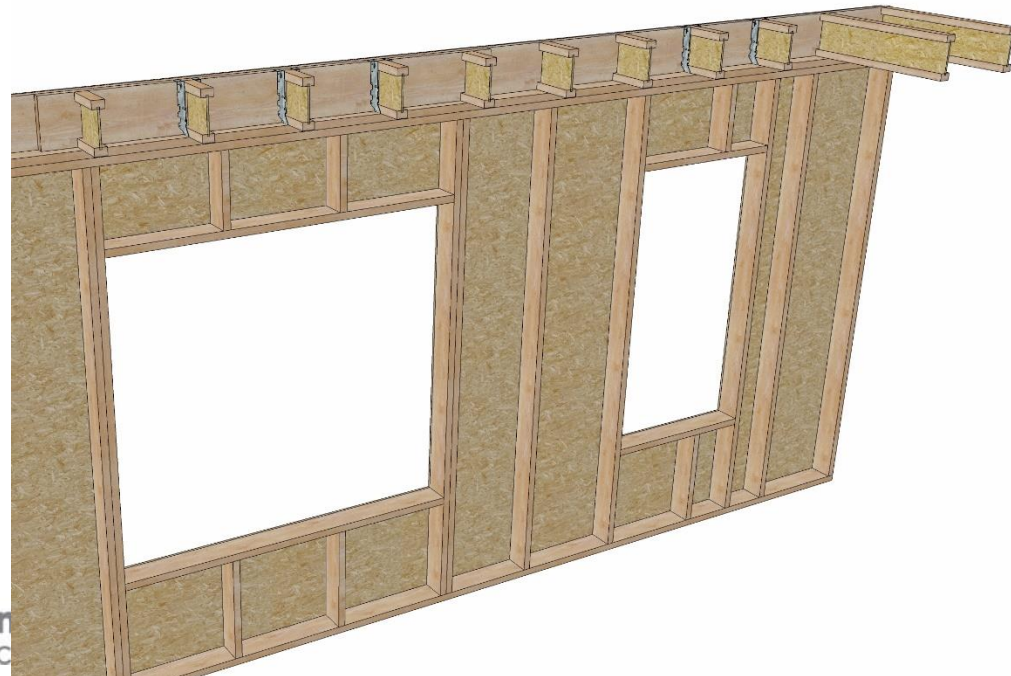


Field Installation



2015 International Residential Code

- Rim Board Headers (Section R602.7.2)
- Solid sawn lumber
- Header size/opening size
- Number of king studs
 - Not less than the number of studs displaced by half of the header span based on the maximum allowed stud spacing



Engineered Rim Header Options

- Engineered Wood Lumber
 - Design or product manufacturers' specs
 - New Wall Construction Guide (2015 pub.)
 - Wider openings
 - Unrated rim board – up to 48" in single-ply applications
- Trusses
 - Engineered design
 - Top-mount hangers
 - 2x6 walls only (bearing)

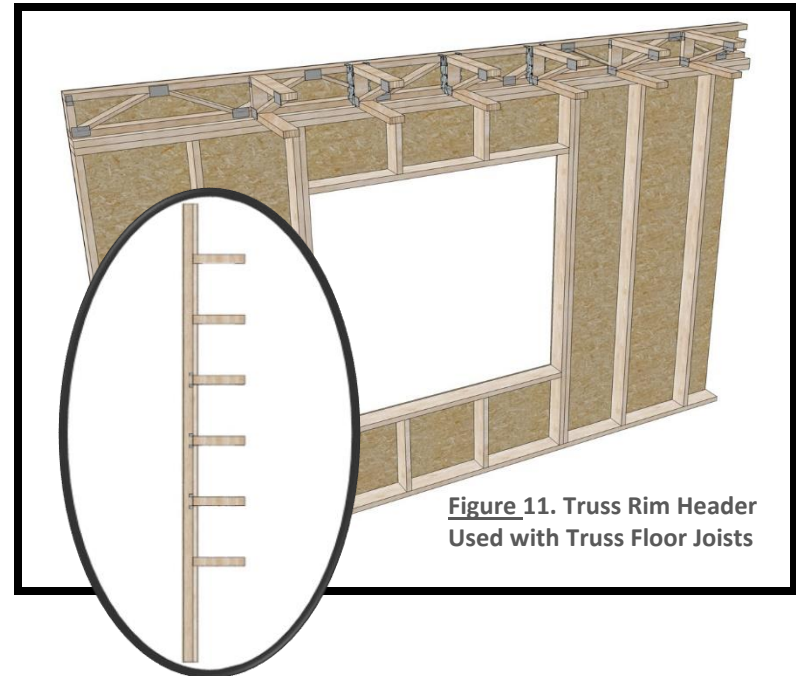
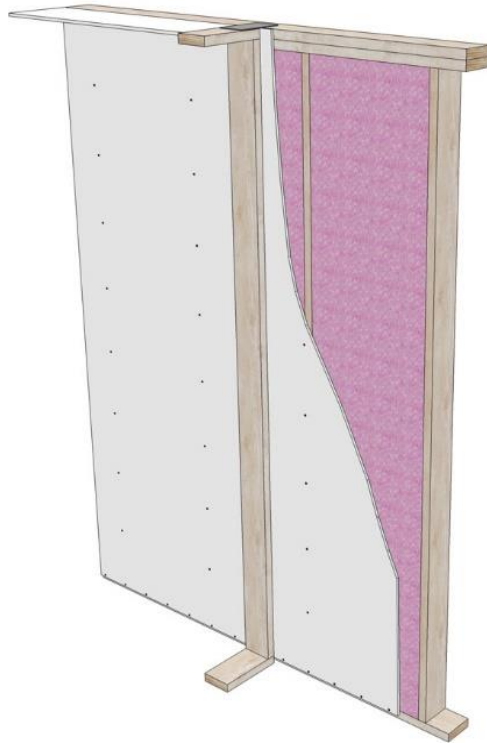


Figure 11. Truss Rim Header Used with Truss Floor Joists

Continuous Drywall at Intersections



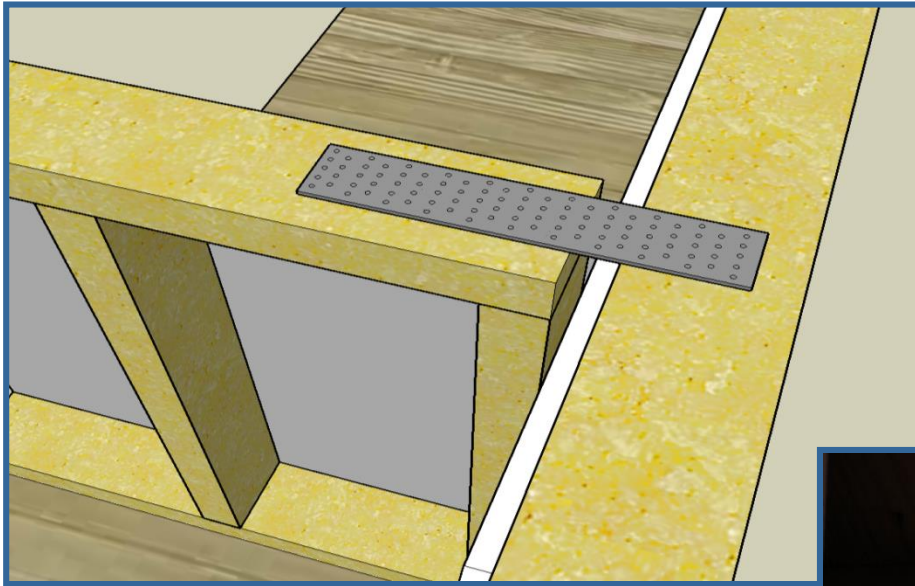
Problem: Interior intersections cause interruption in thermal and air barrier

Solution: Install drywall continuously across the intersection

Details:

- Metal strap to tie top plates together
- 1" gap between framing

Continuous Drywall at Intersections



Continuous Drywall at Intersections



Summary

- Optimized Solutions for HPH:
 - Structural performance
 - Find system efficiencies (system effects)
 - Do no harm and prove new approaches
 - Interactions between performance attributes
 - Build on tried-and-true
 - Provide value





THANK YOU

Home Innovation Research Labs

400 Prince George's Blvd | Upper Marlboro, MD 20774

P: 301.430.6194 | F: 301.430.6180

HomeInnovation.com

