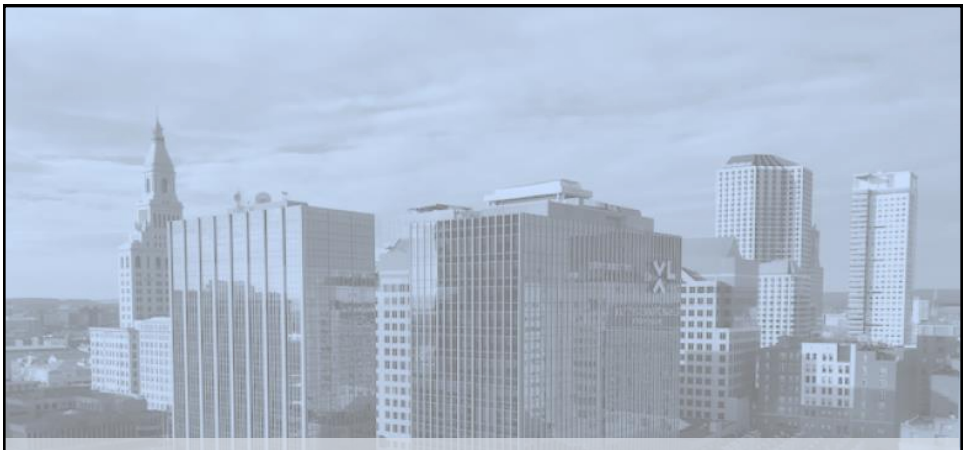
2020 Connecticut State Building and Fire Codes

Find the most current schedule at
https://portal.ct.gov/DASCodeChange

Completed: 2020 Amendments Drafted and Code Change Proposals Received

- 6/30/19 Committees/Work Groups Review
- 8/31/19 Final Drafts Developed
- 10/31/19 Drafts Reviewed
- 11/13/19 Codes and Standards Drafts Approval
- 2/29/20 Public Comment Period
- 5/31/20 Legislative Review/Approval
- 10/1/20 Code Takes Effect



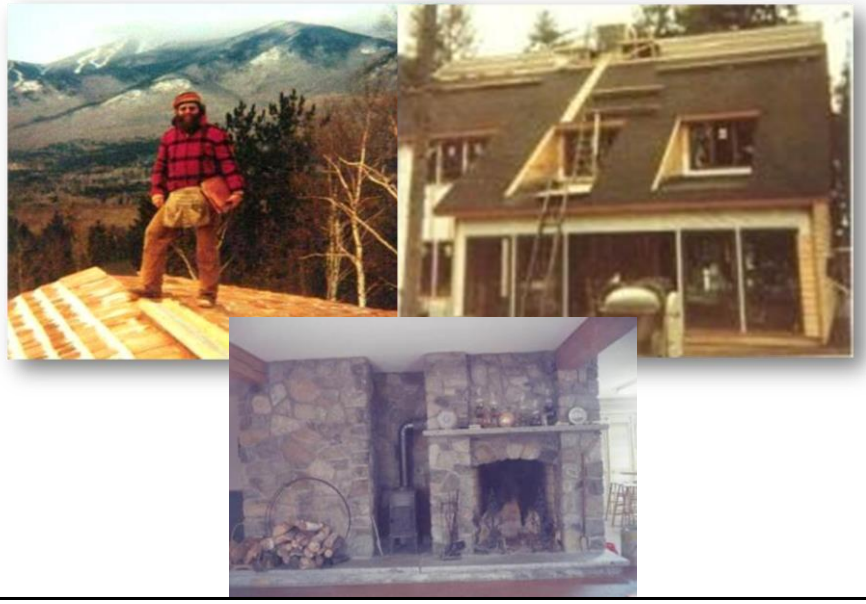
Residential Code Series – Building Exteriors and Energy Conservation Code

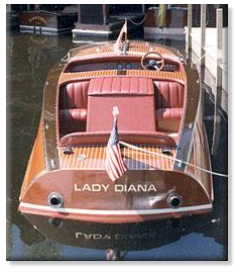
Fall 2019 Career Development Series

Michael C. DeWein

DAS Office of Education and Data Management

Introductions…





NEW ENERGY STORE

ALLIANCE TO SAVE ENERGY
Using less. Doing more.

Current/Past Code Cmtes.:

- ICC SEHPCAC
- ASHRAE 189
- NYS – Energy Technical
- USGBC
- MA BBRS Energy

NEW YORK STATE ENERGY OFFICE

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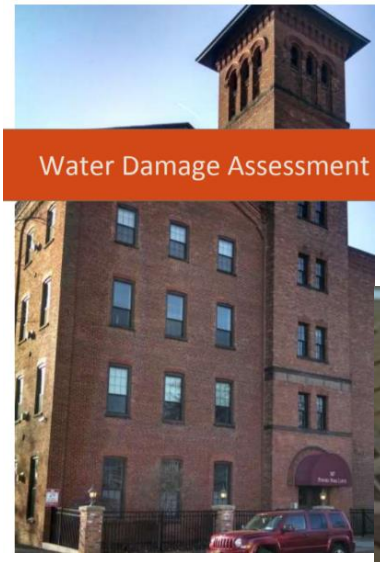
Before We Start…

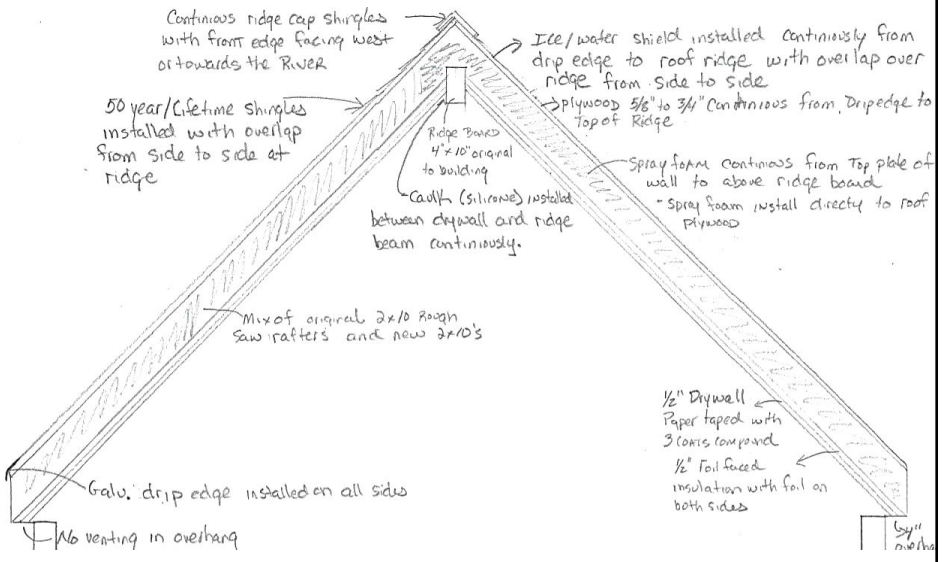
Is the Energy Code a Life Health Safety Code?

Yes…
No…
Maybe…

What Have We got Here?!



Might This Might Result in Structural Failure?!



Agenda

- **Review a case study project for Energy Code and Residential Code problem areas requirements**
- **Discuss required documentation and tools provided for Building Exteriors Plan Review and Site Inspections**
- **Conduct a Plan Review of our case study project**
- **Us Plan Review findings and compliance tools to prepare for a Site Inspection**
- **Conduct a mock Site Inspection of the project**

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Your Handouts

- **Project Plans**
- **RES*check* Reports**
- **Air Leakage/Insulation Installation Checklists for CT**
- **Manual J Report**

- **Do we want to use the Complete Energy Code checklists I developed, or just briefly review as a tool they can use if they want**

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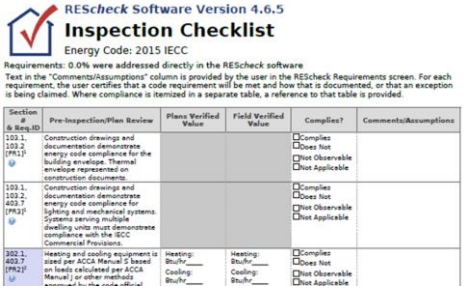
I – Plan Review

Documentation and Checklists



RES*check* Software Version 4.6.5

Inspection Checklist

Energy Code: 2015 IECC

Requirements: 0.0% were addressed directly in the REScheck software

Text in the "Comments/Assumptions" column is provided by the user in the REScheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

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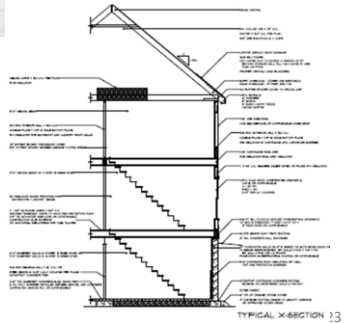

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Plan Review – Objectives

At the conclusion of this plan review section, participants should be able to:

- Evaluate plans, construction documents, manufacturers' installation instructions and REScheck reports to determine compliance with the 2015 IRC and IECC portions of the 2018 CT State Building Code.
- Identify key building exterior components including but not limited to house wraps, siding, insulation, flashing, roofing, walls, doors and window systems on plans and specifications.
- Determine compliance of design components of exterior walls, air sealing details, sealing protrusions, installed R-values of insulation, fenestrations, u-values, energy efficiency ratings of building, mechanical and ventilation systems.
- Develop inspection checklists for the building exteriors and energy conservation.

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Minimum Documentation

Documentation for Energy Code and Enclosure Permit Applications Residential 1 & 2 Family and MF < 3 Stories

Please provide the following documentation to demonstrate compliance with the CT Residential & Energy Code for any project you submit for a building permit:

- ☐ Drawings shall include full Energy Code compliance details and specifications (preferably on a single sheet) including but not limited to:
  - ☐ Attic, Walls, Foundation Insulation Specs
  - ☐ Window U-Value & Infiltration Specs
  - ☐ Air & Vapor Barrier Specs
  - ☐ Duct Sealing & Insulation Specs
  - ☐ Heating Piping Insulation Specs
  - ☐ Water Mitigation and Drainage Specs
  - ☐ Heating & Cooling Systems Specs
  - ☐ Service Water Heating Specs
  - ☐ Mechanical Ventilation System Specs
  - ☐ Elec Power & Lighting System Specs
  - ☐ Programmable Thermostat Specs
  - ☐ WRB and Flashing
- ☐ Statement on Drawing documenting that the Design meets the Energy Code per ECCCNYS Section R103.2.2
- ☐ Energy Code Compliance Path Documentation (One of the following is required):
  - ☐ Prescriptive Approach including All Compliance Documentation (R402.1)
  - ☐ Total UA Alternative (R402.1.5 - REScheck reports if those methods are used for Compliance)
  - ☐ Simulated Performance Alternative (R405 - Statement from a HERS Rater outlining Compliance with Performance Approach including sufficient reports to demonstrate Mandatory Requirements have been met)
  - ☐ Energy Rating Index (R406 - Statement from a HERS Rater outlining Compliance with the ERI method including sufficient reports to demonstrate Mandatory Requirements have been met
- ☐ Manual J&S Sizing Documentation

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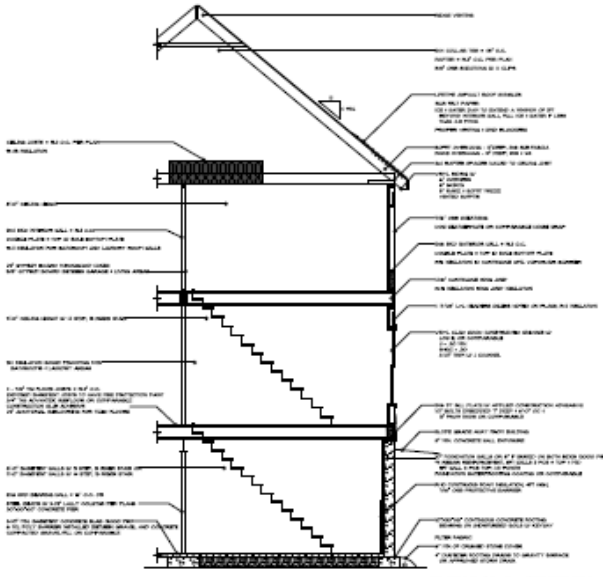
Documentation and Checklists – Examples
Enclosure Sections



TYPICAL X-SECTION

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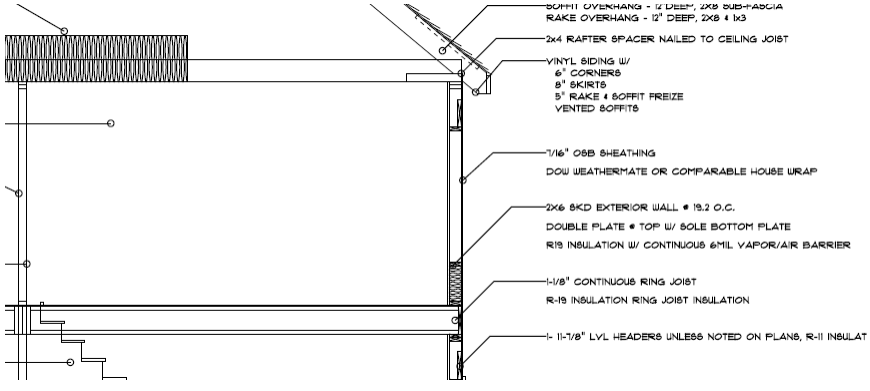
Documentation and Checklists – Examples
Enclosure Sections



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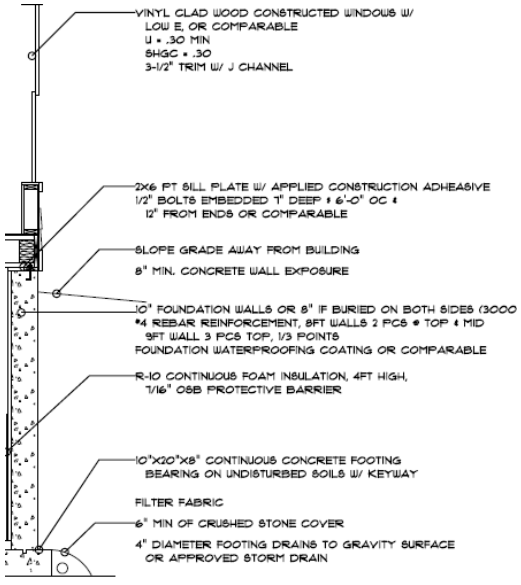
Documentation and Checklists – Examples
Enclosure Sections



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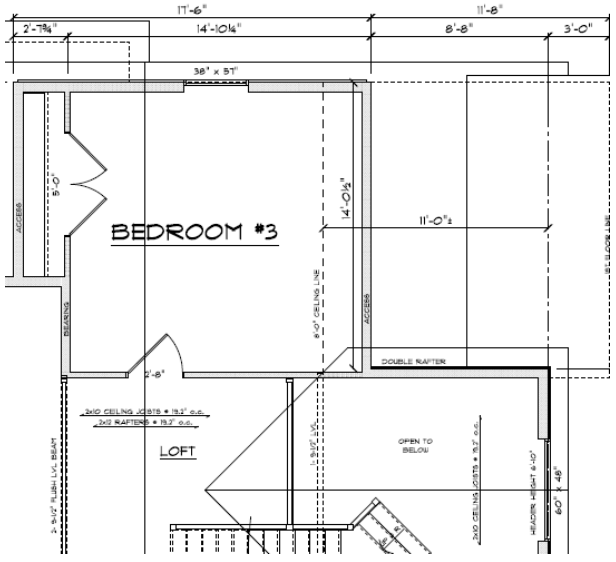
Documentation and Checklists – Examples
Enclosure Sections

For:

- Area Takeoffs Check
- Window door Takeoffs
- Additional Details



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Documentation and Checklists – Examples
RES*check* Reports

REScheck Software Version 4.6.5

Compliance Certificate

Project Unit #* Castle Heights

Energy Code:	2015 IECC
Location:	Cheshire, Connecticut
Construction Type:	Single-family
Project Type:	New Construction
Orientation:	Bldg. faces 0 deg. from North
Conditioned Floor Area:	4,743 ft2
Glazing Area	7%
Climate Zone:	5 (5792 HDD)
Permit Date:	
Permit Number:	

Construction Site:
x
Cheshire, CT 04410

Owner/Agent:

Designer/Contractor:
Johnny Carrier P.E.
Carrier Group, Inc.
68A S Canal St
Plainville, CT 06062
(860) 752-6805
JohnnyC@ByCarrier.com

Compliance: Passes using UA trade-off

Compliance: **3.8% Better Than Code** Maximum UA: **469** Your UA: **451**

The % Better or Worse Than Code Index reflects how close to compliance the house is based on code trade-off rules. It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	U-Factor	UA
Floor 1: All-Wood Joist/Truss:Over Outside Air	27	38.0	0.0	0.026	1
Ceiling 1: Raised or Energy Truss	1,826	25.0	24.0	0.020	37
Ceiling 2: Raised or Energy Truss	89	38.0	2.5	0.024	2
Wall 1: Wood Frame, 24" o .c. Orientation: Front	843	19.0	0.0	0.059	43

Documentation and Checklists – Examples
RES*check* Reports

RES*check* Software Version 4.6.5

Inspection Checklist

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2015 IECC Energy Efficiency Certificate

Insulation Rating	R-Value
Above-Grade Wall	19.00
Below-Grade Wall	0.00
Floor	38.00
Ceiling / Roof	49.00
Ductwork (unconditioned spaces):	____

Glass & Door Rating	U-Factor	SHGC
Window	0.27	0.29
Door	0.17	

Heating & Cooling Equipment	Efficiency
Heating System:_____	____
Cooling System:_____	____
Water Heater:_____	____

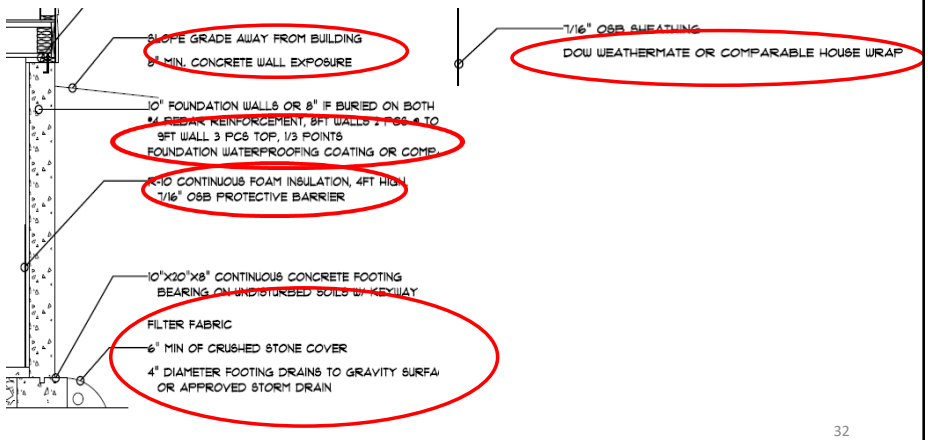
Name:_____ Date:_____

Documentation and Checklists

Docs Exterior for CT Residential Plan Review

Plans - Exterior/Enclosure Features

Materials Spec Sheets – Flashing, WRB, etc.



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Documentation and Checklists – Examples

Manual J&S…

Rhvac - Residential & Light Commercial HVAC Loads
FOR EDUCATIONAL USE ONLY

Elite Software Development, Inc. ,Unit #66 Page 1

Project Report

General Project Information

Project Title:	Unit #66
Designed By:	Rusty Nall
Project Date:	02-16-18
Company Name:	ABC Builders LLC
Company Representative:	Rusty Nall
Company Address:	123 Main St.
Company City:	Any Town CT
Company Phone:	555-733-6673
Company Fax:	
Company E-Mail Address:	
Company Website:	

Design Data

Reference City:	Hartford, Connecticut	
Building Orientation:	Front door faces North	
Daily Temperature Range:	Medium	
Latitude:	41	Degrees
Elevation:	19	ft.
Altitude Factor:	0.999	

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	7	6.1	n/a	n/a	70	n/a
Summer:	88	73	49%	50%	70	44

Check Figures

Total Building Supply CFM:	871	CFM Per Square ft.:	0.196
Square ft. of Room Area:	4,446	Square ft. Per Ton:	2,345
Volume (ft³):	27,529		

Building Loads

Total Heating Required Including Ventilation Air:	36,989 Btuh	36.989	MBH
Total Sensible Gain:	19,143 Btuh	84	%
Total Latent Gain:	3,604 Btuh	16	%
Total Cooling Required Including Ventilation Air:	22,747 Btuh	1.90	Tons (Based On Sensible + Latent)

Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.

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Documentation and Checklists – Examples
Air Leakage and Insulation Installation Checklist (cite table)

Residential Air Leakage and Insulation Installation Checklist
2018 CT Residential Energy Code
Table 402.4.1.1 (check citation)

Date: _____ Name of Evaluator(s): _____

Building Name & Address: _____ Conditioned Floor Area: _____ ft²

Building Contact: Name: _____ Phone: _____ Email: _____

Compliance Approach: ☐ Prescriptive (402.1.2 or 402.1.3) ☐ UA Trade-off (402.1.4) ☐ Building Performance (405) ☐ REScheck ☐ ERI Method (R406)

State: _____ Jurisdiction: _____

Building Type: 1- and 2-Family, Detached: ☐ Single Family ☐ Modular ☐ Townhouse
Multifamily: ☐ Apartment ☐ Condominium

Project Type: ☐ New Construction ☐ Addition to existing building ☐ Existing building renovation

COMPONENT	CRITERIA[a]	PLAN REVIEW			SITE INSPECTION		
		Y	N	N/A	Y	N	N/A
1. Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope.	☐	☐	☐	☐	☐	☐
	Exterior thermal envelope contains a continuous air barrier.	☐	☐	☐	☐	☐	☐
	Breaks or joints in the air barrier shall be sealed.	☐	☐	☐	☐	☐	☐
	Air permeable insulation shall not be used as a sealing material.	☐	☐	☐	☐	☐	☐
2. Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.	☐	☐	☐	☐	☐	☐
	Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	☐	☐	☐	☐	☐	☐
3. Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.	☐	☐	☐	☐	☐	☐
	The junction of the top plate and top of exterior walls shall be sealed.	☐	☐	☐	☐	☐	☐
	Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.	☐	☐	☐	☐	☐	☐
	Knee walls shall be sealed.	☐	☐	☐	☐	☐	☐
4. Windows, skylights and doors	The space between window/door jambs and framing, and skylights and framing, shall be sealed.	☐	☐	☐	☐	☐	☐
5. Rim joists	Rim joists shall be insulated and include the air barrier.	☐	☐	☐	☐	☐	☐
6. Floors (including built-over garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking.	☐	☐	☐	☐	☐	☐
	The air barrier shall be installed at any exposed edge of insulation.	☐	☐	☐	☐	☐	☐

Plan Review
Exterior/Enclosure Features and the IRC
Enclosure Moisture Mitigation

1. **Water and Moisture Mitigation – All work together!**
2. **Foundations**
3. **Foam Plastic Insulation**
4. **Flashing – the Good, Bad and the Ugly, Window and door Penetrations**
5. **Closing the Holes – Water and Infiltration**
6. **WRBs, and coordinating with Building systems**

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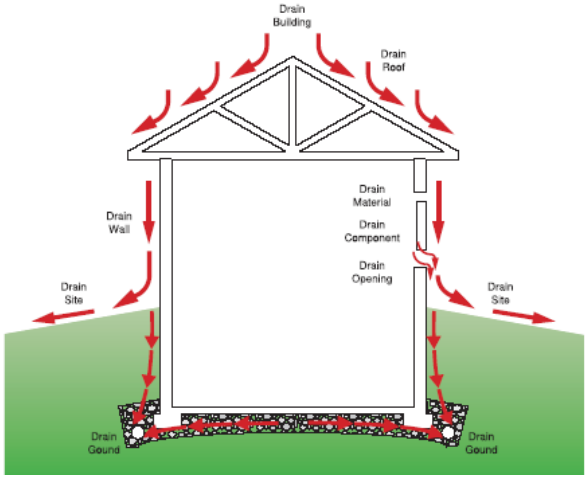
Exterior/Enclosure Features and the IRC

Water and Moisture Mitigation - Making it all work together

Everything Has to Work!



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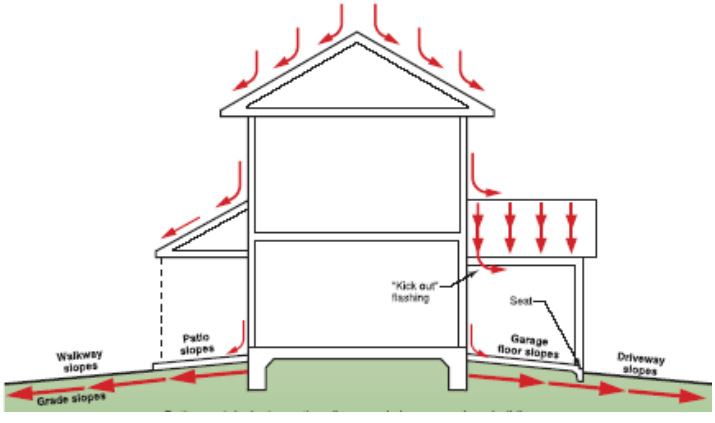
Exterior/Enclosure Features and the IRC

Water and Moisture Mitigation - Making it all work together

Everything!



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Some of the Requirements, "Barriers"

Vapor Retarders

Energy – Chapter 4

- Energy Code – Chapter 402.1.1, Referencing IRC R702.7
  Vapor retarder required on winter warm side… I, II, or III

ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR:
5	Vented cladding over OSB Vented cladding over Plywood Vented cladding over Fiberboard Vented cladding over Gypsum Insulated sheathing with *R*-value > 5 over 2 × 4 wall Insulated sheathing with *R*-value > 7.5 over 2 × 6 wall
6	Vented cladding over Fiberboard Vented cladding over Gypsum Insulated sheathing with *R*-value > 7.5 over 2 × 4 wall Insulated sheathing with *R*-value > 11.25 over 2 × 6 wall

- Exempt in Zone 4, MANY Improvements

Vapor Retarders
Residential – Chapter 3

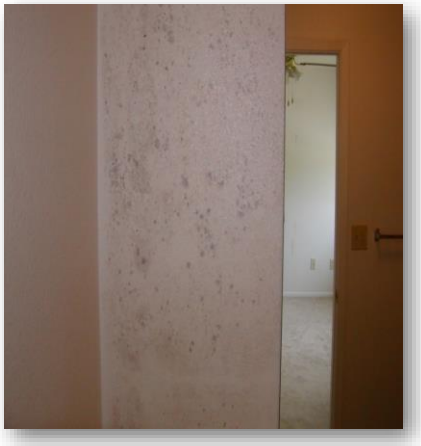
- Residential Code – Section R702.1 “Moisture Vapor Retarder”
  - Removed from Energy
  - Charlotte 2009 Version
- Intent of Code – Slow Water Vapor Migration by Diffusion
- Type I a BAD idea wherever A/C used, especially Central

Vapor Retarders

- Example:
  Poly Vapor Retarder
  BE CAREFUL!!

- Example:
  Kraft-Faced Vapor Retarder

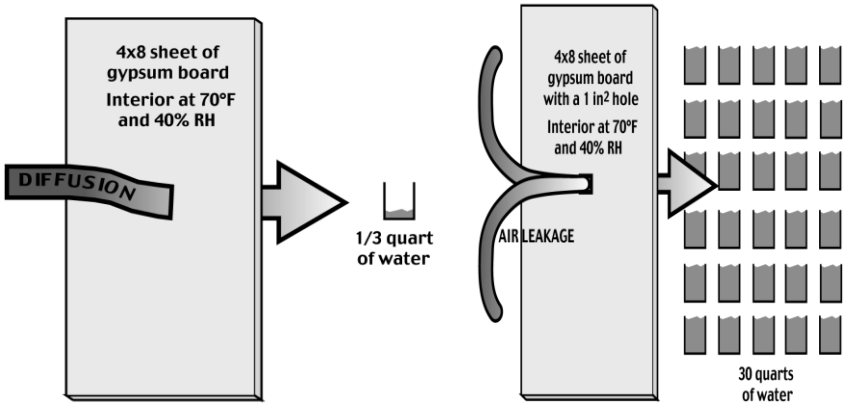
Incorrect Combination of Materials



Physics - Second Law of Thermo- Dynamics States:

- Air Moves From ***High*** to ***Low*** Pressure.
- Heat Moves From ***Warm*** to ***Cold***.
- Moisture Moves From ***Warm*** to ***Cold*** AND From ***Wet*** toward ***Dry***.
- Stuff Rolls Down Hill! (The DeWein Corollary…)

Diffusion



EEBA BFG

Vapor Retarders - Best Practice

- Match the Wall Materials to Climatic and other Design conditions
- Do we want a Poly Vapor Retarder where we are both heating and cooling the house?
- Do we need a Vapor Retarder in Walls that are blown with Foam?
- What do we do for Wet Spray Cellulose in Walls WRT Vapor Retarder?
- Alternate ("Smart") Vapor Retarders?

Representative Vapor Permeability Info

Material	Dry Cup	Wet Cup	Comments
Plywood	.75	3.5	Semi-permeable
OSB	.75	2	Semi-
Fiberboard (AI)	14.5	15	Permeable
Thermo Ply	0.5	0.6	impermeable
XPS	1	1	Semi (but with skin, im-)
EPS	5	5	Semi-
6-mil poly	.06	.06	Impermeable
Kraft paper	1	>>1?	Semi- (variable)
MemBrain™	1	10+	Variable, by design
Tyvek®	14	?	permeable
Latex paint (primer + 1 coat)	3.6	6	Semi-

Smart Vapor Retarders

A Water Management Problem?

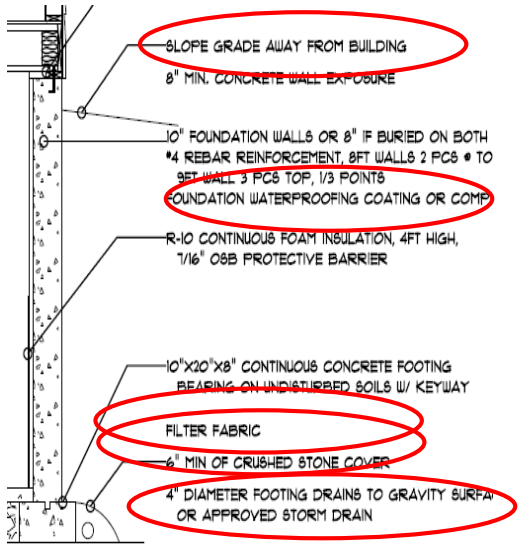
Water Management (Drainage Plane)
R700

- Energy code – Only deals with Vapor Retarder requirement – does it need more? YES!
- Residential Code Section 703 – Exterior Covering
  - 703.1 – Intent to prevent moisture from getting into wall
  - 703-2 – Weather –resistant sheathing paper or material tested to ASTM D 226 (Housewraps, other building papers)
  - ONLY required under Brick and Stone veneer
  - This will be changing in future, in ’06 to include Hard Board lap and panel siding, soon for all sidings.
    - 703.7.5 and .8 - Flashing required, vague around siding other than Stone or Brick
  - Required around openings, doors, windows, fairly vague

Exterior/Enclosure Features and the IRC:

Foundations and Moisture/Water – R406

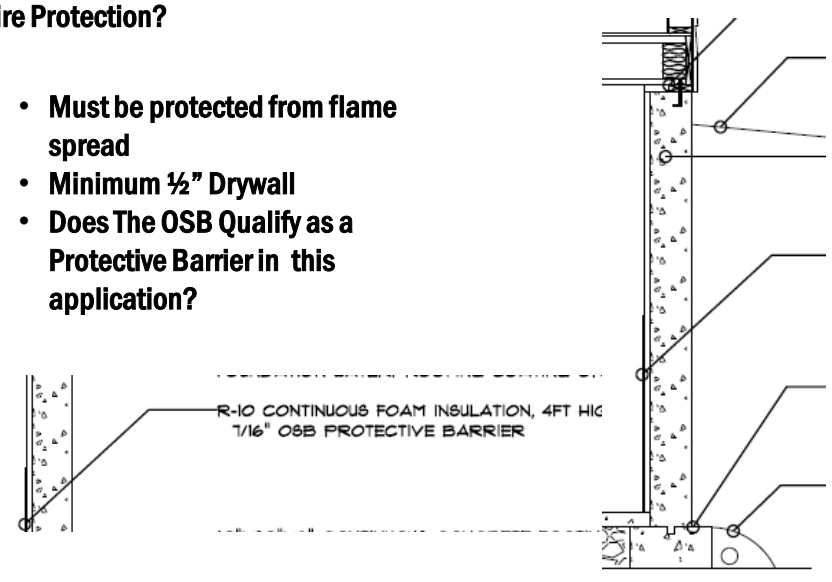
- Slope Grade Away
- Waterproofing
- Filter Fabric
- Crushed Stone
- Footer Drains



Exterior/Enclosure Features and the IRC:

Foam Plastic Insulation – R316.4
Fire Protection?

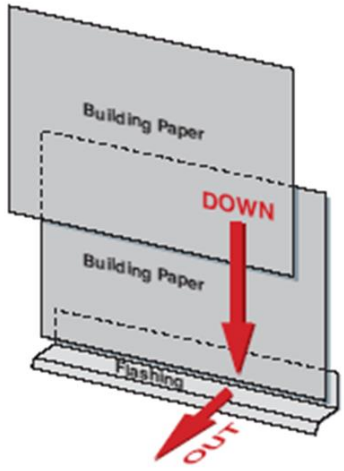
- Must be protected from flame spread
- Minimum ½" Drywall
- Does The OSB Qualify as a Protective Barrier in this application?



Exterior/Enclosure Features and the IRC

WRBs & Flashing R703

- Builders are used to applying basic water management principles daily
  - Shingles
  - Building paper
- Where do we mess up?
  - Almost always at the joints and connections where different things come together



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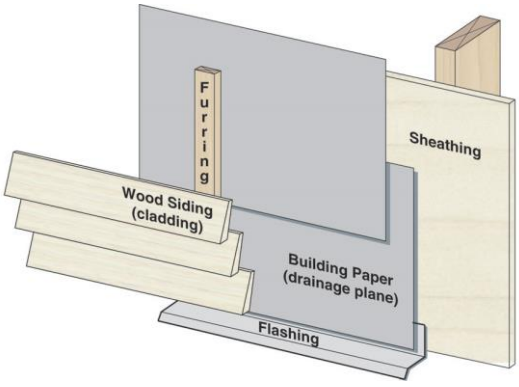
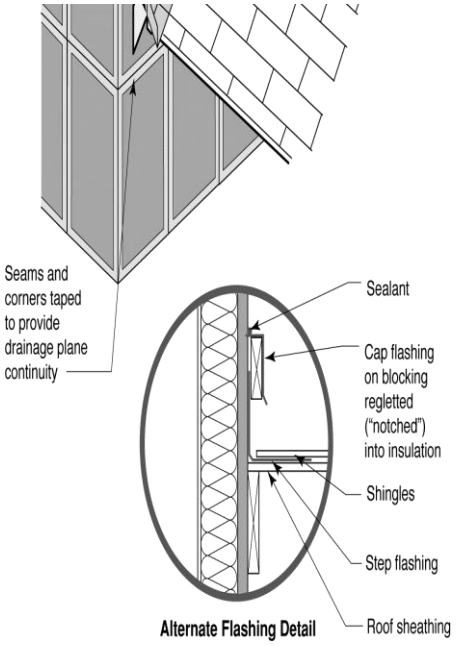
Water Management Simplicity

- Let's look at the basic components of wall water management.

One Solution…





Permeability of WRBs

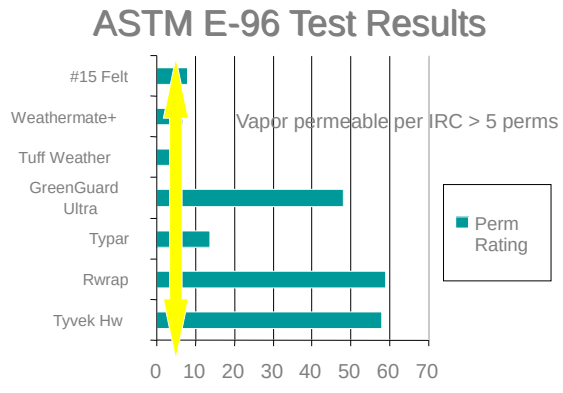
Perforated

- PinkWrap®
- GreenGuard®
- Tuffwrap®
- Barricade®
- Air- Guard®
- Prime Wrap®
- Hi - Q Wrap
- Energy Housewrap
- Dri - Shield Housewrap
- Energy - Wrap
- Weathermate®
- Firstwrap® Air Barrier
- Firstwrap® Plus
- PinkWrap® Plus
- ProWrap & Air Seal
- GreenGuard® Raindrop
- Air Stop

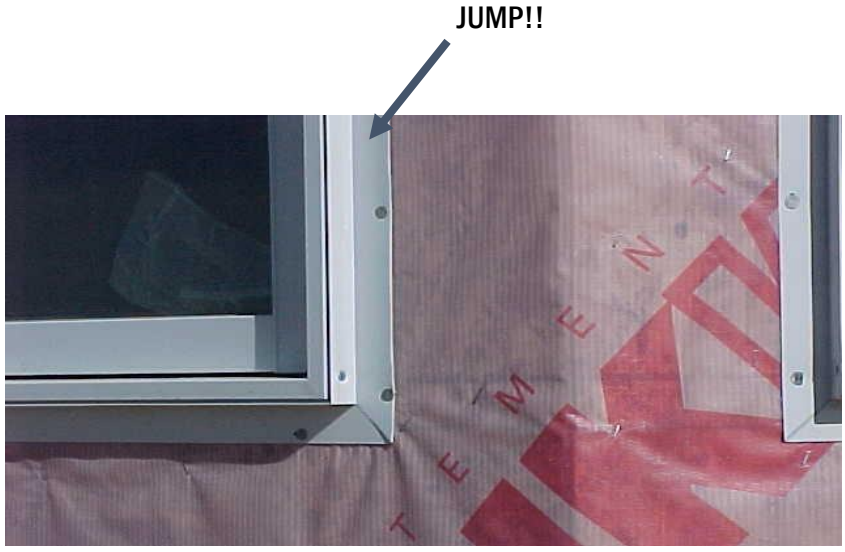
Non Perforated

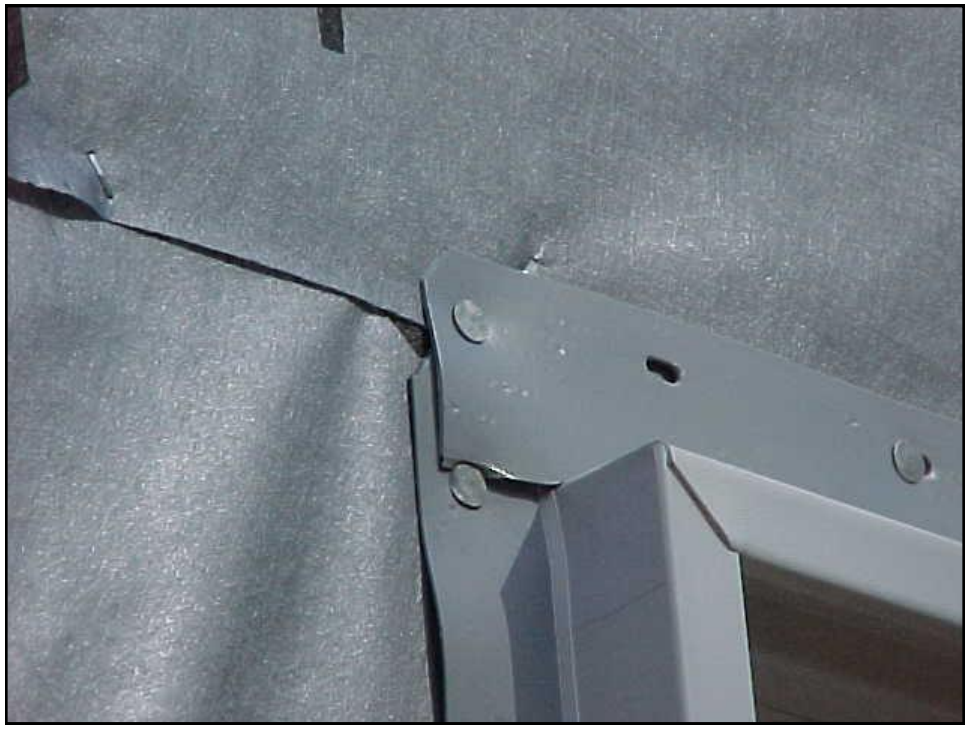
- Tyvek® HomeWrap®
- Tyvek® StuccoWrap®
- Tyvek® CommercialWrap®
- Rwrap®
- Typar® HouseWrap
- GreenGuard® Ultra
- Tuff Weather Wrap
- Weathermate® Plus

Resources: Testing and Marketing data from manufacturers.



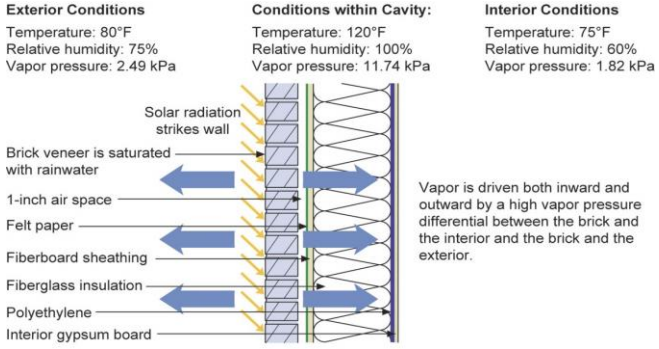
Window Leaks





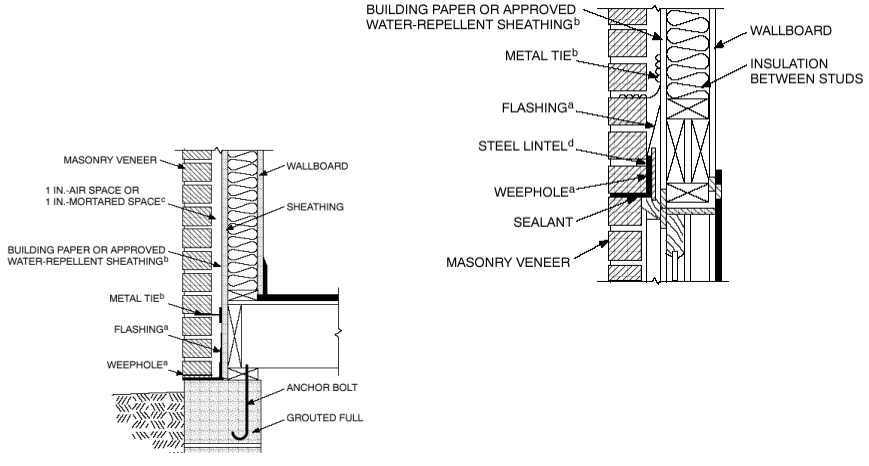
Water Management (Drainage Plane)

RC – Chapter 7

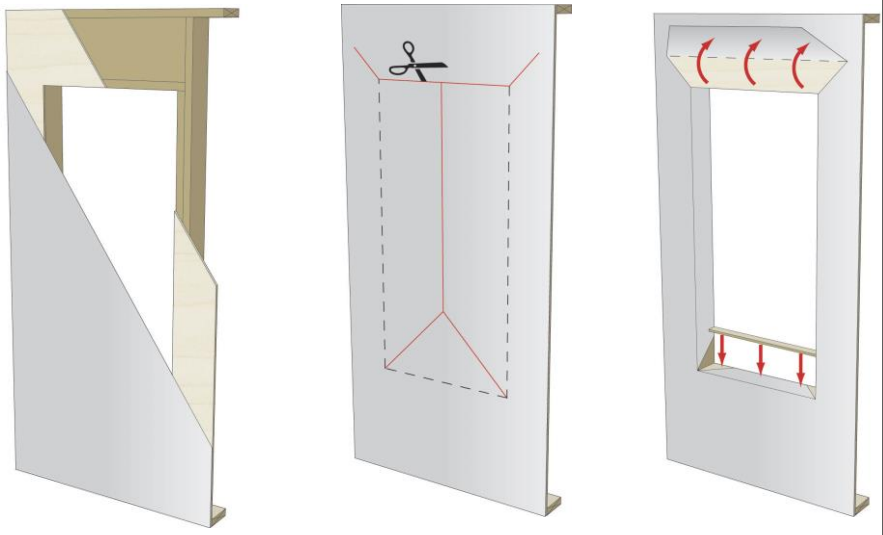


Water Management (Drainage Plane)

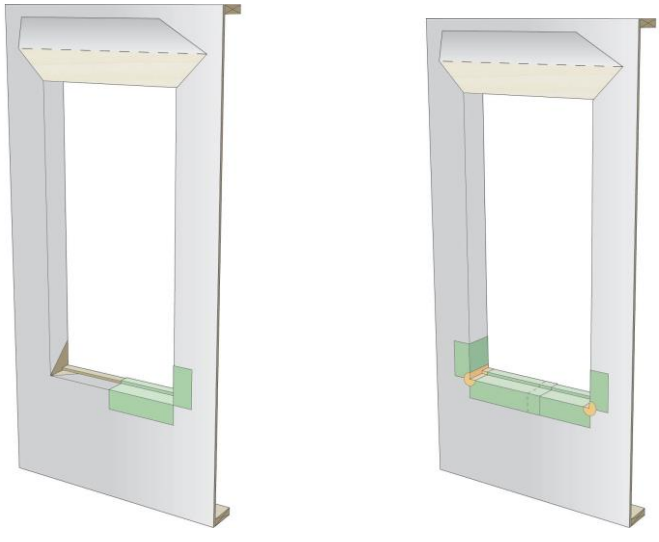
RC – Chapter 7



Window and Door Flashing!

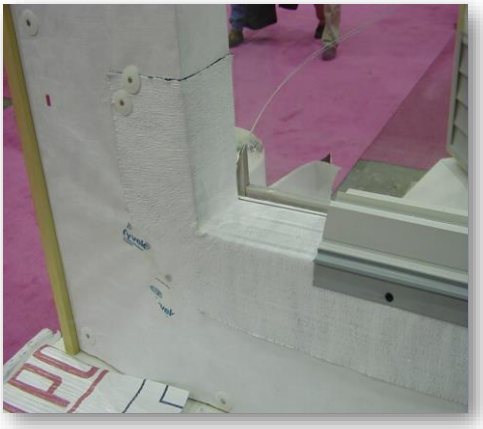


Preparing for the Window…

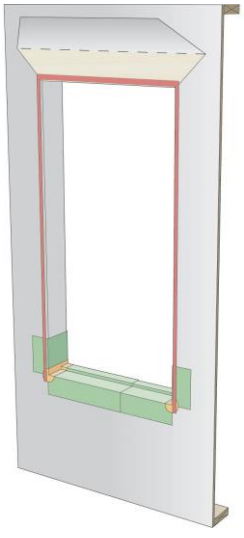


Sill Flashing

- Can use continuous or multi-piece flashing approach
- Key is integration into whole wall system



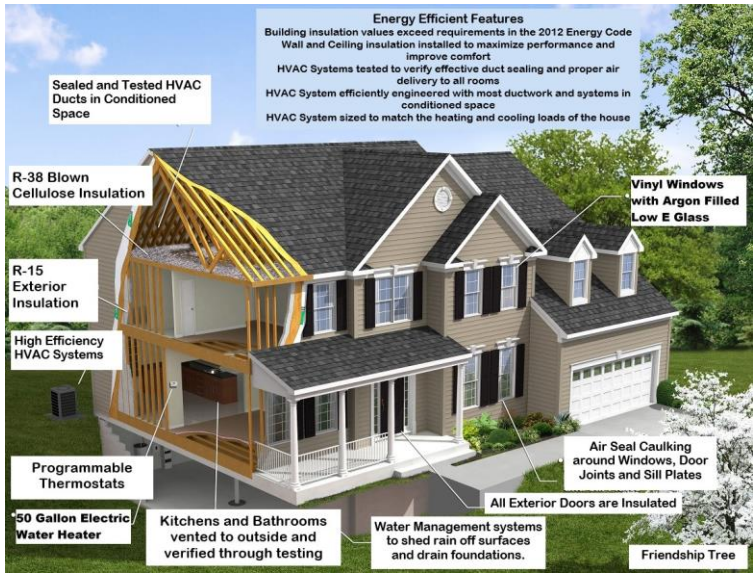
Integrate Windows



Continuous Drainage Plane

Plan Review

Energy & Exterior Features



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Energy Features

Review RES*check*™ Materials

- Basic Project Details
- Climate Zone
- Conditioned Area
- Glazing Area
- Bldg. Orientation
- Compliance Path

REScheck Software Version 4.6.5

Compliance Certificate

Project Unit #* Castle Heights

Energy Code:	2015 IECC
Location:	Cheshire, Connecticut
Construction Type:	Single-family
Project Type:	New Construction
Orientation:	Bldg. faces 0 deg. from North
Conditioned Floor Area:	4,743 ft2
Glazing Area	7%
Climate Zone:	5 (5792 HDD)
Permit Date:	
Permit Number:	

Construction Site:
x
Cheshire, CT 04410

Owner/Agent:

Designer/Contractor:
Johnny Carrier P.E.
Carrier Group, Inc.
68A S Canal St
Plainville, CT 06062
(860) 793-6805
JohnnyC@ByCarrier.com

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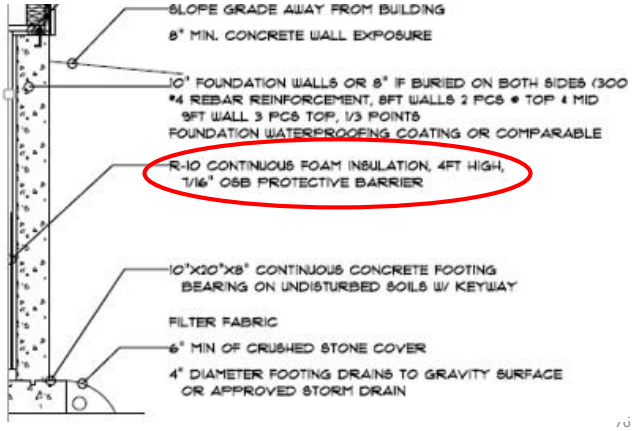
Energy Features

Reviewing Plans, Specs & and Docs – Foundation

- Does this Foundation/Basement Insulation Detail Comply?
- Does It Match *REScheck* Report?

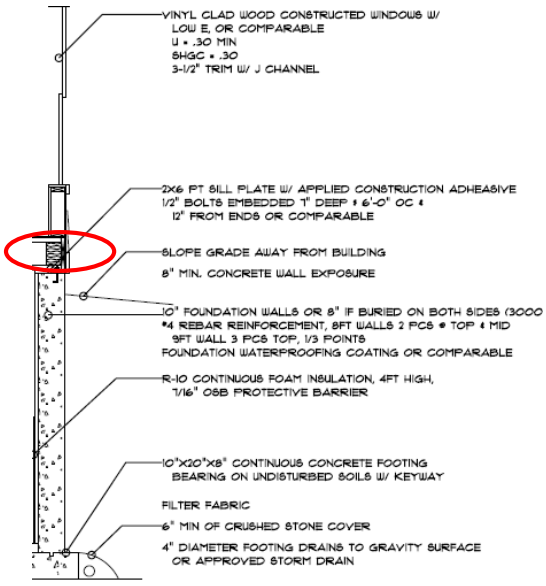


Energy Features

Air Barrier & Insulation

What Have We got?

- Window U-factor
- SHGC – don't need
- R-10 Foam Foundation Insulation
  - This Comply?
- Caulking, Air Sealing?
- Air Barrier?
- Rim Band Insulation?

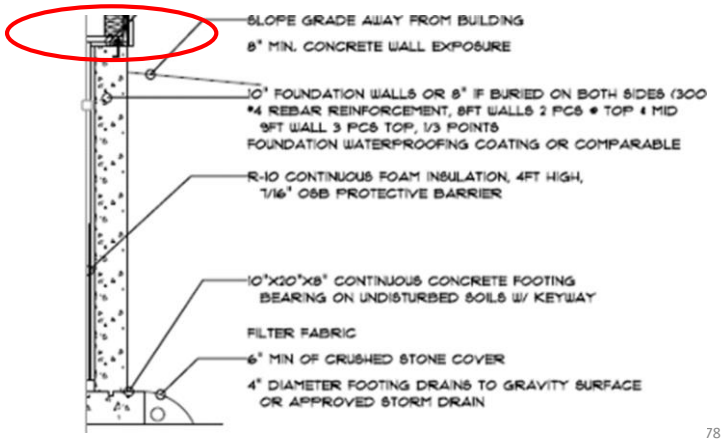


TYPICAL X-SECTION

Energy Features

Reviewing Plans, Specs and Docs – Walls, Rim/Band

- How about this Rim/Band Joist Detail?



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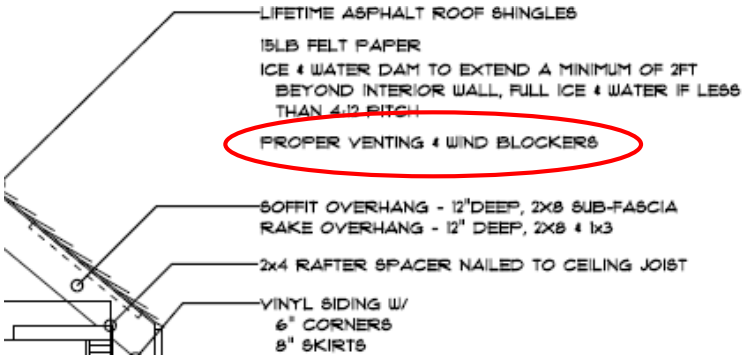
Energy Features

Reviewing Plans, Specs and Docs – Roof/Ceiling

- What Key Detail do we need to check here?



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Energy Features

Reviewing Plans, Specs and Docs – Blower Door Test Prep

- Let's Take A Look At Our Air/Insulation Checklist
- Check These All?
- Give to Builder?
- Part of Application?

Residential Air Leakage and Insulation Installation Checklist
2018 CT Residential Energy Code
Table 402.4.1.1 (check citation)

Date: _____ Name of Evaluator(s): _____

Building Name & Address: _____ Conditioned Floor Area: _____ ft²

Building Contact: Name: _____ Phone: _____ Email: _____

Compliance Approach: ☐ Prescriptive (402.1.2 or 402.1.3) ☐ UA Trade-off (402.1.4) ☐ Building Performance (405) ☐ REScheck ☐ ERI Method (R406)

State: _____ Jurisdiction: _____

Building Type: 1- and 2-Family, Detached: ☐ Single Family ☐ Modular ☐ Townhouse
Multifamily: ☐ Apartment ☐ Condominium

Project Type: ☐ New Construction ☐ Addition to existing building ☐ Existing building renovation

COMPONENT	CRITERIA[a]	PLAN REVIEW Y	PLAN REVIEW N	PLAN REVIEW N/A	SITE INSPECTION Y	SITE INSPECTION N	SITE INSPECTION N/A
1. Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope.	☐	☐	☐	☐	☐	☐
	Exterior thermal envelope contains a continuous air barrier.	☐	☐	☐	☐	☐	☐
	Breaks or joints in the air barrier shall be sealed.	☐	☐	☐	☐	☐	☐
	Air permeable insulation shall not be used as a sealing material.	☐	☐	☐	☐	☐	☐
2. Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed.	☐	☐	☐	☐	☐	☐
	Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	☐	☐	☐	☐	☐	☐
3. Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed.	☐	☐	☐	☐	☐	☐
	The junction of the top plate and top of exterior walls shall be sealed.	☐	☐	☐	☐	☐	☐
	Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.	☐	☐	☐	☐	☐	☐
	Knee walls shall be sealed.	☐	☐	☐	☐	☐	☐
4. Windows, skylights and doors	The space between window/door jambs and framing, and skylights and framing, shall be sealed.	☐	☐	☐	☐	☐	☐
5. Rim joists	Rim joists shall be insulated and include the air barrier.	☐	☐	☐	☐	☐	☐
6. Floors (including built over garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking.	☐	☐	☐	☐	☐	☐
	The air barrier shall be installed at any exposed edge of insulation.	☐	☐	☐	☐	☐	☐

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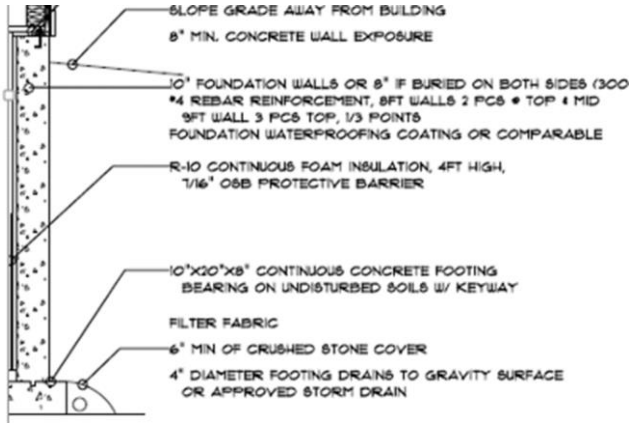
Energy Features

Envelope

Table R402.1.2	Slab edge insulation depth/length.	2 ft. Z- 4 & 5 4 ft. Z-6	____ ft.	☐	☐	☐
Table R402.1.2	Basement wall insulation R-value[i].	Continuous: R-10 Z-4 R-15 Z-5, Z-6 Cavity: R-13 Z-4 R-19 Z-5, Z-6	R-____ R-____	☐	☐	☐
R402.2.9	Basement wall insulation depth.	10 ft. or to basement floor	____ ft.	☐	☐	☐
Table R402.1.2 And R402.2.11	Crawl space wall insulation R-value. From floor to finished grade, plus 2' vertical or horizontal	Continuous: R-10 Z-4 R-15 Z-5, Z-6 Cavity: R-13 Z-4 R-19 Z-5, Z-6	R-____ R-____	☐	☐	☐
R402.2.11	Crawl space continuous vapor retarder	Required Class I		☐	☐	☐
R303.2.1	Exposed foundation insulation protection.	6" below grade		☐	☐	☐
R403.9	Snow melt controls.	Automatic controls over 50°F		☐	☐	☐
Table R402.1.2	Fenestration U-factor[i]	Max: U-0.35 Z-4 U-0.32 Z5, Z-6	U-____	☐	☐	☐



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Energy Features

Envelope

Table R402.1.2	Slab edge insulation depth/length.	2 ft. Z- 4 & 5 4 ft. Z-6	____ ft.	☐	☐	☐
Table R402.1.2	Basement wall insulation R-value[i].	Continuous: R-10 Z-4 R-15 Z-5, Z-6 Cavity: R-13 Z-4 R-19 Z-5, Z-6	R-____ R-____	☐	☐	☐
R402.2.9	Basement wall insulation depth.	10 ft. or to basement floor	____ ft.	☐	☐	☐
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R402.2.11	Crawl space continuous vapor retarder	Required Class I		☐	☐	☐
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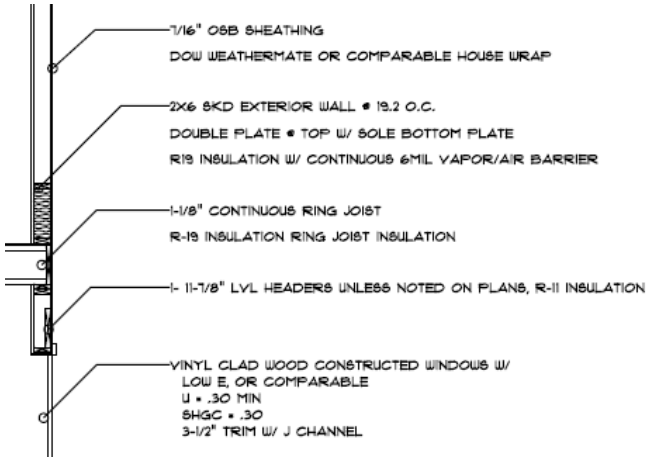

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II – Site Inspection

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Site Inspection - Objectives

At the conclusion of this inspection section, participants should be able to:

- Develop a checklist for inspection of the building exterior and energy conservation components of a residential structure to determine compliance with the state building code.
- Identify noncompliant construction and/or installation of exterior building components including but not limited to roofing, house wraps, siding, insulation, flashing, walls, doors and window systems.
- Write a compliance report on project and develop a punch list of corrective measure for project code compliance.

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Site Inspection-Bulk Water and Moisture

Preparation

Exterior Elements – Water, Moisture, Air Barrier peer CT Residential Code

- ❑ Foundation Drainage
- ❑ Foundation Waterproofing
- ❑ Site Drainage
- ❑ WRB
- ❑ Flashing

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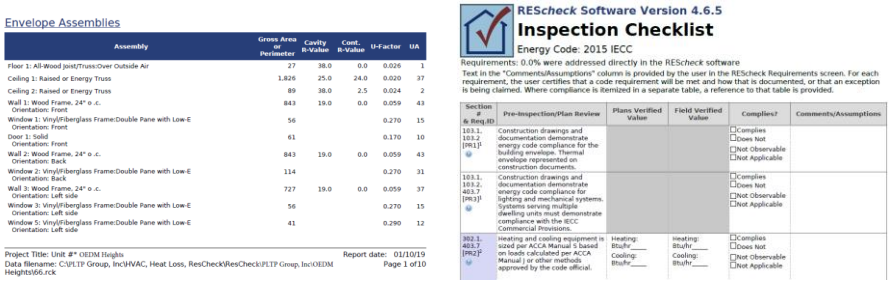
Site Inspection-Energy

Materials Tools and Preparation



Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	U-Factor	UA
Floor 1: All-Wood Joist/Truss:Over Outside Air	27	38.0	0.0	0.026	1
Ceiling 1: Raised or Energy Truss	1,826	25.0	24.0	0.020	37
Ceiling 2: Raised or Energy Truss	89	38.0	2.5	0.024	2
Wall 1: Wood Frame, 24" o.c. Orientation: Front	843	19.0	0.0	0.059	43
Window 1: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Front	56			0.270	15
Door 1: Solid Orientation: Front	61			0.170	10
Wall 2: Wood Frame, 24" o.c. Orientation: Back	843	19.0	0.0	0.059	43
Window 2: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Back	114			0.270	31
Wall 3: Wood Frame, 24" o.c. Orientation: Left side	727	19.0	0.0	0.059	37
Window 3: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Left side	56			0.270	15
Window 5: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Left side	41			0.290	12

Project Title: Unit #* OEDM Heights
Data filename: C:\PLTP Group, Inc\HVAC, Heat Loss, ResCheck\ResCheck\PLTP Group, Inc\OEDM Heights\66.rck
Report date: 01/10/19
Page 1 of10

REScheck Software Version 4.6.5

Inspection Checklist

Energy Code: 2015 IECC

Requirements: 0.0% were addressed directly in the RE*Scheck* software

Text in the "Comments/Assumptions" column is provided by the user in the REScheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Pre-Inspection/Plan Review	Plans Verified Value	Field Verified Value	Complies?	Comments/Assumptions
103.1, 103.2 [PR1][1]	Construction drawings and documentation demonstrate energy code compliance for the building envelope. Thermal envelope represented on construction documents.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
103.1, 103.2, 403.7 [PR3][1]	Construction drawings and documentation demonstrate energy code compliance for lighting and mechanical systems. Systems serving multiple dwelling units must demonstrate compliance with the IECC Commercial Provisions.			☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
302.1, 403.7 [PR2][2]	Heating and cooling equipment is sized per ACCA Manual S based on loads calculated per ACCA Manual J or other methods approved by the code official.	Heating: Btu/hr_____ Cooling: Btu/hr_____	Heating: Btu/hr_____ Cooling: Btu/hr_____	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	U-Factor	UA
Wall 4: Wood Frame, 24" o .c. Orientation: Right side	727	19.0	0.0	0.059	38
Window 4: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Right side	78			0.270	21
Wall 5: Solid Concrete or Masonry:Interior Insulation Orientation: Front	455	0.0	10.0	0.077	35
Wall 6: Solid Concrete or Masonry:Interior Insulation Orientation: Back	455	0.0	10.0	0.077	35
Wall 7: Solid Concrete or Masonry:Interior Insulation Orientation: Left side	495	0.0	10.0	0.077	38
Wall 8: Solid Concrete or Masonry:Interior Insulation Orientation: Right side	495	0.0	10.0	0.077	38

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2015 IECC requirements in REScheck Version 4.6.5 and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.

Name - Title _____ Signature _____ Date _____

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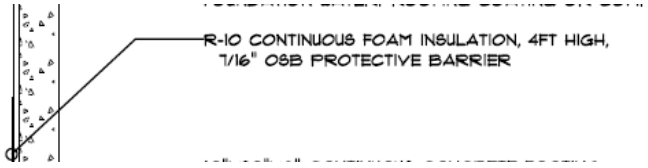
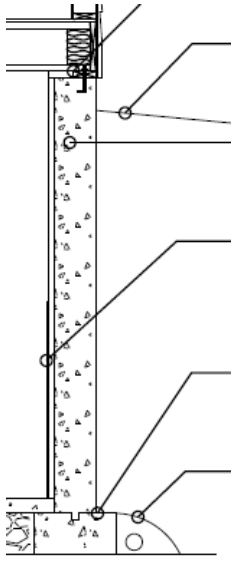
Site Inspection-Foundation

Foundation Insulation, Site Drainage & Water/Damp Proofing

- Drainage Details
- Water/Damp Proofing
- Foundation Insulation
  - R-value matches Plans and RES*check*?
  - Properly Positioned?
  - Review Energy vs. RES*check* Report





Site Inspection-Foundation

Foundation Insulation, Site Drainage & Water/Damp Proofing

- **NOT** Entered IN RES*check*
- From Bottom Up – NOT Top Of Foundation down
- Send Back for proper, complying RES*check*?

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	U-Factor	UA
Floor 1: All-Wood Joist/Truss:Over Outside Air	27	38.0	0.0	0.026	1
Ceiling 1: Raised or Energy Truss	1,826	25.0	24.0	0.020	37
Ceiling 2: Raised or Energy Truss	89	38.0	2.5	0.024	2
Wall 1: Wood Frame, 24" o.c. Orientation: Front	843	19.0	0.0	0.059	43
Window 1: Vinyl/Fiberglass Frame:Double Pane with Low-E Orientation: Front	56			0.270	15
Door 1: Solid Orientation: Front	61			0.170	10
Wall 2: Wood Frame, 24" o.c. Orientation: Back	843	19.0	0.0	0.059	43
Window 2: Vinyl/Fiberglass Frame:Double Pane with Low-E	114			0.270	31
	727	19.0	0.0	0.059	37
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Wall 5: Solid Concrete or Masonry:Interior Insulation Orientation: Front	455	0.0	10.0	0.077	35
Wall 6: Solid Concrete or Masonry:Interior Insulation Orientation: Back	455	0.0	10.0	0.077	35
Wall 7: Solid Concrete or Masonry:Interior Insulation Orientation: Left side	495	0.0	10.0	0.077	38
Wall 8: Solid Concrete or Masonry:Interior Insulation Orientation: Right side	495	0.0	10.0	0.077	38

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2015 IECC requirements in RES*check* Version 4.6.5 and to comply with the mandatory requirements listed in the RES*check* Inspection Checklist.

Name - Title Signature Date

Report date: 01/10/19
Loss, ResCheck\ResCheck\PLTP Group, Inc\OEDM Page 1 of10

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Project foundation insulation

And Use generic best practice pic as well

Site Inspection – Framing/Weather-In

Drainage Plane

- WRB Installed Right?
- Fasteners
- Taped Seams?
- Caulked to Foundation/Sill?

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Site Inspection - Water and Moisture

Flashing, Cladding, Windows and Doors

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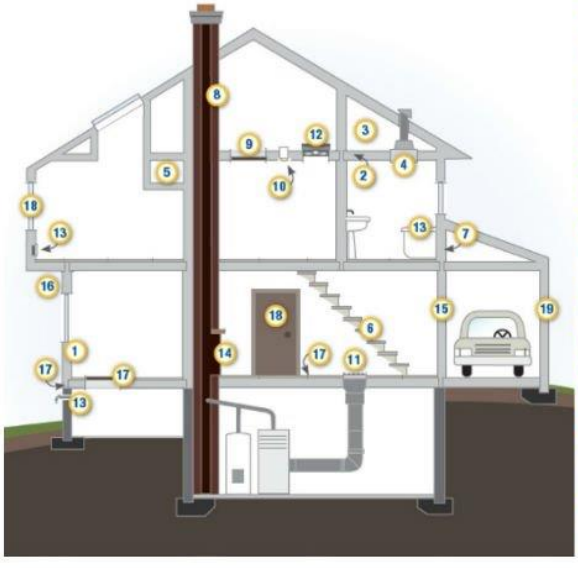
Site Inspection - Water and Moisture

Foundation

Site Inspection – Energy Code Features

Other Key Details & Miscues



Air Sealing Trouble Spots

1. Air Barrier and Thermal Barrier Alignment
2. Attic Air Sealing
3. Attic Kneewalls
4. Shaft for Piping or Ducts
5. Dropped Ceiling/Soffit
6. Staircase Framing at Exterior Wall
7. Porch Roof
8. Flue or Chimney Shaft
9. Attic Access
10. Recessed Lighting
11. Ducts
12. Whole-House Fan
13. Exterior Wall Penetrations
14. Fireplace Wall
15. Garage/Living Space Walls
16. Cantilevered Floor
17. Rim Joists, Sill Plate, Foundation, Floor
18. Windows & Doors
19. Common Walls Between Attached Dwelling Units

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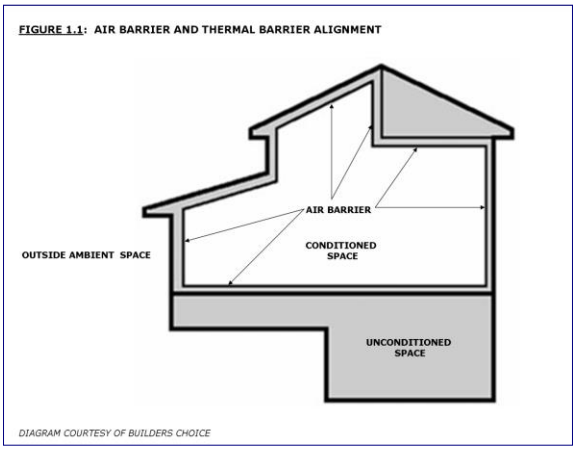
Site Inspection – Energy Code Features

Other Key Details & Miscues

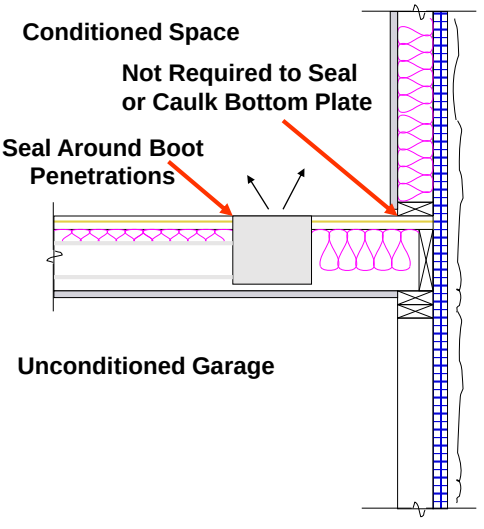
- What Is the Air Barrier?
- What Is The Conditioned Space?
- Insulation installed in full contact with the air barrier
- Provides continuous alignment of insulation & the air barrier.



Site Inspection – Energy Code Features

Other Key Details & Miscues

- Floor Over Conditioned Space

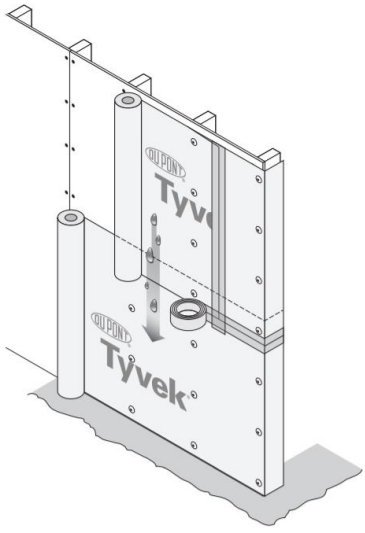


Site Inspection – Energy Code Features

Other Key Details & Miscues

Installation as an air barrier:

1. Install shingle-fashion (start at the bottom)
2. Fasten with broad crown staples (or equiv.)
3. Clean surface of debris before taping
4. Tape all seams – vertical AND horizontal



DuPont Tyvek Water-Resistive and Air Barrier Installation Guidelines

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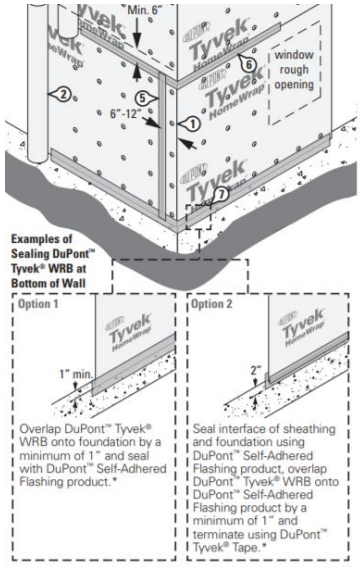
Site Inspection – Energy Code Features

Other Key Details & Miscues

4. Overlap house wrap onto foundation
5. Seal wrap to foundation



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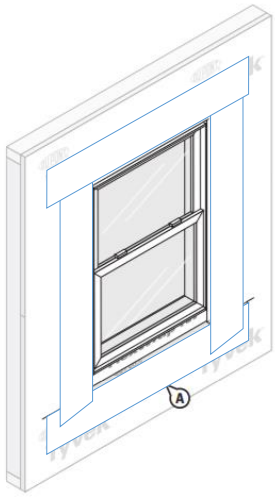
Site Inspection – Energy Code Features

Other Key Details & Miscues

6. Flash/seal all penetrations



DuPont Tyvek Water-Resistive and Air Barrier Installation Guidelines

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Site Inspection – Energy Code Features

Other Key Details & Miscues

Courtesy of the Department of Energy's Building America Solution Center (http://basc.energy.gov)

Is This An Air Seal?

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Site Inspection – Energy Code Features

Other Key Details & Miscues

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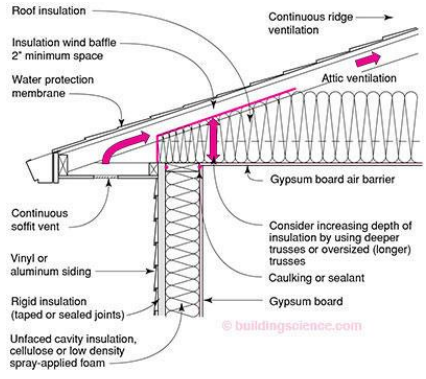
Site Inspection – Energy Code Features

Other Key Details & Miscues

- Air barrier at tub/shower enclosure
- located on an exterior wall
- Insulation is in full contact with air barrier

Site Inspection – Energy Code Features

Other Key Details & Miscues



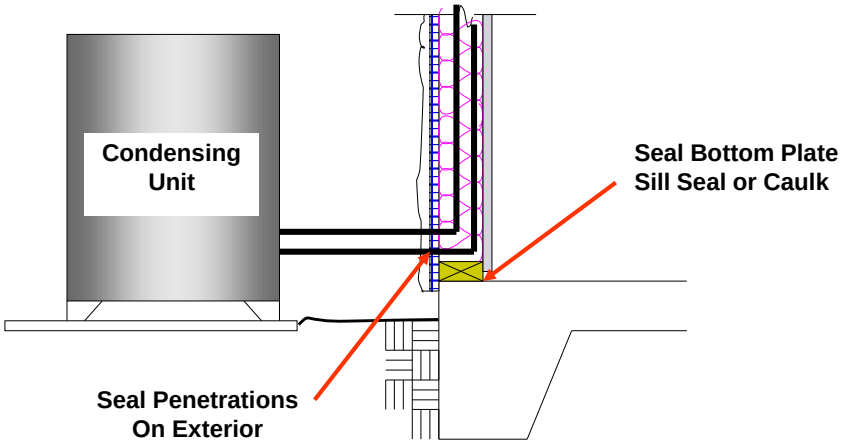
- Eave Baffle
- Chutes
- Other Air Sealing
- BIG Hole – Attic Kneewall – Air Sealing, Insulation

Site Inspection – Energy Code Features

Other Key Details & Miscues

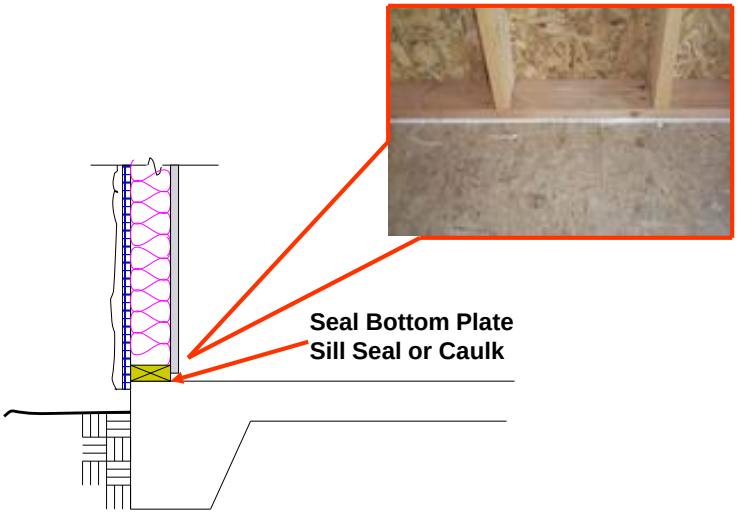
- Bonus Room Construction

Exterior Walls Utility Penetrations



Site Inspection – Energy Code Features

Other Key Details & Miscues



Site Inspection – Energy Code Features

Other Key Details & Miscues

Site Inspection – Energy Code Features

Other Key Details & Miscues

- OSB or plywood backing attic side

- Thermoply backing installed on attic.

Site Inspection – Energy Code Features

Other Key Details & Miscues

Spray Foam Works Great!

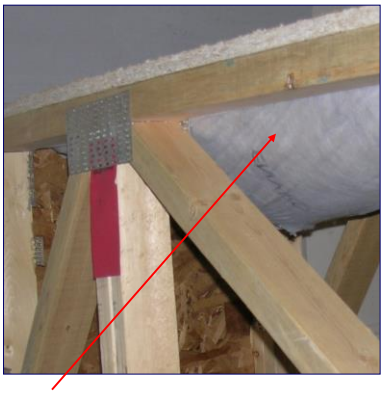
Another Way – but must insulate to WALL levels.

Is stuffing batts insulation here gonna cut it?

Site Inspection – Energy Code Features

Other Key Details & Miscues

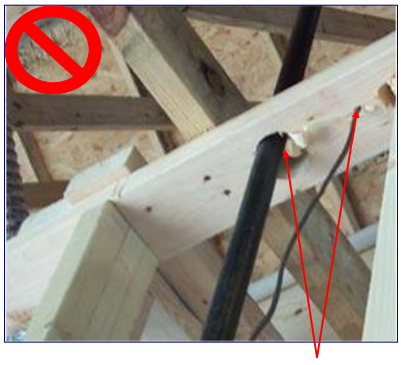
- Cantilevered floor
- Insulation installed in contact with sub-floor



- Mock up of cantilevered floor
- Insulation installed in contact with sub-floor

Site Inspection – Energy Code Features

Other Key Details & Miscues



- All penetrations into unconditioned space need to be sealed!

- HVAC penetrations into unconditioned space need sealing

Site Inspection – Energy Code Features

Other Key Details & Miscues

- Correct The picture at the left depicts the correct way to seal penetrations of the air barrier between conditioned space and unconditioned space.
- The duct work, draft stop, sewer and water lines are sealed using caulk or expansive foam.

Site Inspection – Energy Code Features

Other Key Details & Miscues

Other Areas to Air Seal - Fireplace Chimney Penetrations

Air Sealing Installation That Will Not Comply

Air Sealing Installation That Will Comply

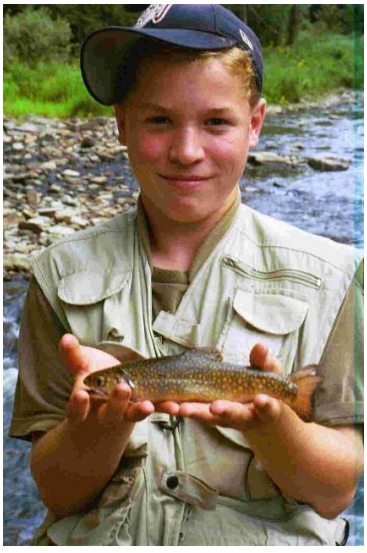
Site Inspection – Energy Code Features

Other Key Details & Miscues

Manufactured fireplace installed with air barrier (gypsum board, Thermoply, or equivalent) in place. All seams caulked, taped, or sealed with expansive foam.

The interior gypsum board, OSB or equivalent is sealed with caulk to the sheet metal flap or fire stop. Seal all joints, seams, and penetrations with caulk or sealant. Seal the sheet metal collar at the flue with fire rated caulk. Maintain all clearances per manufacturer's specifications.

This Is Why I Do Energy Code Work!



Acknowledgements

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- US-DOE Building America Program
- Building Science Corporation

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Office of the State Fire Marshal
(860) 713 - 5750
Office of Education and Data Management
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Thank You!

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- Energy Code T/A
- Training
- Energy Code Consulting & Municipal Services
- Plan Review Services
- Air Barrier Inspections
- Large Building Blower Door Testing

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