Insulation Strategies to Meet Upcoming Code and Above Code Programs

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Presentation Overview

- **Innovative insulating & wall assembly strategies**
  - Typical assembly
  - New innovations
    - Features & benefits of each

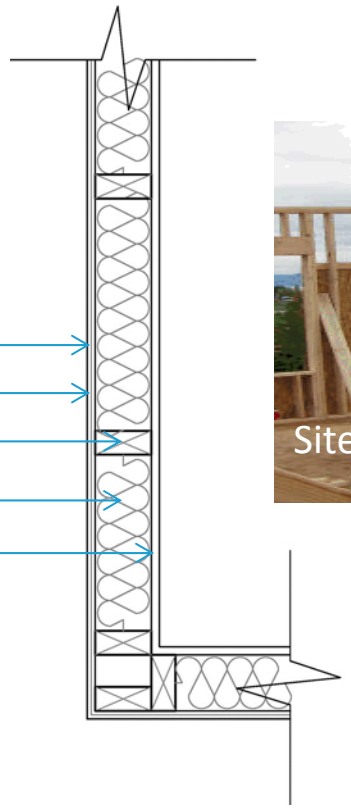
Typical Site Built Residential Wall

Concept:

- Site built wood frame wall with exterior sheathing and batt insulation

Components:

- Exterior Finish (bulk moisture control)
- Building wrap
- Exterior sheathing
- 2x4 Studs @16” O.C.
- Batt Insulation (+/- 3.7 R per inch)
- Gypsum board



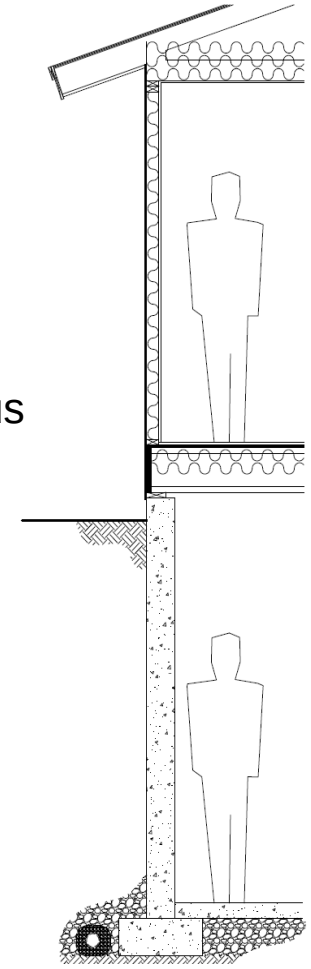
Benefits:

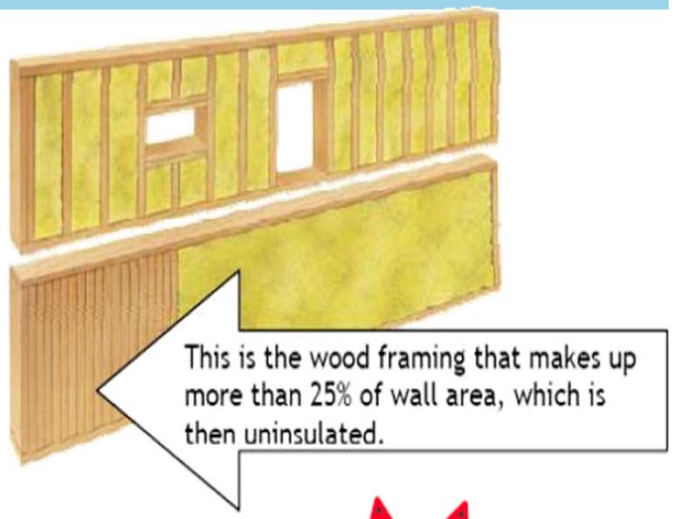
- Relatively low cost

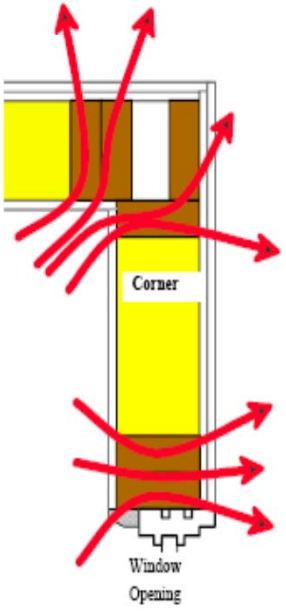
Typical Site Built Residential Wall

Key performance deficiencies

- Low effective R-value
- Difficulty meeting IECC 2012 R-value requirements with 2x4 stud cavity
- Thermal bridging due to non-continuous insulation
- Air leakage points
- No vapor control layer







Innovative Solutions
Structural Insulated Panels (SIP)

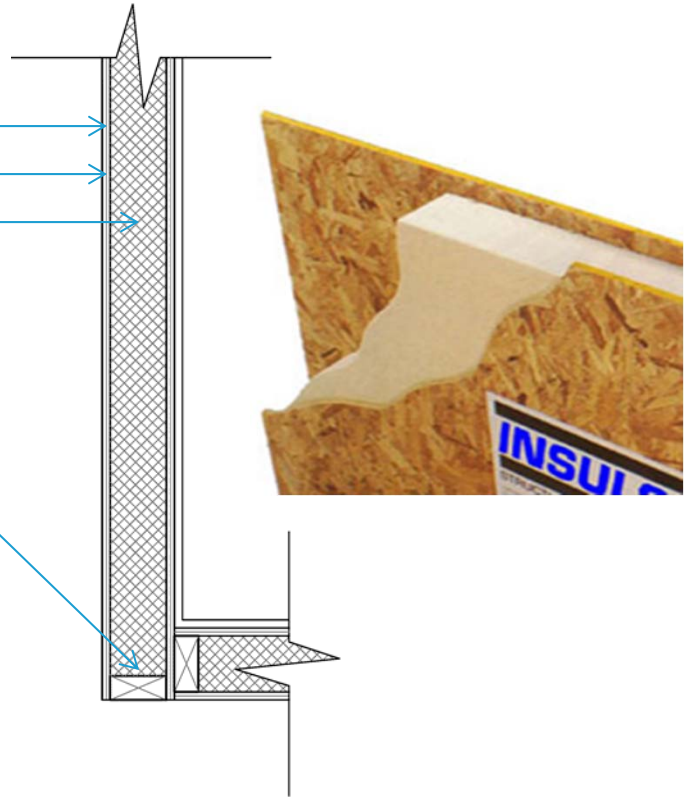
Concept:

- EPS or Polyurethane sandwiched between sheathing to create a highly insulated wall

Components:

- Moisture barrier control layer
- Wood sheathing
- Rigid foam insulation core
  - EPS - R-3 to R-4.5 per inch

    or
  - Closed cell spray foam insulation – R-6 to R-7 per inch
- 2x4 or 2x6 Studs



Benefits:

- R-value increases with thickness of SIP
- Minimal thermal bridging
- Panelization creates labor and construction cycling benefits
  - Can achieve R-21 to R-55 in the whole assembly

Structural Insulated Panels (SIP)
Key Performance Metrics

- **Code & Above Compliance:**
  - Can meet wall insulation requirements for all climate zones at 4 inch thickness

- **Key Control Layer Placement:**
  - Thermal– rigid insulation
  - Vapor– exterior finish
  - Bulk moisture- exterior cladding
  - Air- rigid insulation

- **Applicability per climate Zone:**
  - Suitable for all climate zones

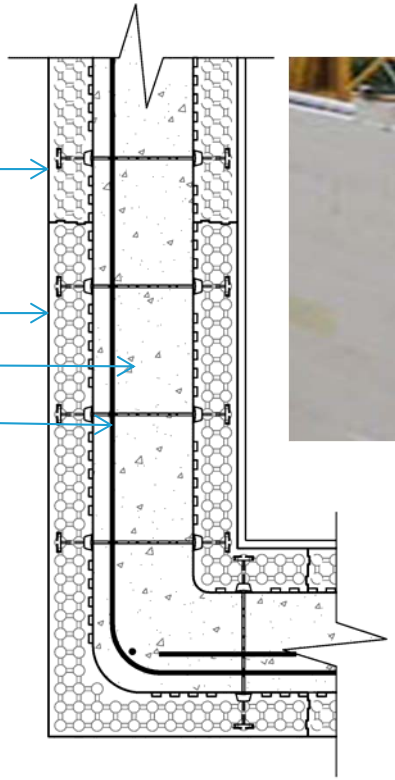
Innovative Solutions
Insulated Concrete Forms (ICF)

Concept:

- EPS blocks are together and filled with concrete to create a highly insulated wall

Components:

- Exterior Finish
  - Moisture barrier
- Rigid foam insulation, R-3 to R-4.5 per inch
- Concrete
- Rebar



Benefits:

- High R-value increases with thickness of ICF
- High resistance to severe weather/ high wind speeds
- Potential for HVAC equipment size reduction

Insulated Concrete Forms (ICF)

Key Performance metrics

- **Code & Above Compliance:**
  - Meets wall insulation requirements for all climate zones
- **Key Control Layer Placement:**
  - Thermal– rigid insulation
  - Vapor– exterior finish
  - Bulk moisture- exterior finish
  - Air- exterior finish
- **Applicability per climate Zone:**
  - Suitable for all climate zones

Innovative Solutions

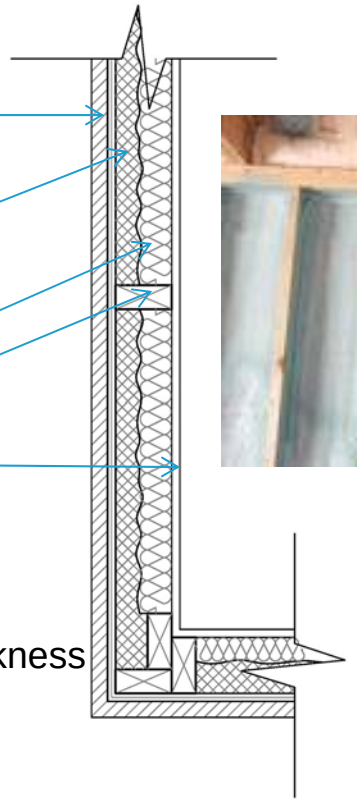
Hybrid cavity with continuous exterior insulation

Concept:

- Typical site built stud wall with a flash coat of closed cell SPF in the cavity, and your favorite fibrous insulation filling the rest of the cavity

Components:

- Insulated exterior sheathing
  - Integral moisture control layer
  - Separate moisture control layer
- Closed cell SPF
  - 1-2 inches @ R-6.7 per inch
- Air permeable insulation, avg 3.7 R per inch
- 2x4 or 2x6 Studs
- Gypsum board



Benefits:

- Reduced air infiltration due to air sealing properties of spray foam
- SPF can be vapor permeable or a vapor barrier depending on thickness
- Increased R-value without significantly increased depth
- Potential for HVAC equipment size reduction
- Suitable for walls and ceilings

Hybrid insulation wall
Key performance metrics

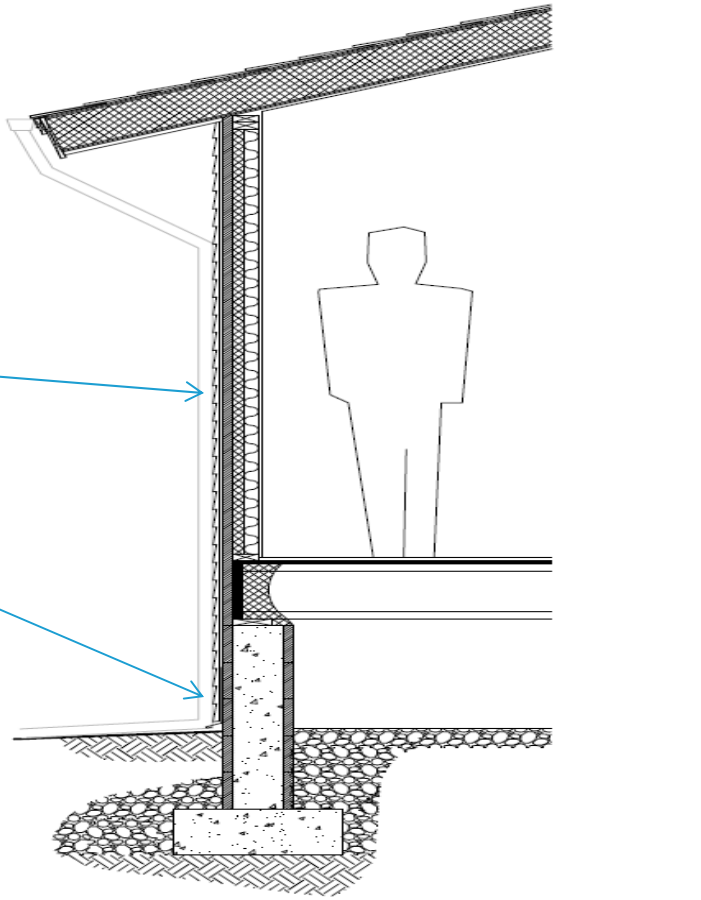
- **Code & Above Compliance:**
  - Meets insulation requirements for all climate zones using 2x4 construction

- **Key Control Layer Placement:**
  - Thermal– High density foam, air permeable insulation
  - Vapor– Joint sealed exterior continuous insulation
  - Bulk moisture- exterior cladding
  - Air- Closed cell SPF, Joint sealed exterior continuous insulation

- **Applicability per climate Zone:**
  - Suitable for all climate zones

Example of Optimized Approach

- SIP Roof, 8 inch R-49
- Hybrid Insulation wall, 2x4 R-24
- ICF Foundation wall, 11.5 inch R-25
- **Exceeds code and above requirements for all climate zones!**



HIGH PERFORMANCE SECTION

Thank you!

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