BEST6

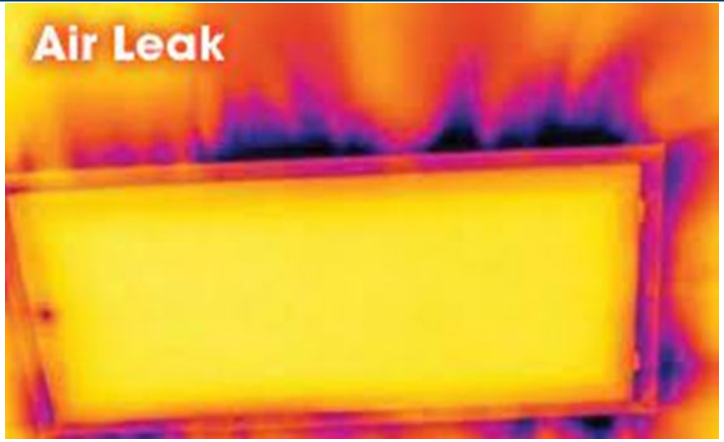
Delivering the best climate results on the “worst” projects

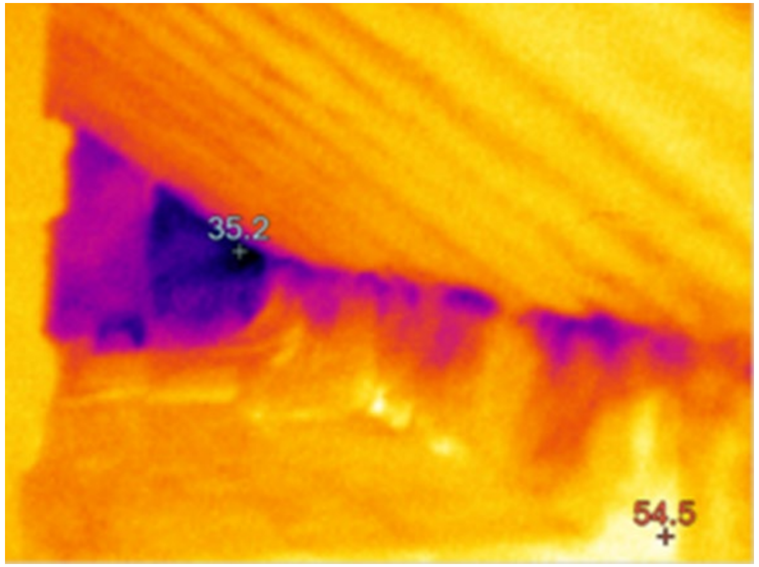
Learning Objectives

- Identify Common Enclosure Issues relating to underperforming buildings (energy)
- Understand project approaches to influence quality
- Identify key details with significant energy implications <u>and</u> no or low incremental cost to correct
- Discuss "Future proofing" building enclosures
- Applying a durability lens to enclosure decisions

Common Energy Issues

- Air Leakage
  - 13% of energy consumed by residential buildings (DOE)
  - 6% of energy consumed by commercial buildings (DOE)
  - Potentially much higher for poorly constructed enclosures
- Presents as “feathering” in IR images





Common Energy Issues

- Thermal Bridging
  - Up to 30% of total losses
  - Linear (e.g. floor lines)
  - Isolated (point) (e.g. fasteners, brick ties)
  - Repeating (steel studs)
  - Continuous insulation generally effective in reducing thermal bridging

Before

R-13 batts in cavity between studs

After

R13 + ½" rigid foam continuous insulation over studs

Source: Dryvit/Dow

Influencing Quality

- Enclosure Consultant – Keys to Success
  - Defined Scope (and understood by project stakeholders)
  - Influence (on client, and on decision makers)
  - Collaboration – involve stakeholders in key decisions & achieve buy-in to solutions

Influencing Quality

- Enclosure Consultant – Keys to Success
  - Pro-active – identify and solve problems before they are problems
  - Technical knowledge – be the expert!
  - Story Telling – horror stories from past projects

Influencing Quality

- Enclosure Consultant – Key Scope Items
  - Design Review / Consultation
  - Submittal Review
  - Pre-construction / Pre-installation meetings
  - Performance Mock-ups / First Installs (stand along mock-up preferable)
  - Field review visits
  - Performance testing

"Worst" projects – most challenging

- Wood frame multi-family
  - Stick-built
  - Less skilled trades
  - Lower tier contractors
  - Lower quality materials
  - Complicated details
  - Often very leaky (air)
  - Lots of opportunity to improve energy performance through air tightness!

Key Details

- Air/WRB material selection
  - Mechanically Fastened Sheet
  - Adhered Sheet
  - Fluid applied

Key Details

- Base of Wall
  - Unsealed → no air barrier
  - Connect air/WRB to footing
  - Self-adhered membrane from sheathing to footing
  - Tape sheet air/wrb to self-adhered membrane
  - “Sill saver” foam between sill plate and footing (additional protection)
  - Other flashings over top

Key Details

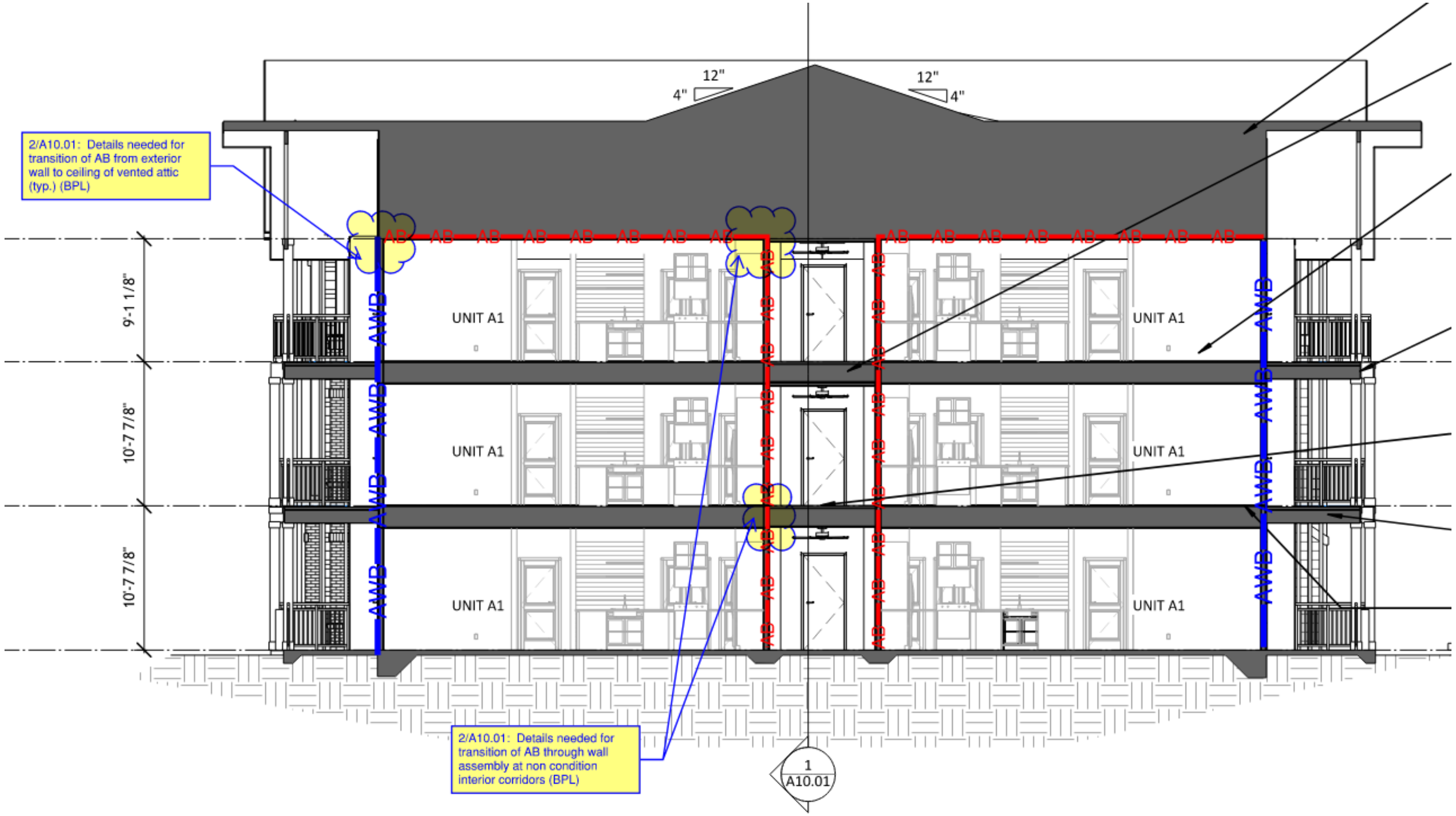
- Top of Wall
  - Unsealed → no air barrier
  - Self-adhered membrane from sheet air/WRB to sheathing
  - Airtight drywall ceiling @ interior for air barrier
  - Sprayfoam sheathing to top plate @ interior

Key Details

- Balconies
  - Pre-strip air/WRB through balcony
  - Integrate w/ Air/WRB above balcony for air barrier continuity

Key Details

- Unconditioned corridors
  - Connect AB through floor assembly
  - Airtight sheathing
  - Spray foam through depth of floor assembly



Key Details

- MEP Penetrations
  - Not like this!
  - Use airtight boxes and flash <u>before</u> installation of cladding
  - Sprayfoam can be used in stud space to encapsulate non airtight boxes

Key Details

- Soffits
  - Make sure Air/WRB wraps the soffit for AB continuity

Future Proofing

- General Approach
  - Optimize performance within available first cost budget
  - Prioritize long service life items over shorter service life / easily replaceable / upgradeable items
  - Think about replacement sequence – design for future replacements where applicable

Future Proofing

- Air/WRB
  - Focus on achieving durable airtight performance
  - Consider life cycle of cladding materials
  - Many wall claddings are likely to be in place for life of building
  - invest first cost $ on items that are unlikely to be replaced during life of building

Future Proofing

- Roofing
  - Low-slope roofing typical life cycle 25+/- years (or less)
  - Will definitely be replaced over life of building
  - Allow for re-roofing (removeable counter flashing etc.)
  - Consider threshold heights to allow for increased insulation
  - Better to VE on roof than wall air/wrb (within reason)

Future Proofing

- Waterproofing
  - Consider location
  - Below grade waterproofing very difficult to repair/replace – invest first cost $
  - Split slab waterproofing very difficult to repair/replace – invest first cost $
  - Balcony waterproofing / other exposed easily replaceable ok to VE

Future Proofing

- Windows
  - Big influence on energy performance (depending on window/wall ratio)
  - May be replaced, but typically long life cycle and often difficult to replace
  - Invest first cost $ in windows

Durability Lens

- Durability is the ability of a physical product to remain functional, without requiring excessive maintenance or repair, when faced with the challenges of normal operation over its design lifetime

Durability Lens

- remain functional
- without excessive maintenance or repair
- Challenges of normal operation
- over design lifetime

Durability Lens

Define Expectations

- ➢ Expected life cycle ➔ Owner
- ➢ Acceptable maintenance / repair ➔ Owner
- ➢ Challenges of normal operation ➔ Consultant
- ➢ Design lifetime ➔ Consultant

Durability Lens

Durability Lens for decision making

- Objective approach – non confrontational
  - Does proposed product / detail / solution meet owner expectations for durability?
  - If not, is Owner willing to reduce expectations (cost vs. performance decision)
- Document decisions
- Document any changes in Owner expectations

Durability Lens

Durability Lens for decision making

- Sets clear expectations
- Clear decision making approach
- Documentation of decisions and performance expectations
- Protects design and construction teams from unreasonable expectations

Thank You