



How Do We Retrofit the Tough Buildings?

Cape Cod Style and Masonry

Ken Neuhauser, Building Science Corporation

   Energy Efficiency & Renewable Energy

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29 April 2013

Cape Cod Style



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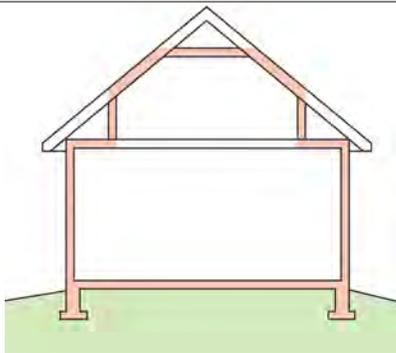


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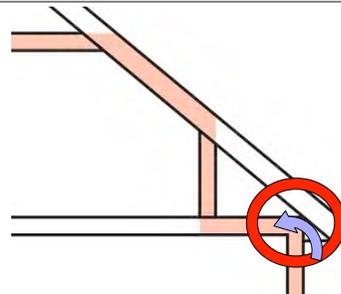


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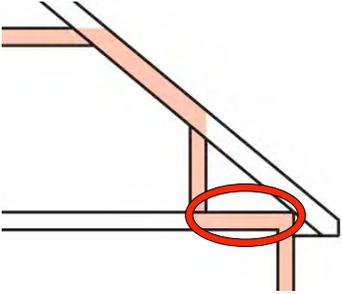


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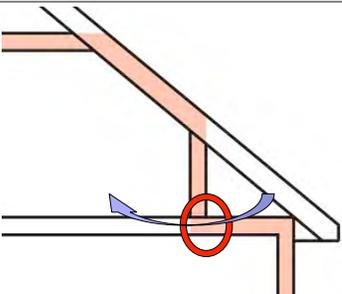
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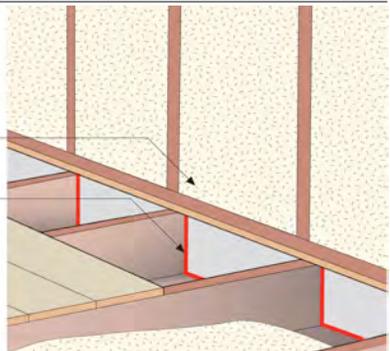
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Cape Cod Style – Knee Wall



Replace insulation in cavity

Continuous bead of sealant around entire perimeter of closure

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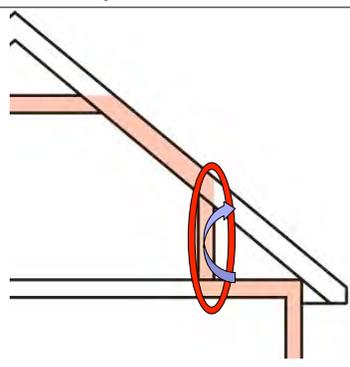
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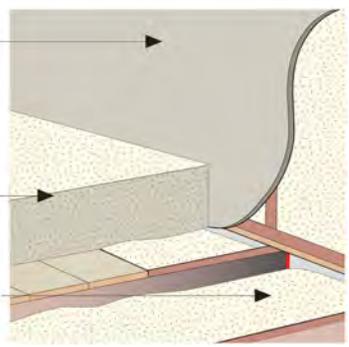
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Cape Cod Style – Knee Wall



Add insulating sheathing to kneewall framing

Additional insulation

Replace insulation in cavity

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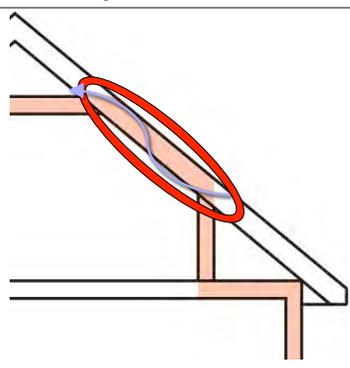
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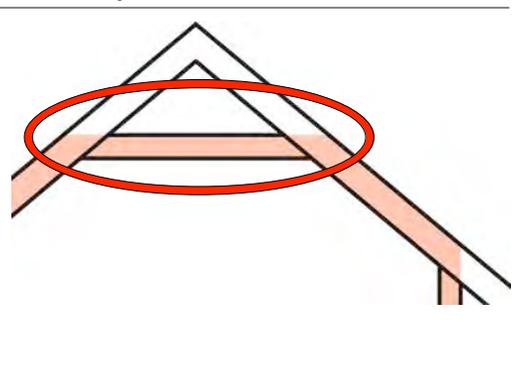
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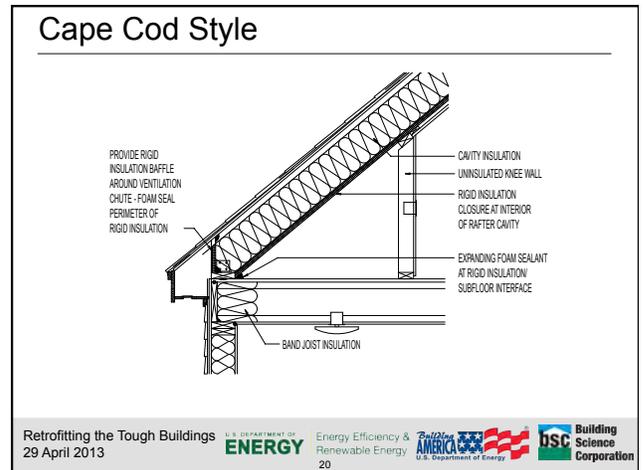
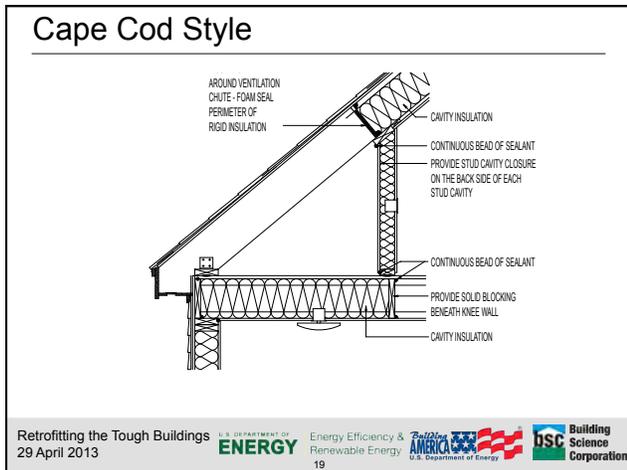
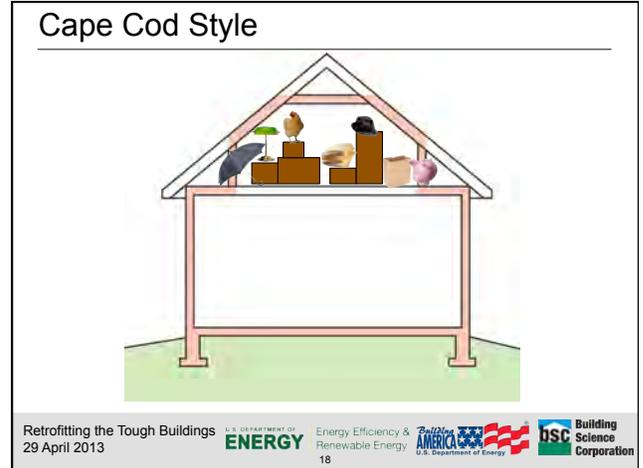
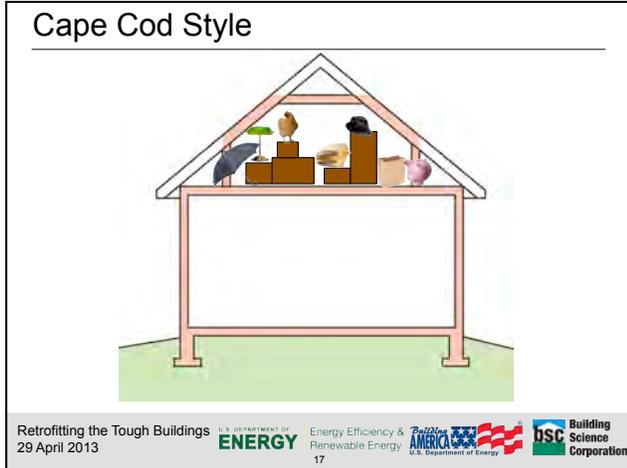
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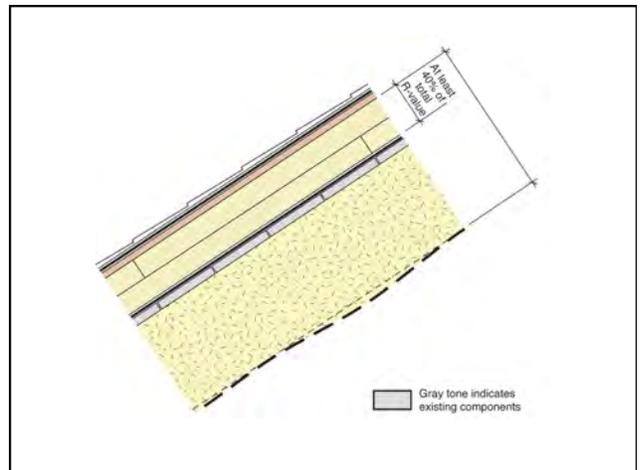
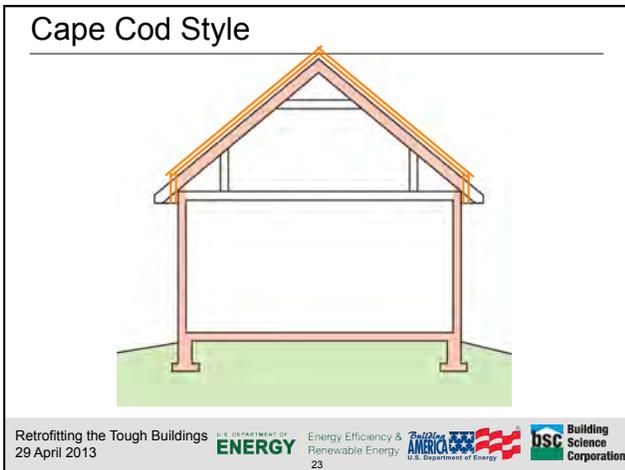
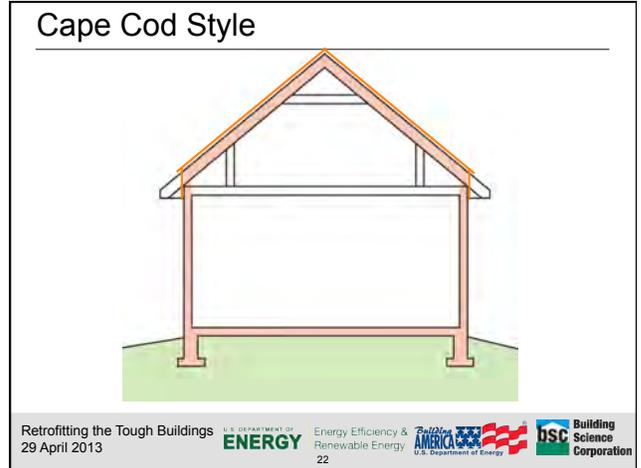
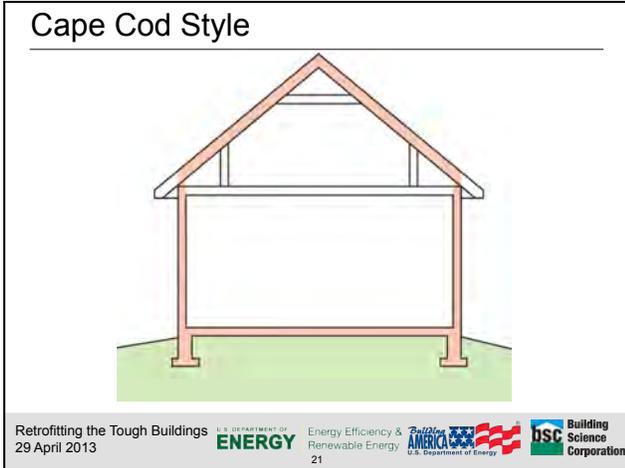
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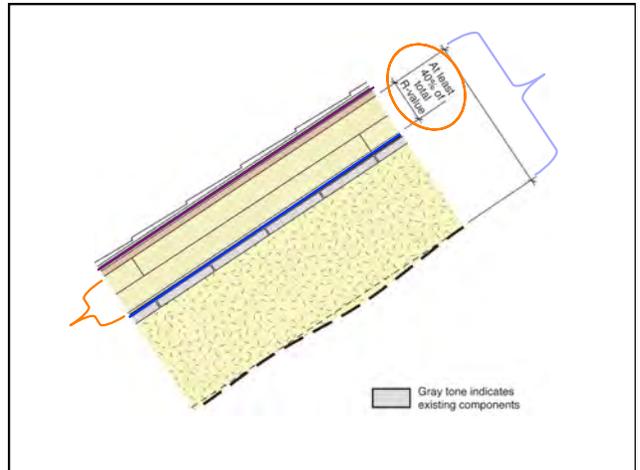
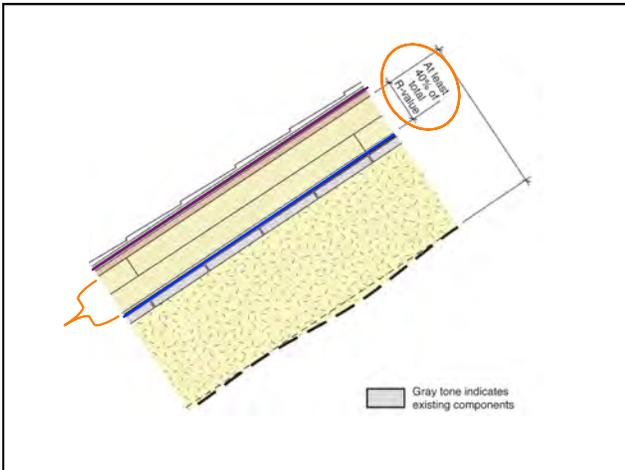
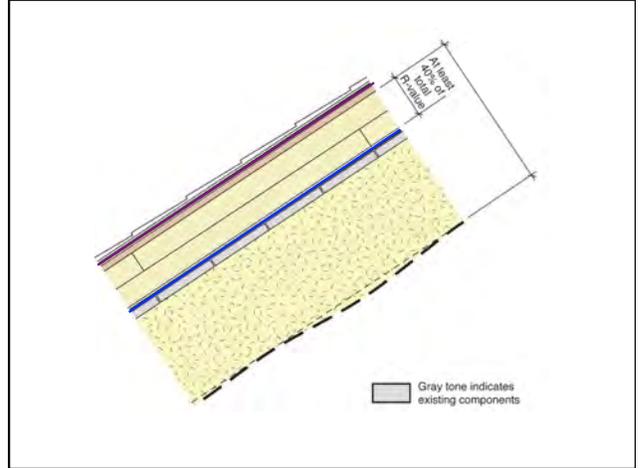
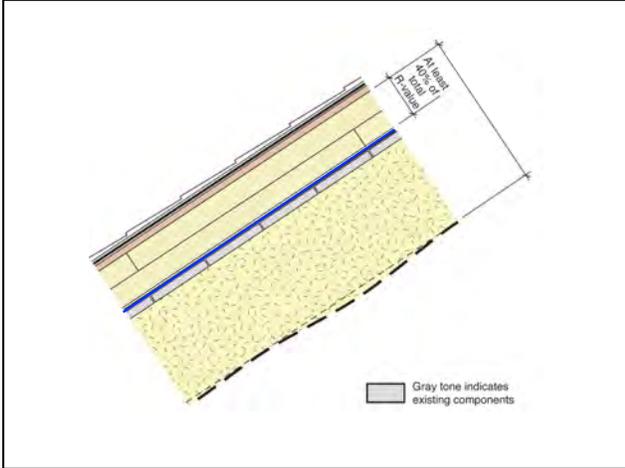
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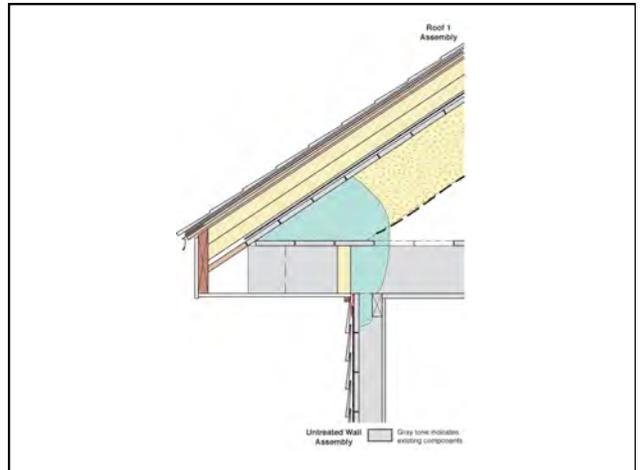
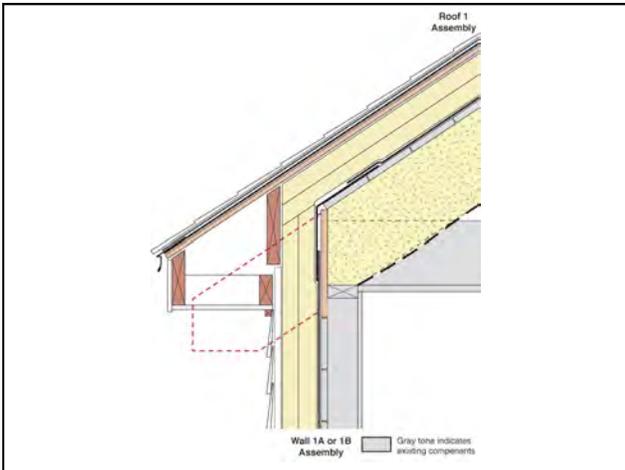
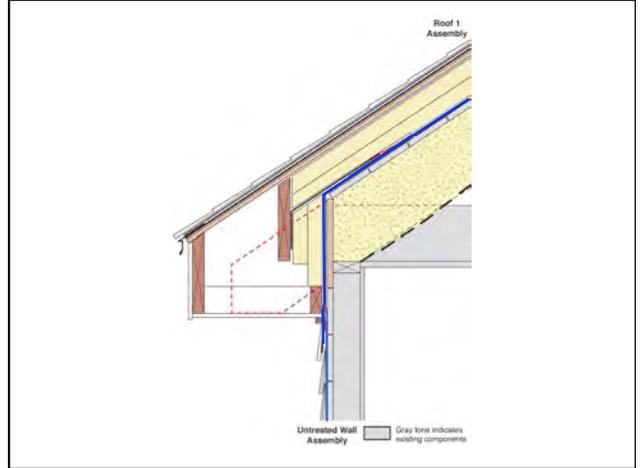
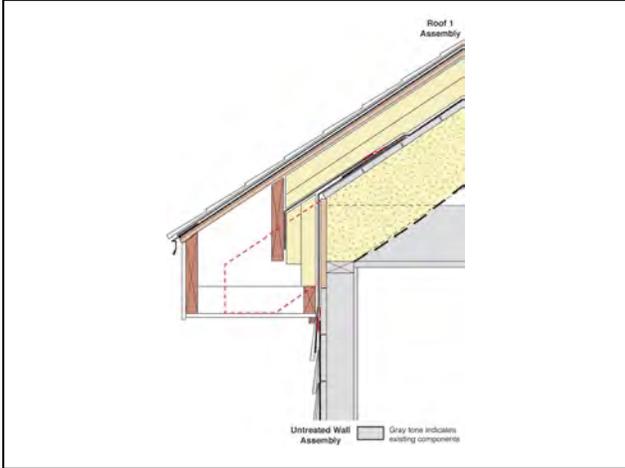
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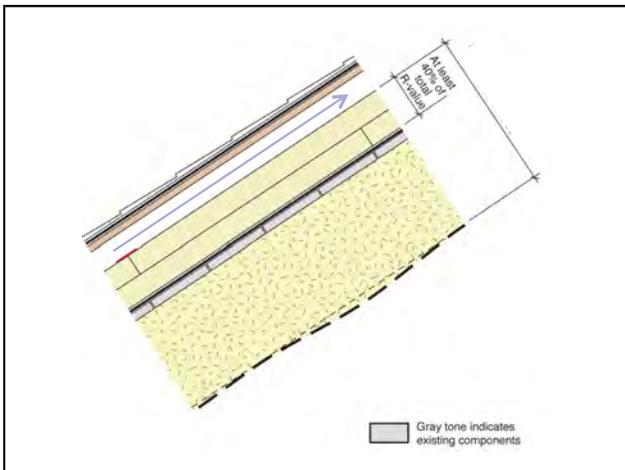
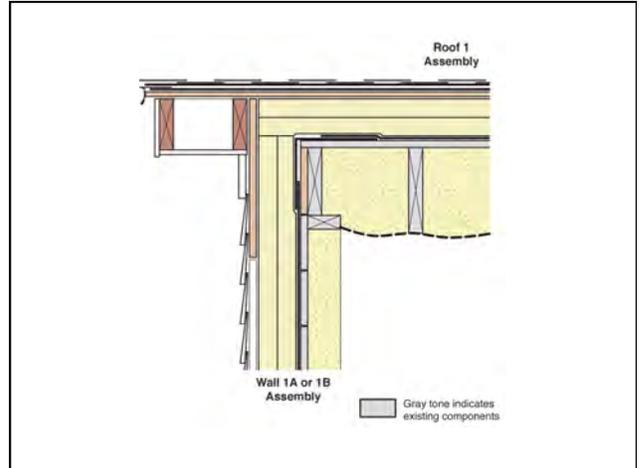
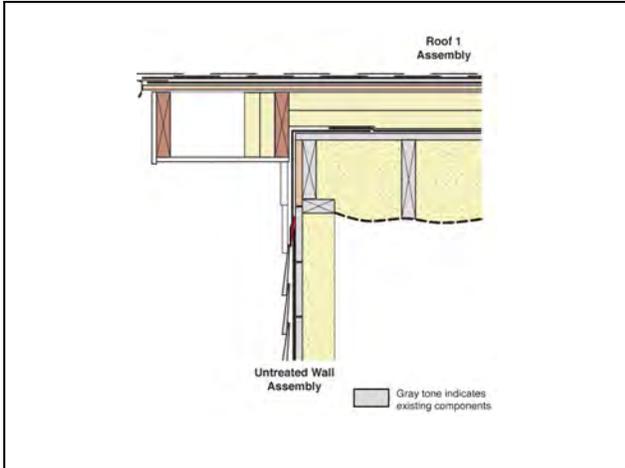
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Cape Cod Style – air control layer

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The photograph shows a Cape Cod style house under construction. The exterior walls are partially covered with a white Tyvek air barrier. The house has a gabled roof and a chimney. The surrounding area includes trees and a lawn.

Cape Cod Style – air control layer



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Cape Cod Style – insulating sheathing



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Cape Cod Style – insulating sheathing



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Cape Cod Style – ready for roofing



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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Cape Cod Style – overhang



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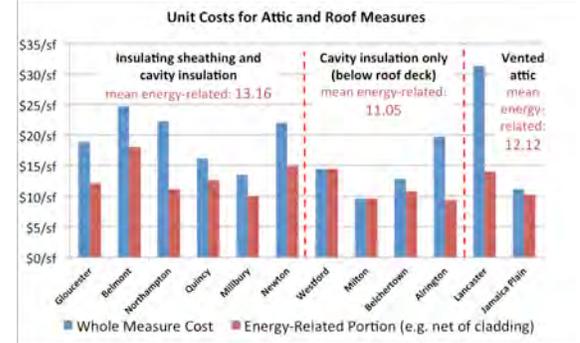
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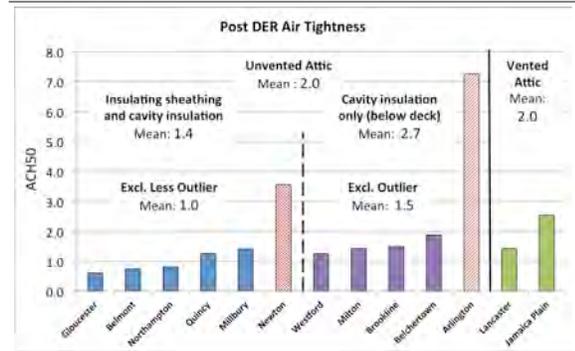
DER Pilot – cost data

- National Grid Deep Energy Retrofit Pilot Program (Massachusetts)
- R-60 target
- Data for 6 implementations
- Cost net of standard re-roofing
 - Mean: \$13.16 / s.f.
 - Range: \$10 – 18 / s.f.

DER Pilot – cost data



DER Pilot – performance data



Cape Cod Style – Before



Cape Cod Style – After



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RETROFIT BUILDER
GUIDE**

<https://www1.nationalgridus.com/DeepEnergyRetrofit-MA-RES>





**Initial Performance Results for
Massachusetts DER Pilot
Program**



Masonry Walls



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Masonry Walls

Section

Plan

- EXISTING MASONRY WALL STRUCTURE
- EXISTING INTERIOR FINISH
- 3/4" WOOD STRAPPING ATTACHED THROUGH RIB INSULATION TO WOOD FRAMING @16" O.C. VERTICAL
- 2x4 WOOD FRAMING @24" O.C. ATTACHED TO WALL WITH MASONRY FASTENERS @16" O.C. VERTICAL
- FIBER-CEMENT CLADDING FASTENED TO STRAPPING AS PER MANUFACTURER INSTRUCTIONS
- 2" POLYISOCYANURATE RIB INSULATION SEAMS OFFSET HORIZONTALLY AND VERTICALLY RELATIVE TO PREVIOUS LAYER
- 2" POLYISOCYANURATE RIB INSULATION SEAMS OFFSET HORIZONTALLY AND VERTICALLY RELATIVE TO PREVIOUS LAYER
- 1/2" POLYISOCYANURATE RIB INSULATION BETWEEN 2x4 WOOD FRAMING
- FULLY ADHERED AIR AND WATER-CONTROL MEMBRANE APPLIED OVER SURFACE OF EXISTING MASONRY

outside

inside

outside

inside

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CEDA Wx Implementation – cost data

- 2 Story (Average of 3 lowest bids):
 - \$14.43 / s.f. gross wall area
- Post implementation contractor estimate:
 - \$12.60 / s.f. gross wall area
- Above 2 stories (Average of 3 lowest bids):
 - \$25.31 / s.f. gross wall area
- Post implementation contractor estimate:
 - \$20.10 – 21.30 / s.f. gross wall area

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Masonry Walls – windows

Windows

- Flashing
- Flanking losses
(thermal bridges)
- Replacement

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Masonry Walls – windows

Windows

- Flashing
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(thermal bridges)
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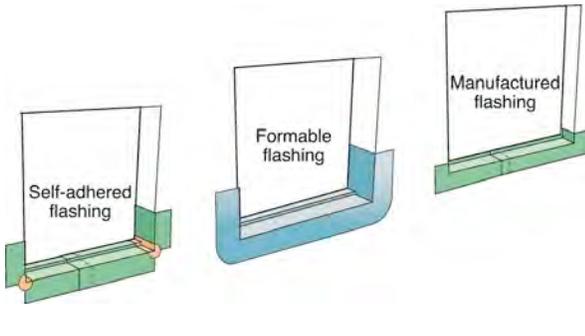
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Masonry Walls – windows



Self-adhered flashing

Formable flashing

Manufactured flashing

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Masonry Walls – windows



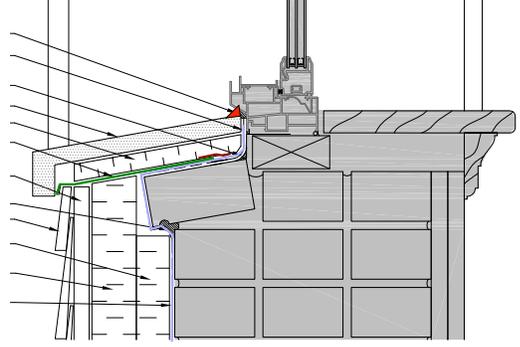
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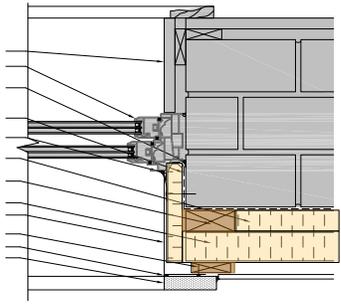
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Masonry Walls – windows

- Windows
 - Flashing
 - Flanking losses (thermal bridges)
 - Replacement



REPLACEMENT WINDOW JAMB DETAIL

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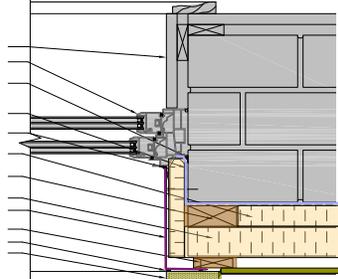
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Masonry Walls – windows

Windows

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REPLACEMENT WINDOW JAMB DETAIL

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Evaluation of Two CEDA Weatherization Pilot Implementations of an Exterior Insulation and Over-Clad Retrofit Strategy for Residential Masonry Buildings in Chicago

