

2011 BETEC Symposium – December 6, 2011

A FIELD REPORT ON HIGH PERFORMANCE LIGHT FRAMED WALLS



Alex Lukachko, M.Arch.

Building Science Corporation, Somerville, MA

www.buildingscience.com

Topics in this Report

Construction of High Performance Walls by Component:

1. Advanced Framing
 - Greensburg, KS
2. Insulating Sheathing
 - Westford, MA – Habitat for Humanity
 - Westford, MA – Barn Renovation
3. Air barriers
 - Gaithersburg, VA – NIST NZE
 - Wyandotte, MI – NSP2 New Construction

The report will also touch on: finding ants, the use of spray foam, when to use a blower door, and how Joe would do it.

Building America



The U.S. Department of Energy's Building America Program is reengineering the American home for energy efficiency and affordability. Building America works with the residential building industry to develop and implement innovative building processes and technologies – innovations that save builders and homeowners millions of dollars in construction and energy costs. This industry-led, cost-shared partnership program uses a systems engineering approach to reduce energy use, utility bills, construction time, and construction waste.

For more information, visit our website at: www.buildingamerica.gov

High Performance Walls

What do we want to achieve?

- Control heat flow

Thermal Control Recommendations

Climate Zone	Wall	Vented Attic	Compact Roof	Basement Wall	Exposed floor	Slab edge ¹	Windows (U/SHGC)	Sub-slab ²
1	10	40	35	5	10	none	yes	none
2	15	50	40	10	20	5	0.35/<.25	none
3	20	50	45	10	20	7.5	0.30/<.3	5
4	25	60	45	15	30	7.5	0.30/<.35	7.5
5	30	65	50	15	30	10	0.24/<.50	7.5
6	35	75	60	20	40	10	0.18/--	10
7	40	90	65	25	45	15	0.15/--	15
8	50	100	75	35	50	20	0.15/--	20

Table 0.2: Current Recommended “True” Minimum R-value (+/-)³ including thermal bridging

1. Slab edge insulation includes all of stem wall or monolithic slab edge
2. Full area coverage of slabs
3. these are recommended values based on experience - see economics section

Straube, J.F. “High R-value Enclosures for High Performance Residential Buildings in All Climate Zones” Building Science Corporation, 2010

High Performance Walls

What do we want to achieve?

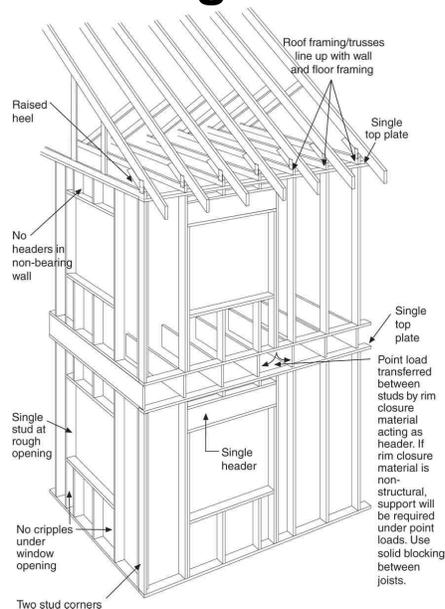
- Control heat flow
- Control air flow
 - Zones 1-3 < 0.25 cfm/sf of enclosure area at 50 Pa pressure
 - Zones 4-6 < 0.20 cfm50/sf
 - Zones 7- 8 < 0.15 cfm50/sf
 - Airtightness levels of under 0.10 cfm/sf @ 50Pa are achievable in prototype housing and by custom builders.

High Performance Walls

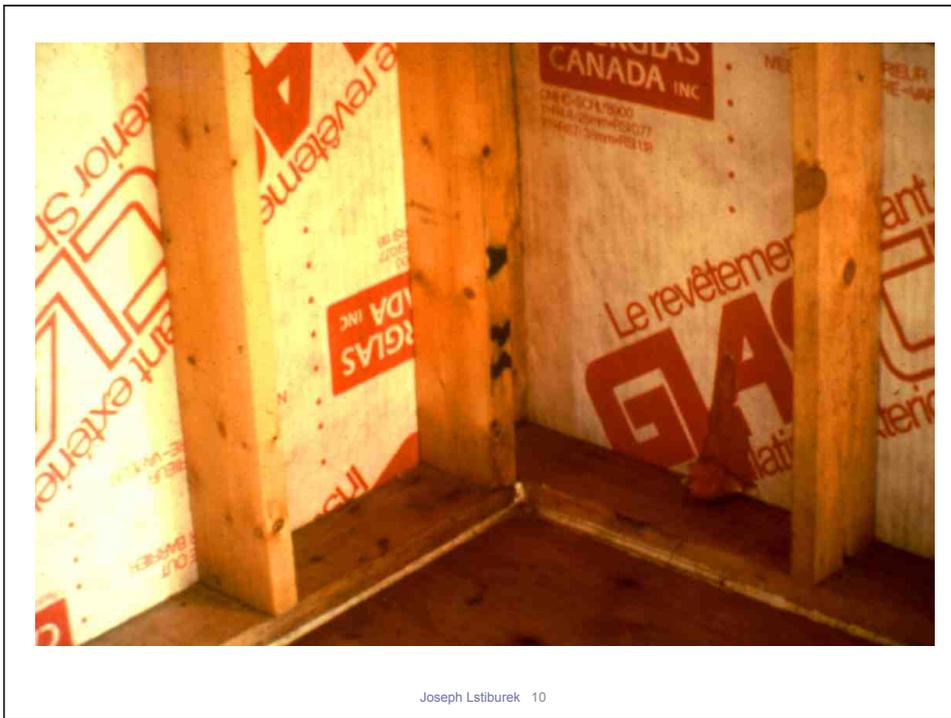
What do we want to achieve?

- Control heat flow
- Control air flow
- Durable, i.e., Control moisture
- Comfort (Mean Radiant Temperature)
- Constructable, i.e., can achieve quality installation
- Affordable

Advanced Framing



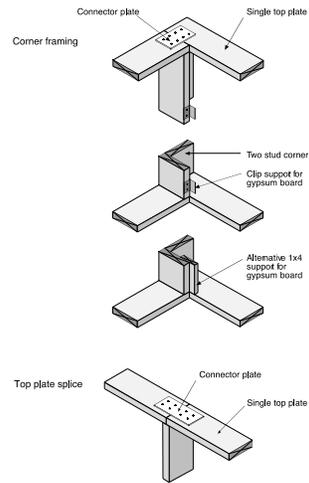
Joseph Lstiburek 8



Joseph Lstiburek 10

Advanced Framing System

- 2 Stud Corners



Joseph Lstiburek 11





Advanced Framing System

- Insulated headers
- No header necessary at non-bearing walls

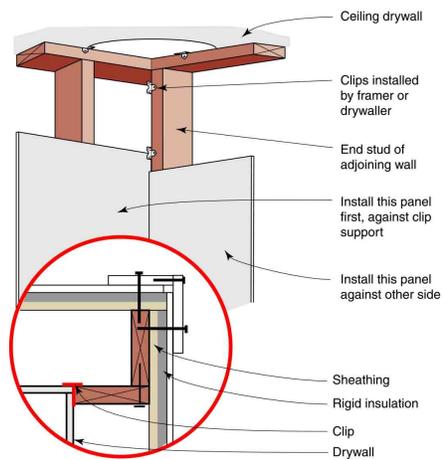


Joseph Lstiburek 14

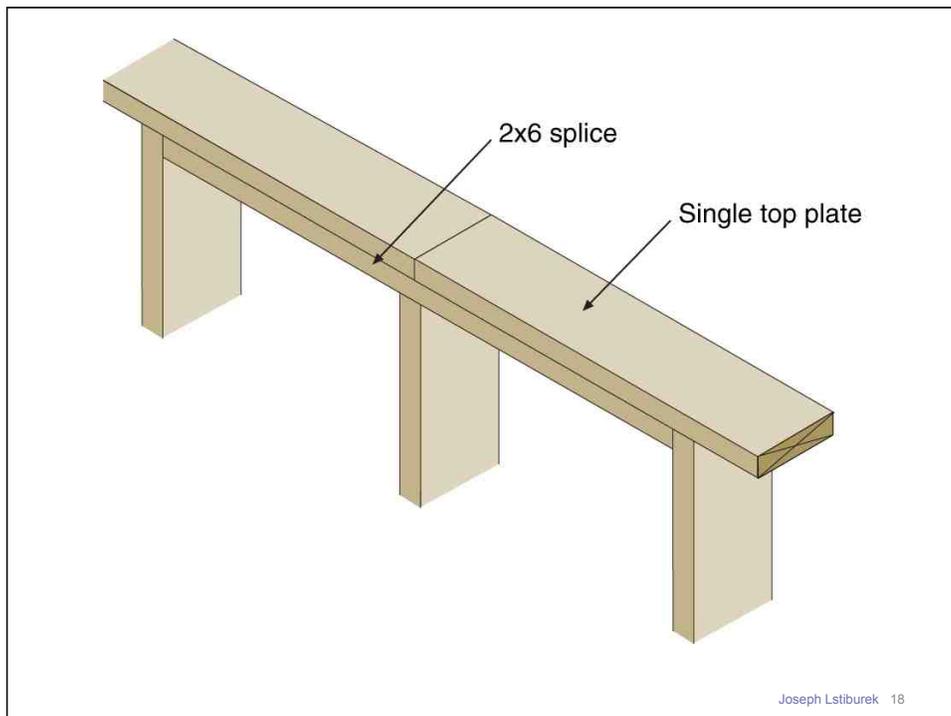
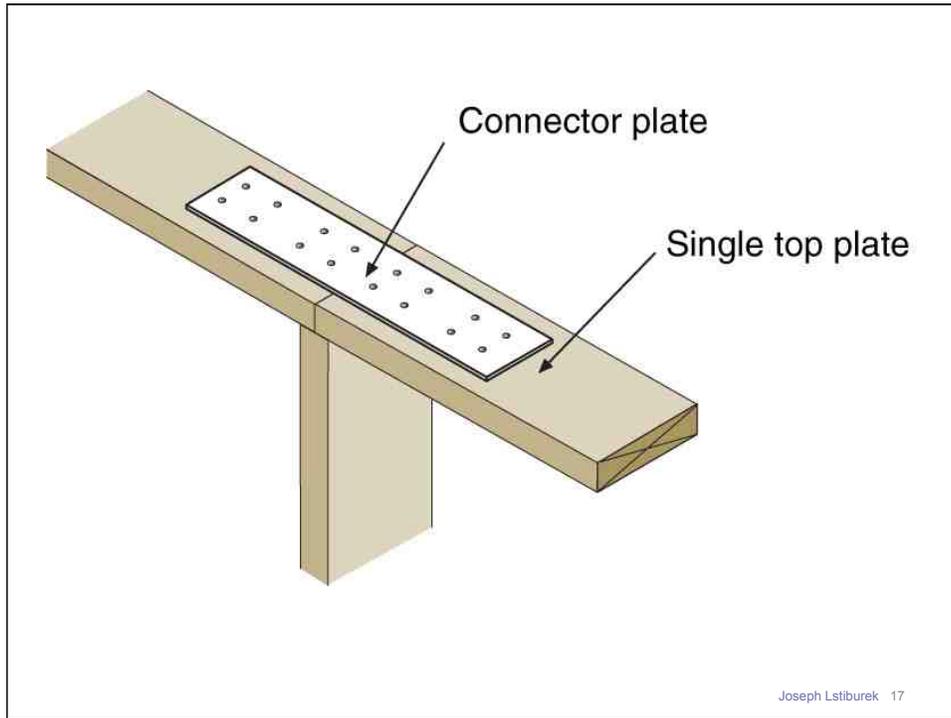


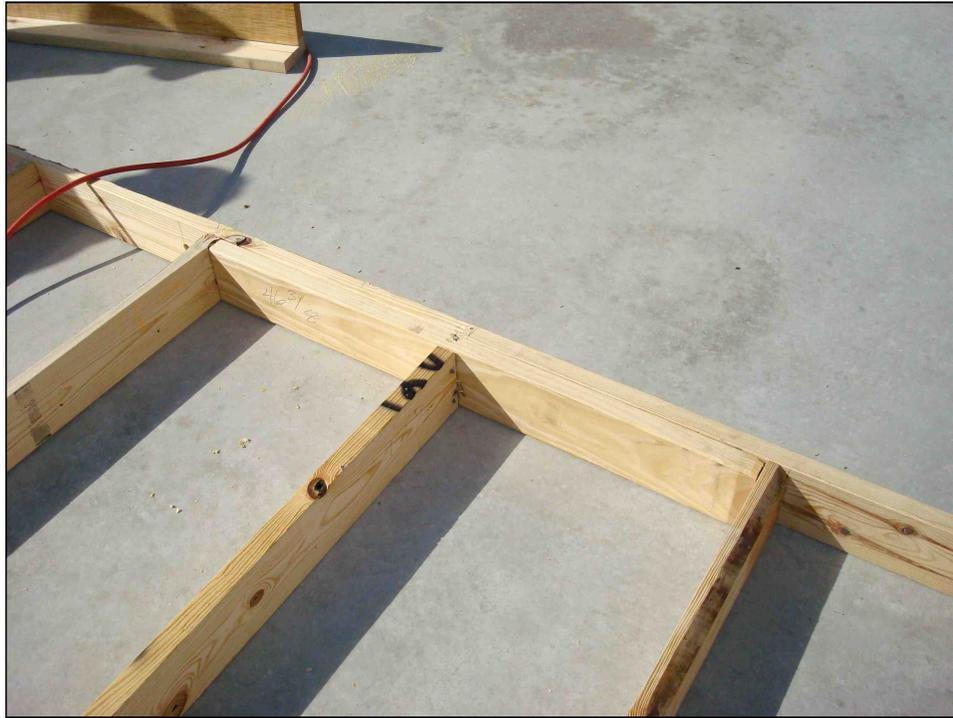
Advanced Framing System

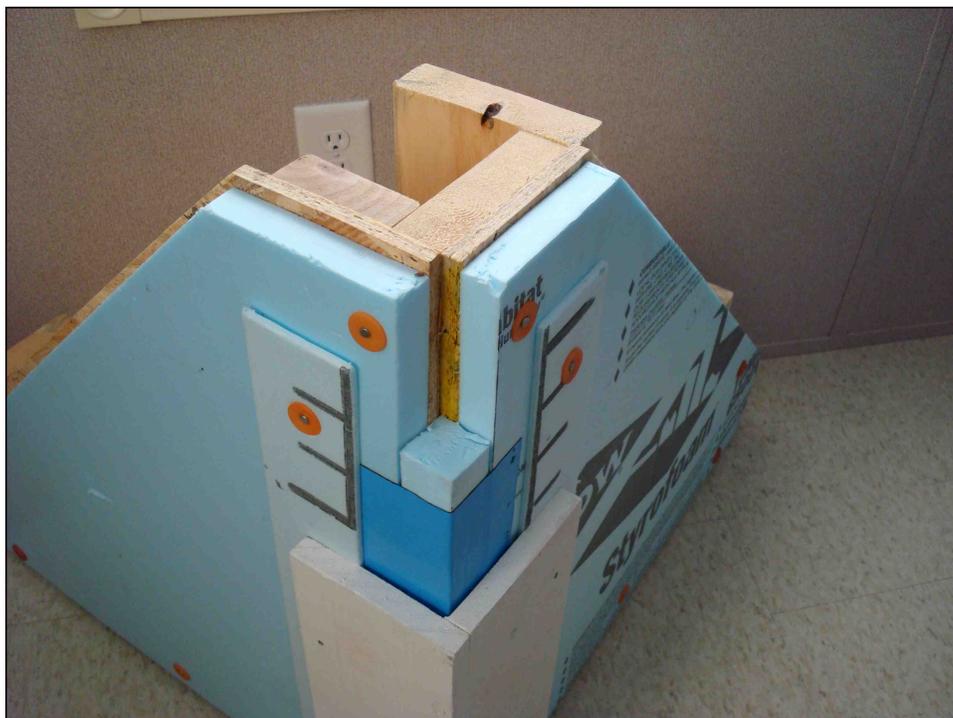
- Drywall clips allow for better installation with less drywall cracking

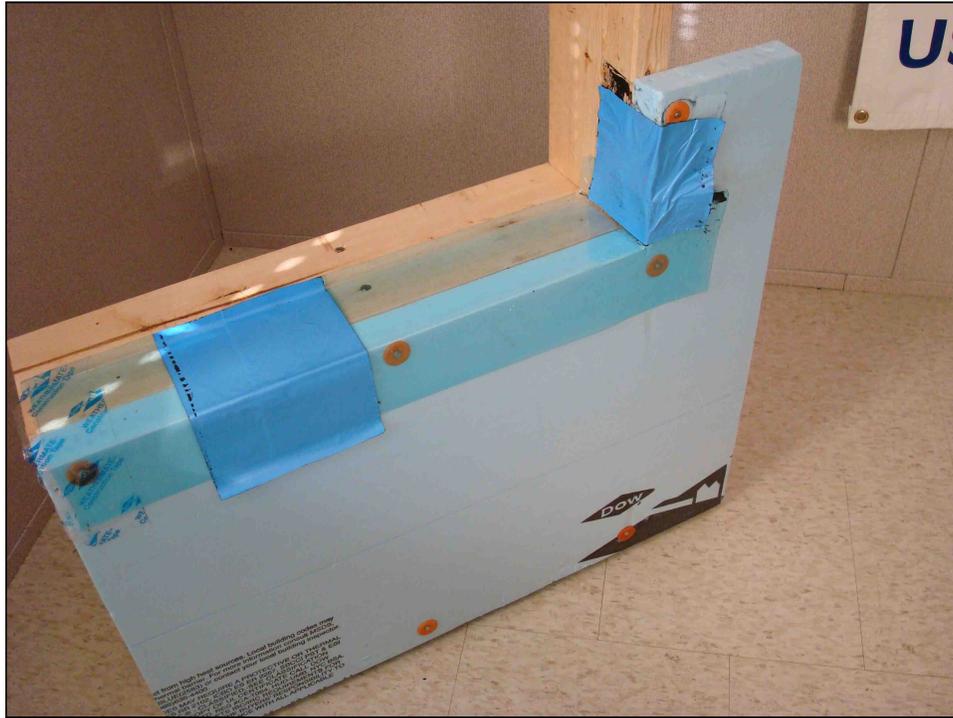


Joseph Lstiburek 16















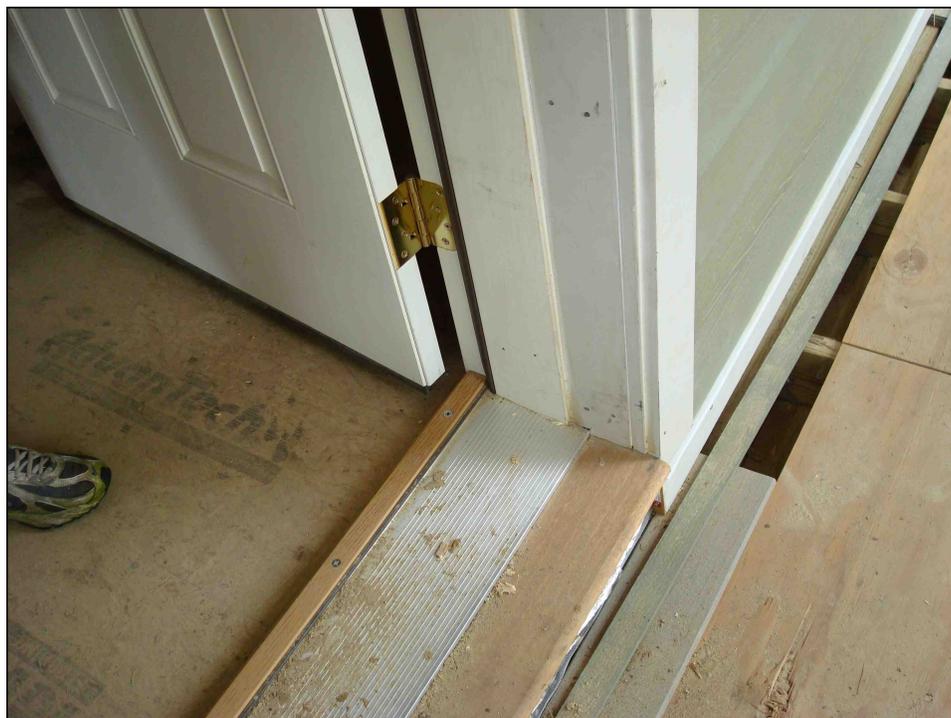
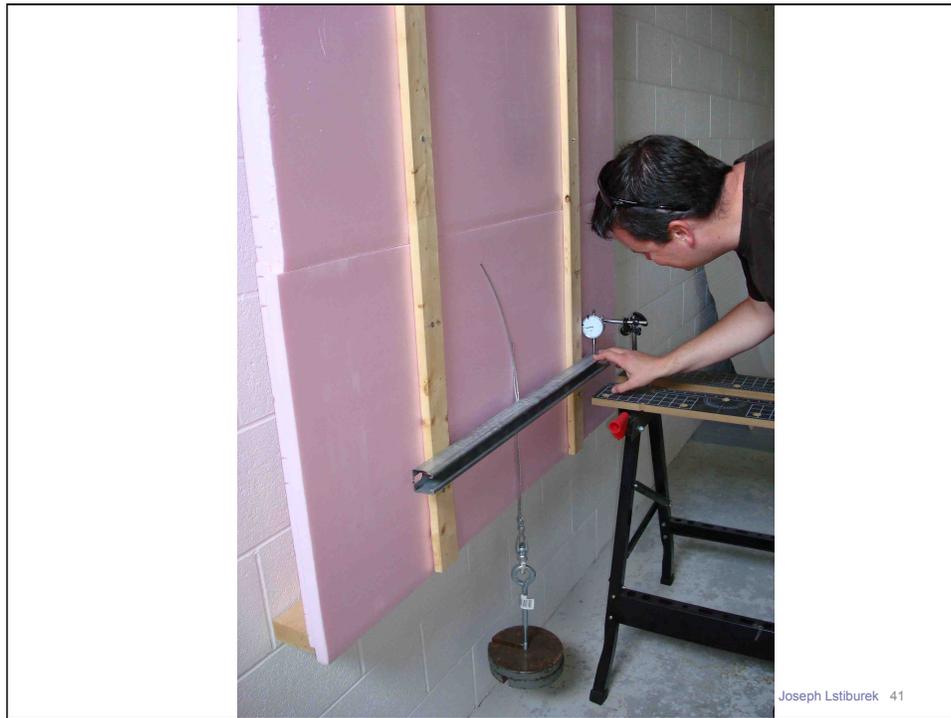




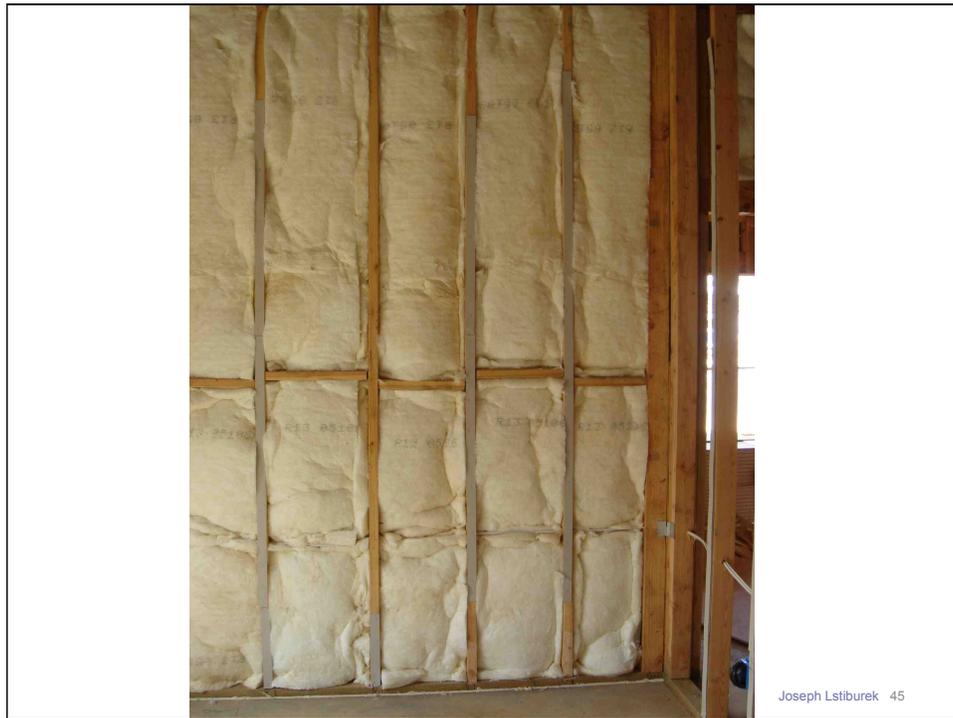
















Joseph Lstiburek 49



Joseph Lstiburek 50

Westford, MA – Barn Renovation



Building Science Corporation

Joseph Lstiburek 51



Building Science Corporation

Joseph Lstiburek 52



Building Science Corporation

Joseph Lstiburek 53



Building Science Corporation

Joseph Lstiburek 54



Building Science Corporation

Joseph Lstiburek 55



Building Science Corporation

Joseph Lstiburek 56



Building Science Corporation

Joseph Lstiburek 57



Building Science Corporation

Joseph Lstiburek 58



Building Science Corporation

Joseph Lstiburek 59



Building Science Corporation

Joseph Lstiburek 60



Building Science Corporation

Joseph Lstiburek 61

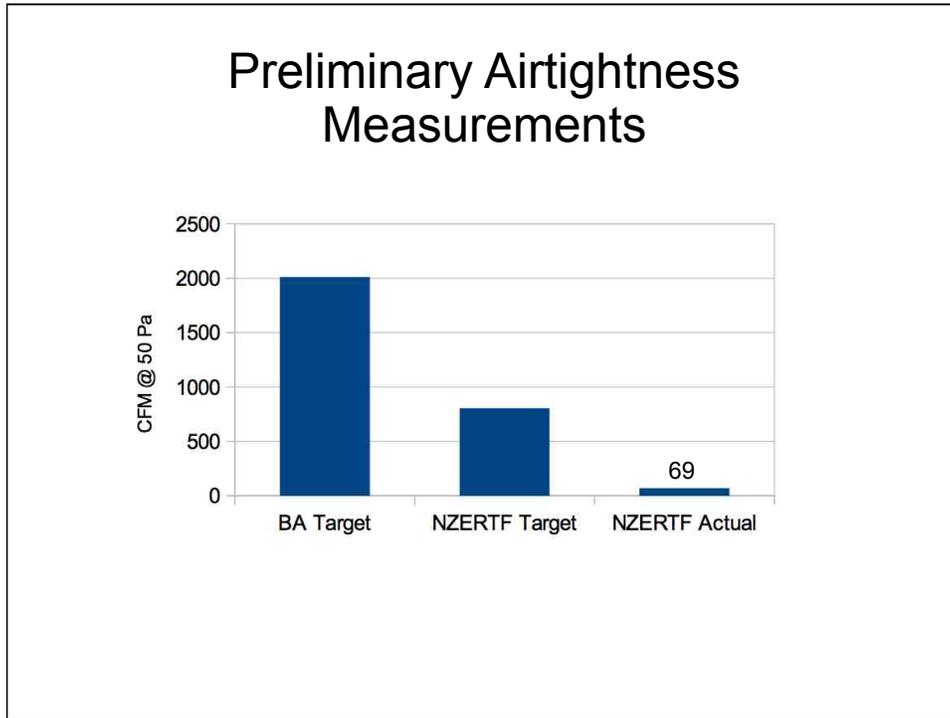


Building Science Corporation

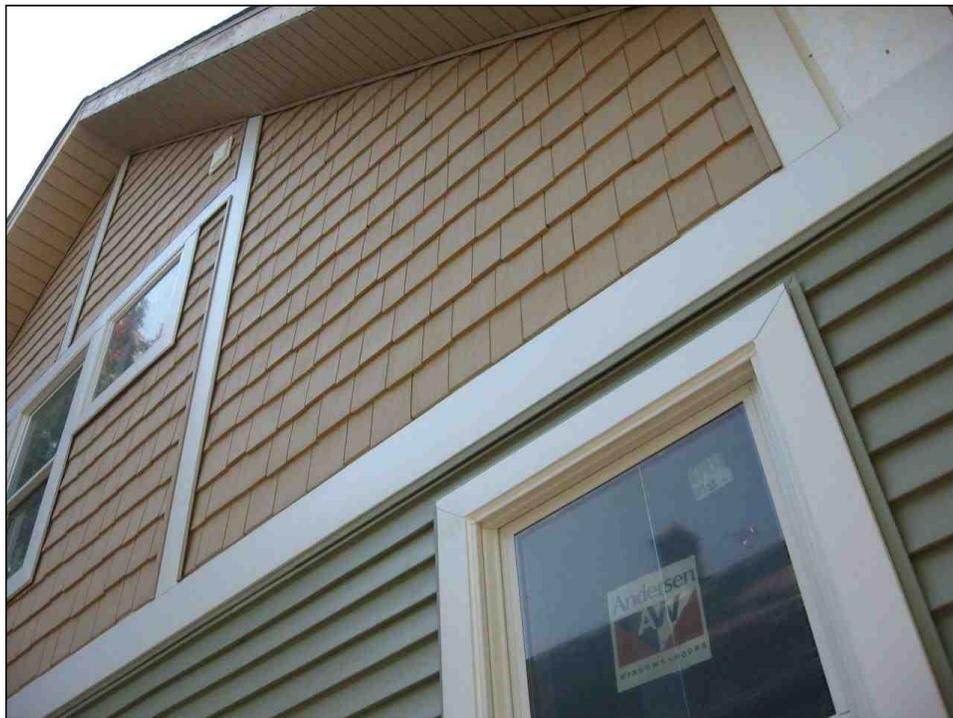
Joseph Lstiburek 62



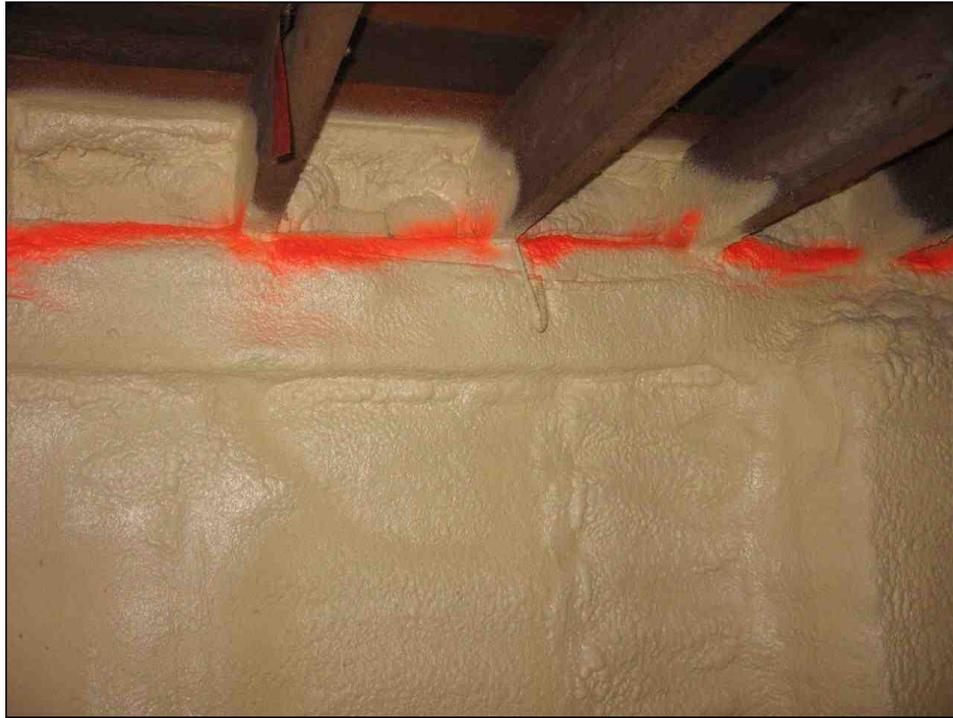


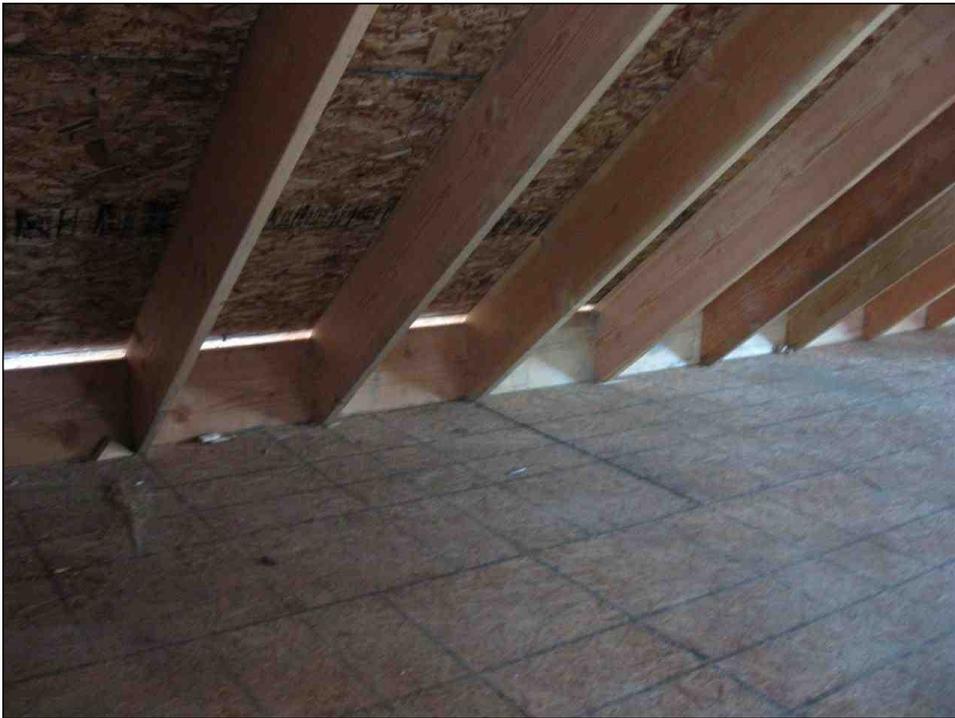














Questions?

Contact information:

- Alex Lukachko, Building Science Corporation
 - alex@buildingscience.com