Exterior Wall Strategies with Exterior Insulating Sheathing – Cold Climate

Building America Summer 2012
Technical Update Meeting

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Home Quality + Performance

Context

"Lower household mobility in the wake of the housing market crash could also mean that homeowners will focus on upgrades with longer paybacks, particularly energy-efficient retrofits." *Joint Center for Housing Studies of Harvard University*

- Homeowners are investing in new siding ($4.847 billion in 2009)
  - Is it cost effective to add a little insulation or a lot?
  - If adding more than 1 inch of foam, what is the best strategy?

- Homeowners are investing in new windows/doors ($11.448 billion in 2009)
  - Will high R-value windows with insulation in the existing wall cavity achieve comparable energy savings to exterior foam?

Context

- I'm doing… and I plan on spending…

	$	$$	$$$
New windows			
New Siding			
Insulation			

- So what do I do?

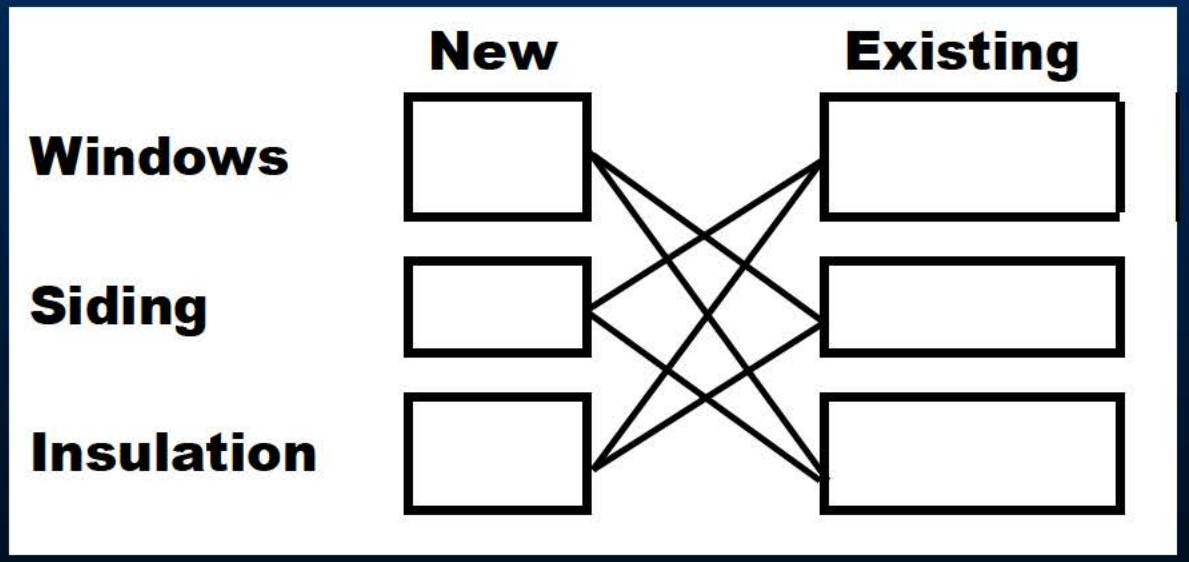
Technical Approach

- Do no harm, use basic building science, minimize long term damage functions, then increase energy efficiency

1. Keep water out of wall
2. Air seal wall
3. Insulate assembly as budget allows

Technical Approach

- Simple analysis
  - Windows – reuse existing, or buy new?
  - Siding – replace or not?
  - Are current walls insulated or not?
- This results in 8 permutations



Recommended Guidance

For all 8 permutations:

- Install complete drainage plane and window flashing system with integral air barrier
  - All walls should resist bulk water and be airtight
  - Integrate air tightness at top of wall / bottom of wall
- Not doing siding? Tough. If you are insulating the cavity, keep the water out
- Not replacing windows? Tough. Pull 'em, flash 'em, reinstall
- You only wanted to do insulation? Tough.
  - For what you are paying a professional to make a sight unseen evaluation of your house, *the risks are too great to just insulate without eliminating the highest risks* – *bulk water and air leakage*
  - There are plenty of other "it depends" scenarios but the nature of retrofit requires an individual comprehensive analysis

Technical Approach – Energy Analysis (TREAT) Cold Climate

	Pre-Retrofit	Scenario 1	Scenario 2
Exterior insulation	None	R-15	None
Cavity insulation	None	R-15	R-15
Air sealing	12 ACH50	3.0 ACH50,	3.0 ACH50, R-60
Attic Insulation	R-19	R-60	R-60
Furnace	0.78 AFUE	0.95 AFUE	0.95 AFUE
Window replacement	**Single with Storm**	**Single with Storm**	**R-5 window**
SAVINGS			
Peak (Ranch)	**~48kBtuh**	**~19kBtuh**	**~17kBtuh**
Heating (Nat Gas)	**-**	**~77%**	**~79%**
Peak (Colonial)	**~69kBtuh**	**~30kBtuh**	**~25 kBtuh**
Heating (Nat Gas)	**-**	**~76%**	**~81%**

Recommended Guidance

Once the water and air leakage concerns been addressed:

- In the $$ range? What should be done?
  - No wall insulation? → Dense pack walls unless you have single glazed windows
  - Some existing wall insulation? → Buy High-R windows
  - You won the lottery? → Go DER

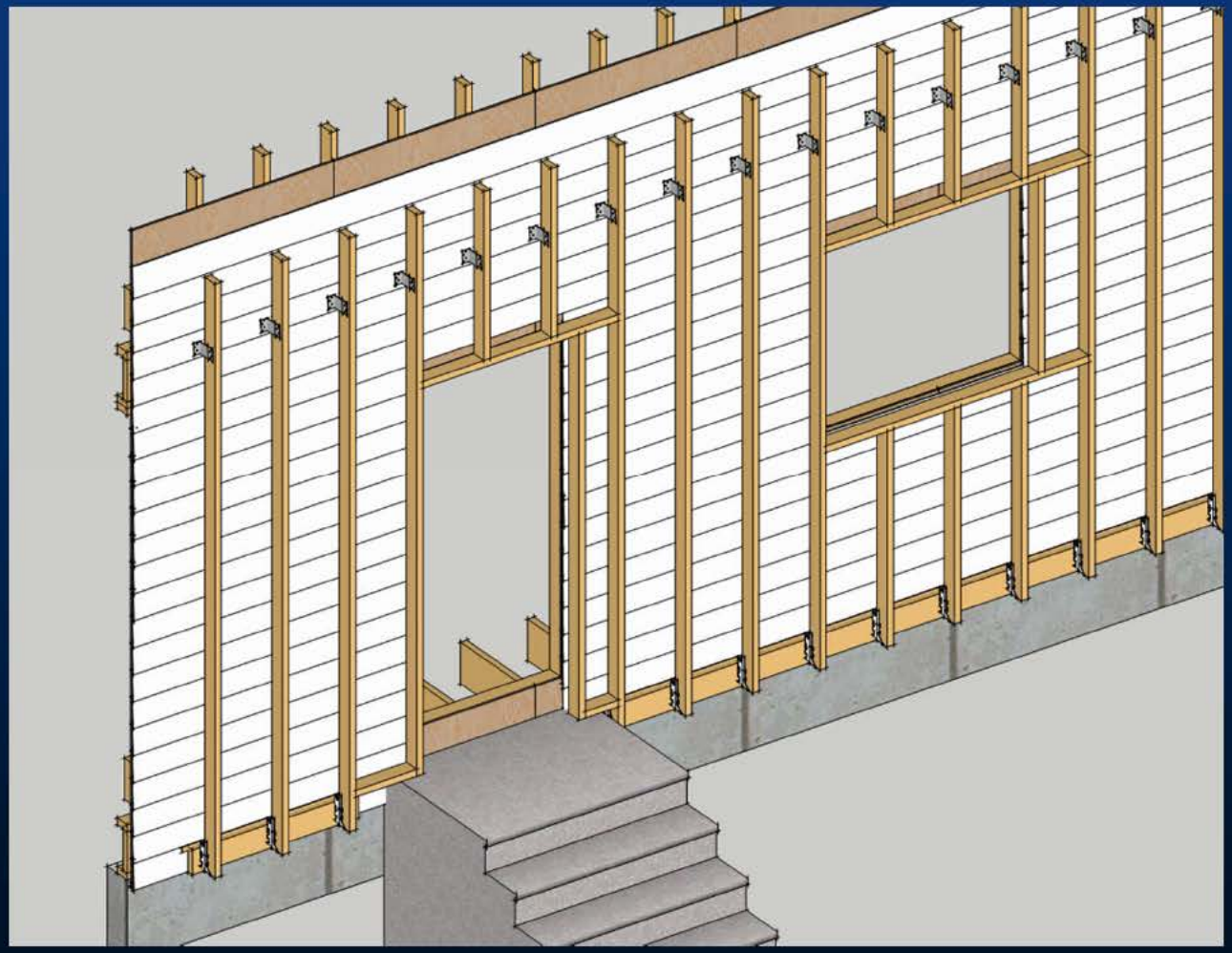
Recommended Guidance

You really want to do exterior insulation (on a budget)?

- Avoid lead abatement
- Don't rely on finding each individual vertical stud
- Include window replacement in the budget

Maybe try this…

Recommended Guidance (With Adult Supervision – Structural Eng)



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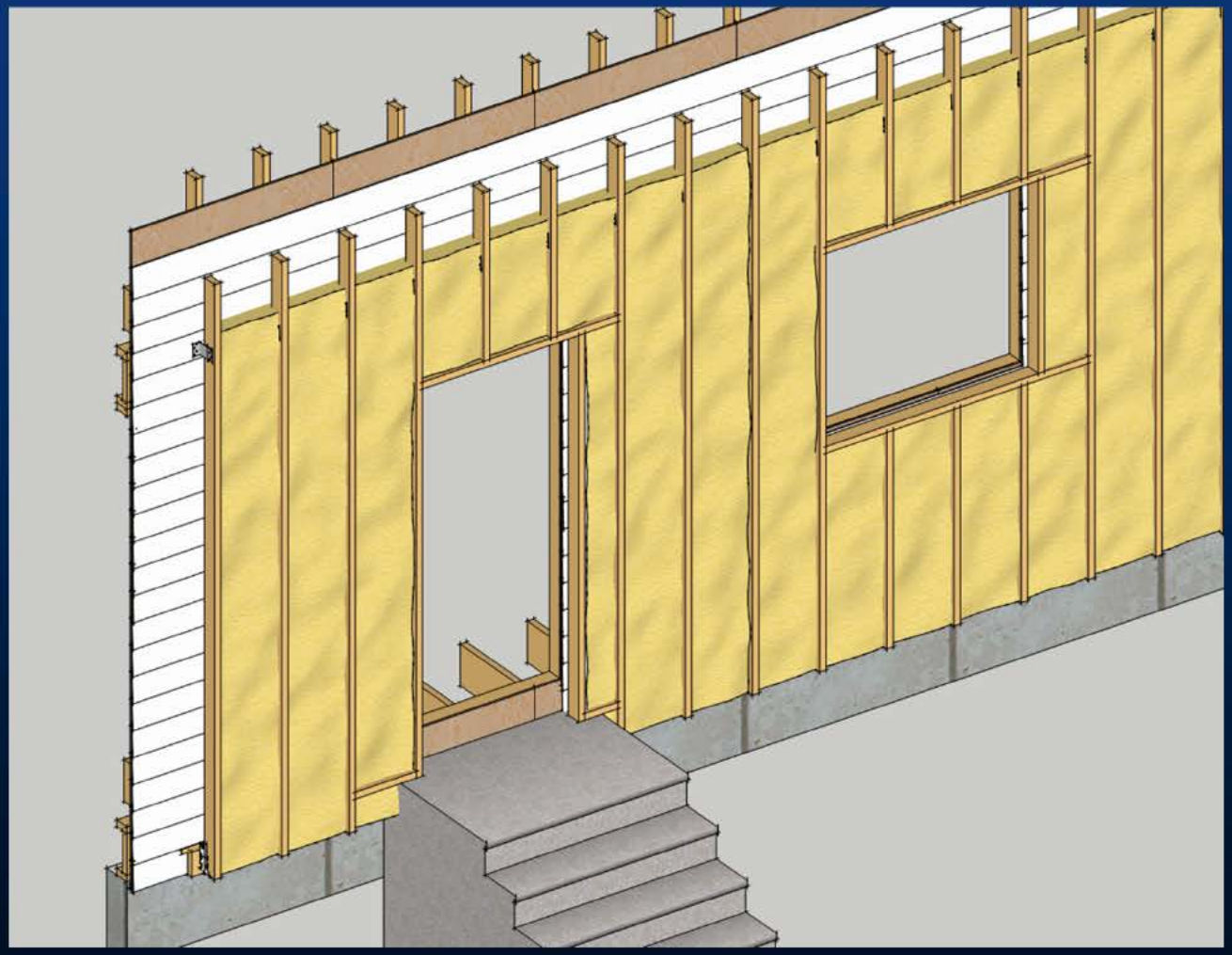

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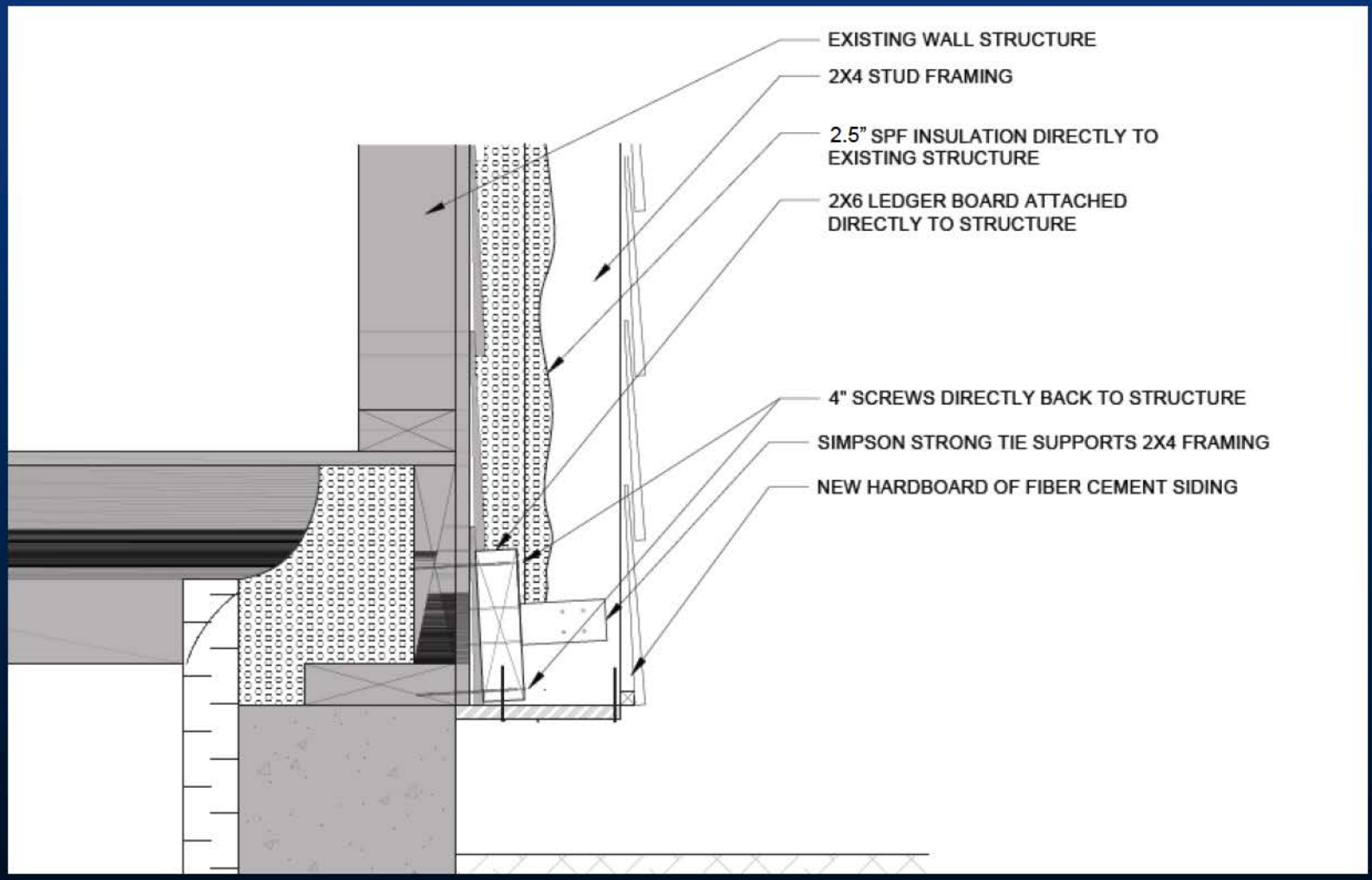

Value

- Houses that rot (due to bulk water leaks and condensation due to air leakage) have little long term value
- The cost of short term energy saved vs. major repair of deteriorated structure is not comparable
- Recognize that no matter what you are doing, you are doing it for other reasons (aesthetics) and costs will likely not be recouped at resale (but siding and windows are in top 10 of recouped value)

Value

Exterior insulation vs. High-R Windows

- Go for the windows
  - Comfort
  - Security
  - Functionality

Market Readiness

- Cavity Insulation – market ready and available
- Windows – market ready and available
- Exterior Insulation Strategies
  - Depends on what you do and aesthetics desired
  - Some is ready (i.e. EIFS)
  - Some are still “engineer at your own risk”

Pros and Cons

Pros

- Siding and drainage plane industry should love us…
- Fits with what today's resale buyers are looking for (good "bones" of house vs. "glitz")

Cons

- Not necessarily what homeowners may want to hear
  - I have to reside my house so it doesn't leak?
- No perfect balance between energy, durability
  - But isn't perfect the enemy of good?

References

- GHA (2011). GreenHomes America. The GreenHomes Promise. Irvine, CA: GreenHomes America. http://www.greenhomesamerica.com/about-us/32-home-energy-audit-guarantee.aspx.
- Harvard (2010). Joint Center for Housing Studies of Harvard University. A New Decade of Growth for Remodeling. Cambridge, MA: Harvard University.
- Martin, Zeno (2012). Securing Rainscreen Siding. *Journal of Light Construction*. February 2012.
- Will, Abbe and Kermit Baker. (2007). The Performance of Remodeling Contractors in an Era of Industry Growth and Specialization. Joint Center for Housing Studies Working Paper Series, W07-8.
- http://www.remodeling.hw.net/2011/costvsvalue/national.aspx
- http://www.windowsvolumepurchase.org/