



FGBC



FLORIDA GREEN  
BUILDING COALITION

A Green Florida for a Blue Planet



# Chapter 3

## Building Envelope & Durability



# Building Envelope

## What does the Building Envelope Include?

1. Foundations
2. Thermal Envelope
3. Durability



# Building Envelope Foundation

## Learning Objectives—Foundations

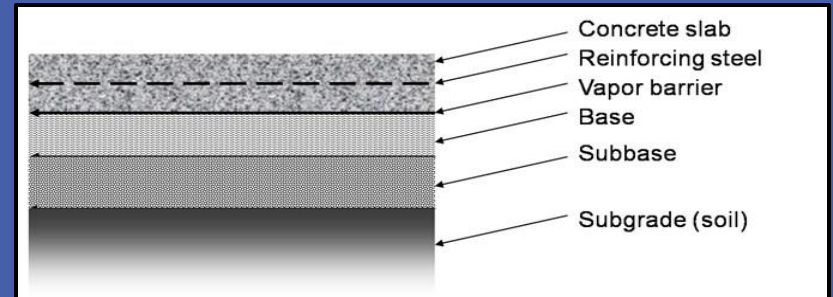
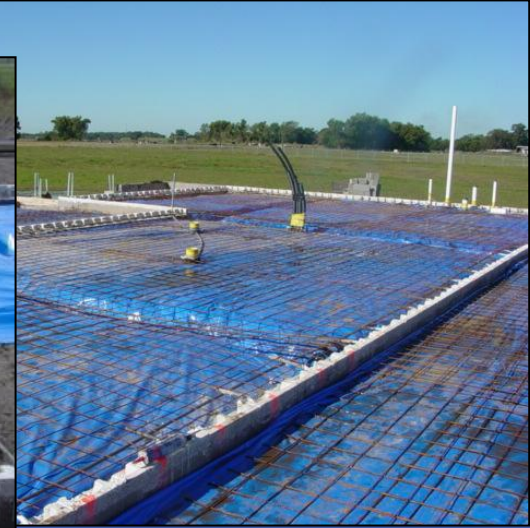
- What exactly is a foundation supposed to do?
- How is the foundation affected by water?

# Building Envelope Foundation





# Building Envelope Foundation



# Building Envelope Foundation



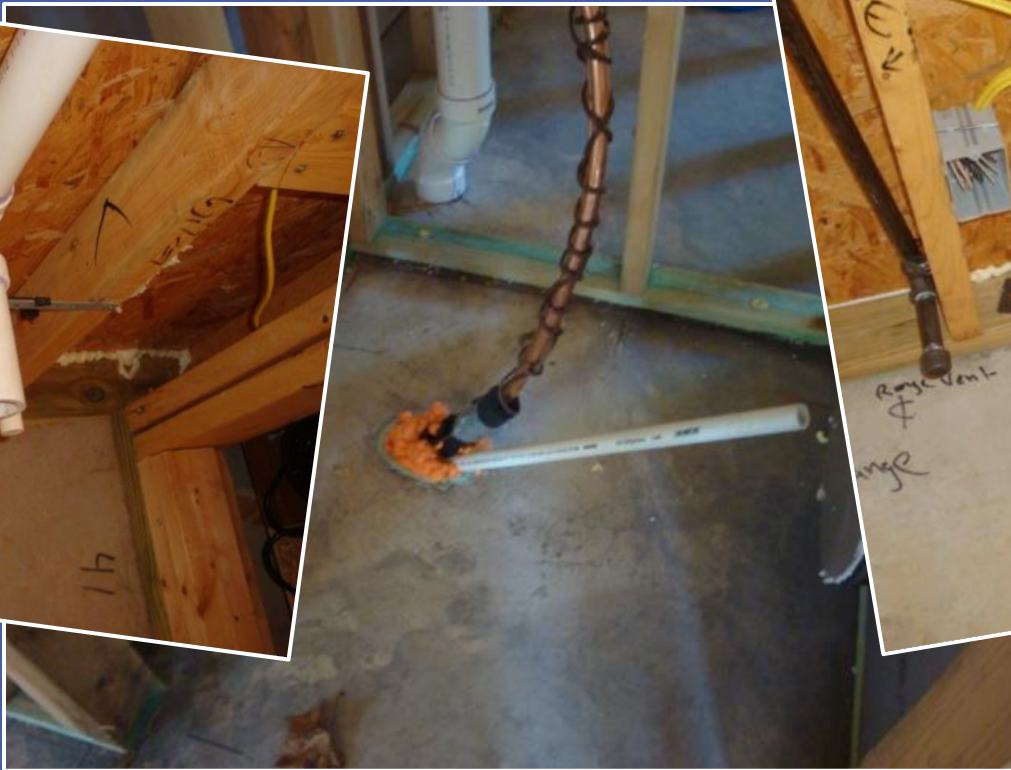
Keep the Soil Gas Out





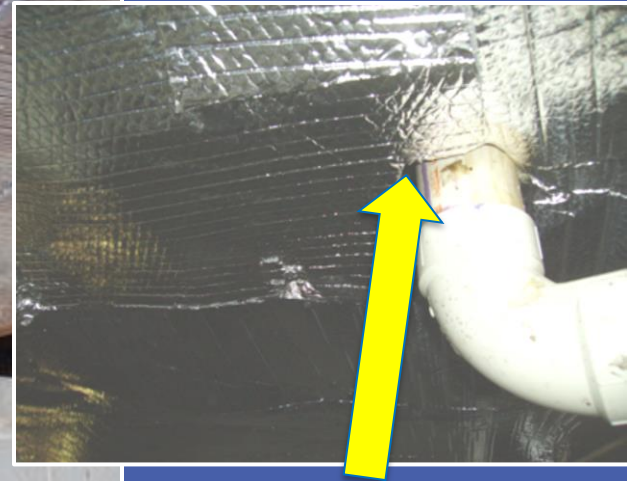
# Building Envelope Foundation

## Sealing slab penetrations



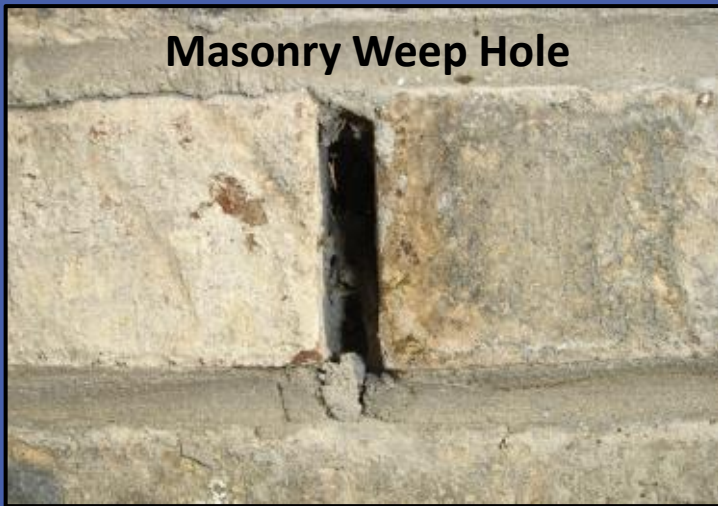
# Building Envelope Foundation

Use a water vapor retarder

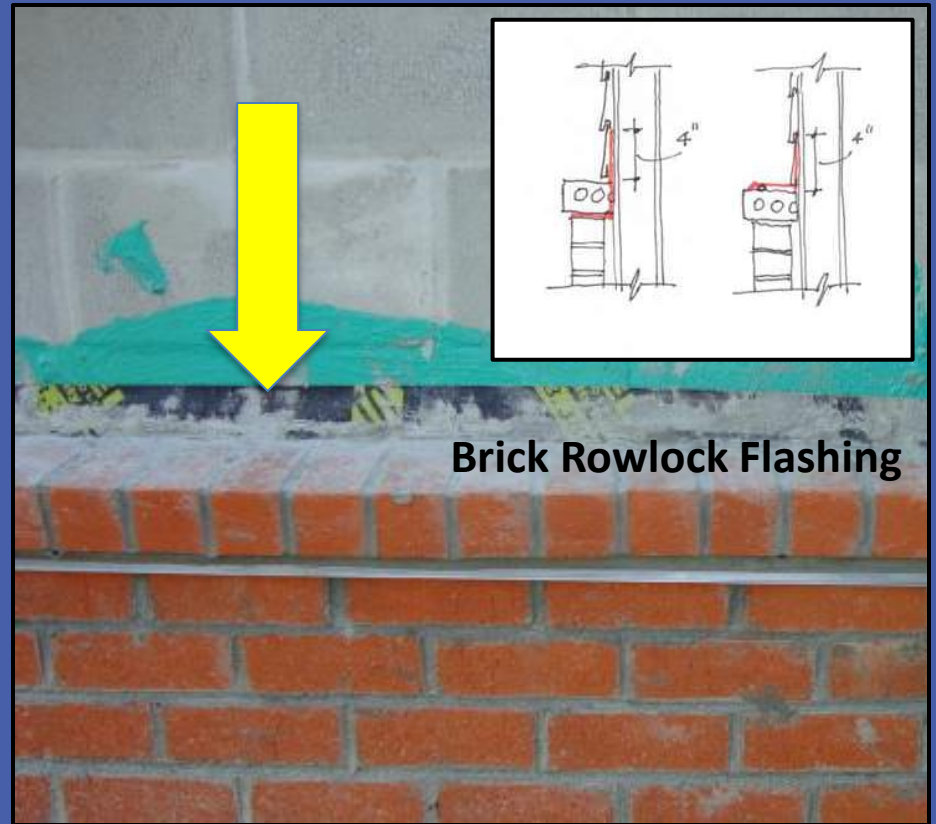




# Building Envelope Foundation



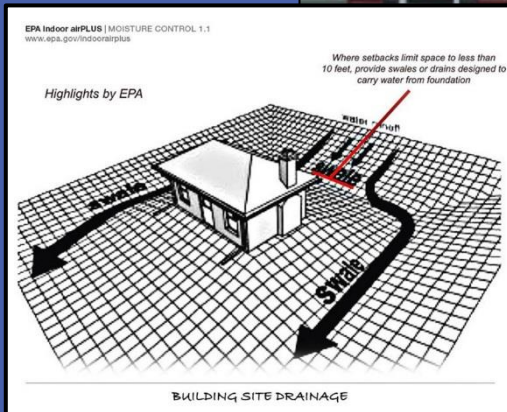
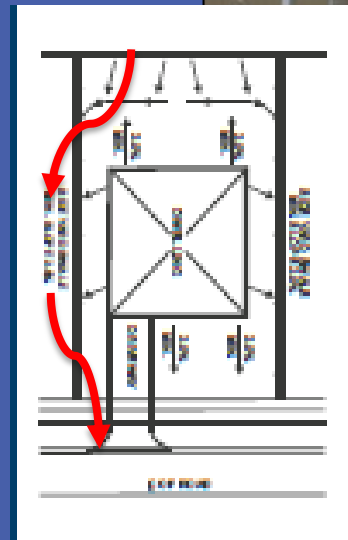
Allow bulk water to get out





# Building Envelope Foundation

Drain water away from the foundation





# Building Envelope Foundation

## Review—Foundations

- What exactly is a foundation supposed to do?
- How is the foundation affected by water?





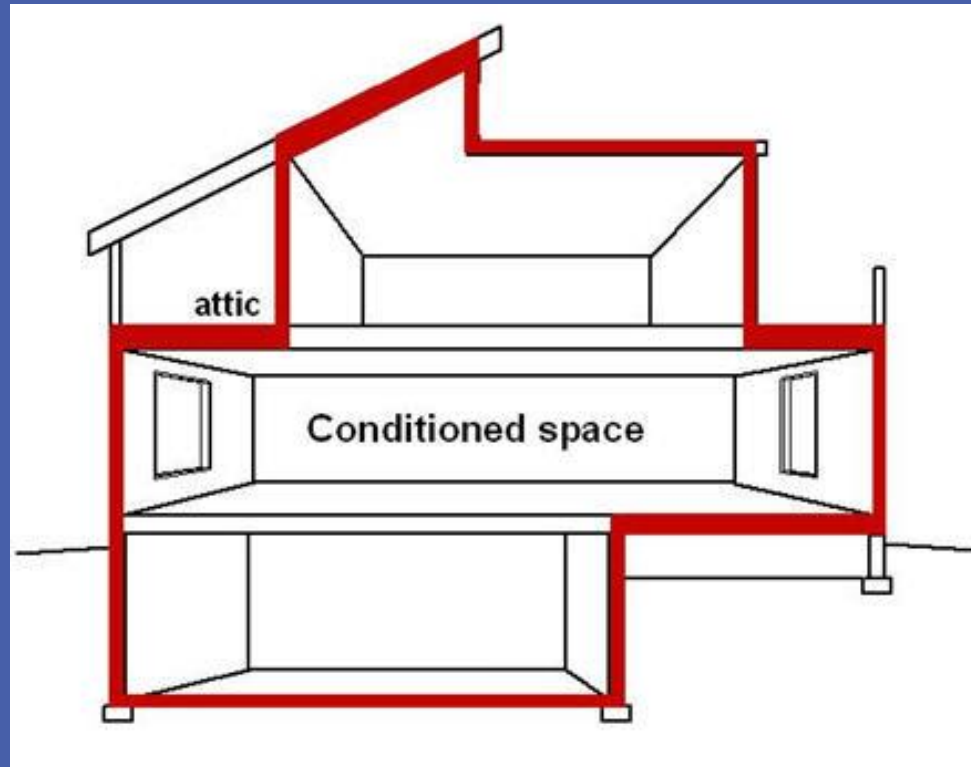
# Building Envelope Thermal Envelope

## Learning Objectives—Thermal Envelope

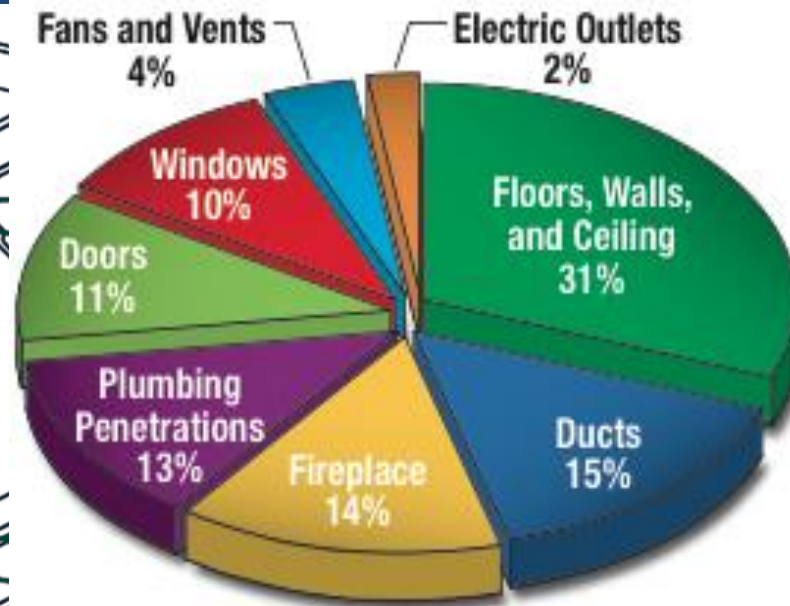
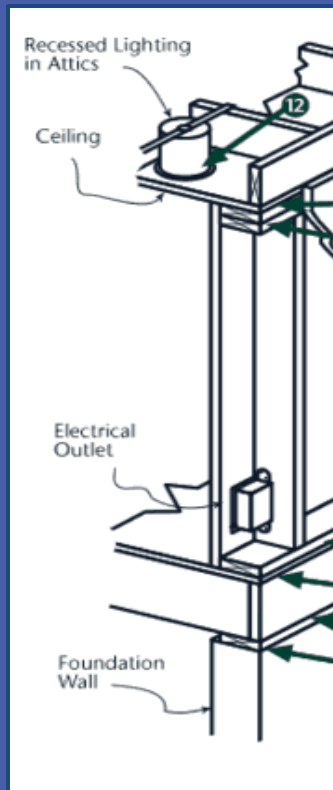
- What is the building envelope?
- What is an air barrier?
- How is that different from a moisture barrier?
- What is a thermal boundary?

# Building Envelope

## Thermal Envelope



# Building Envelope Thermal Envelope



## How Does the Air Escape?

Air infiltrates into and out of your home through every hole and crack. About one-third of this air infiltrates through openings in your ceilings, walls, and floors.





# Building Envelope Thermal Envelope

Caulking



Methods to  
Reduce  
Air Infiltration



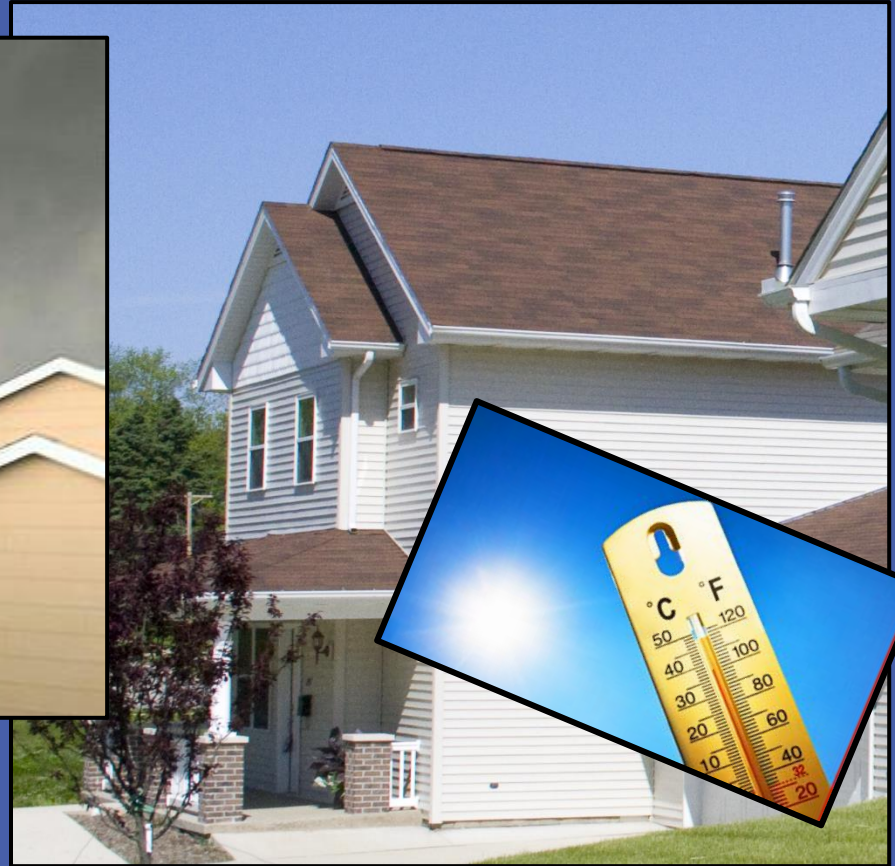
Weatherstripping



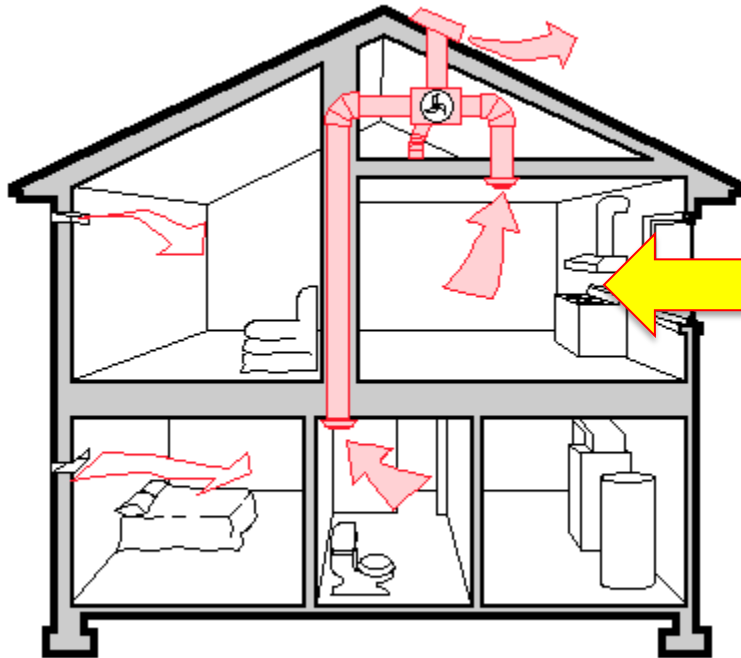
Foaming



# Building Envelope Thermal Envelope



# Building Envelope Thermal Envelope



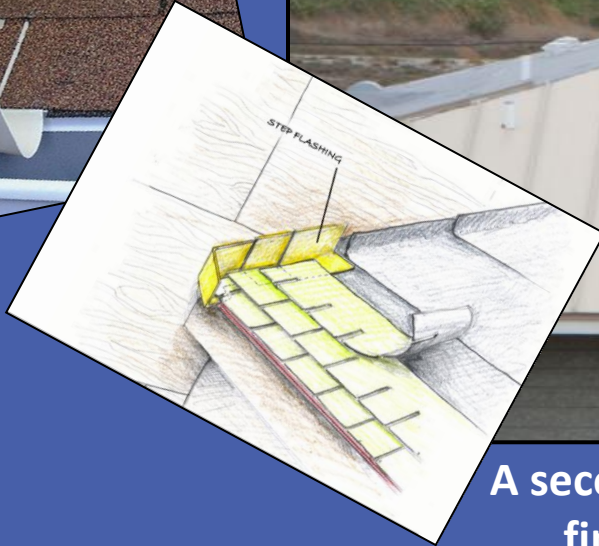
Proper ventilation to remove moisture and cooking odors



# Building Envelope Thermal Envelope

## Methods to Reduce Water Infiltration

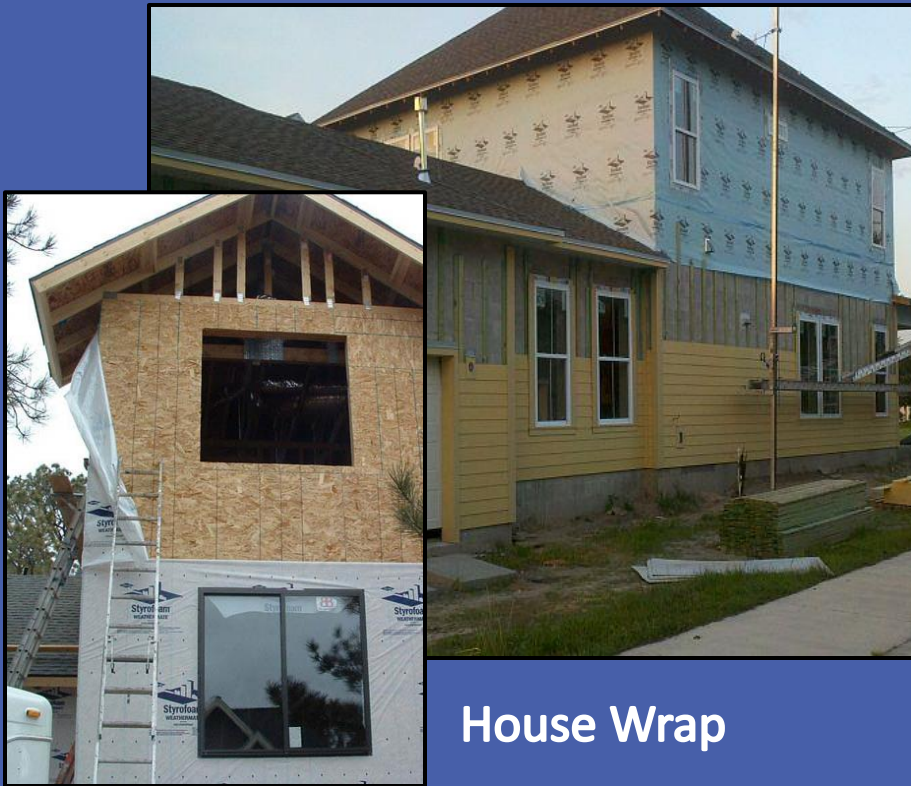
### Flashing



A secondary water proofing membrane, under the finished roof reduces water and wind damage.

# Building Envelope Thermal Envelope

Another method for reducing water infiltration and for channeling bulk water



House Wrap



Furring Strips over House Wrap



# Building Envelope Thermal Envelope

## Step 5: Flashing the Installation - Air Barrier Applications

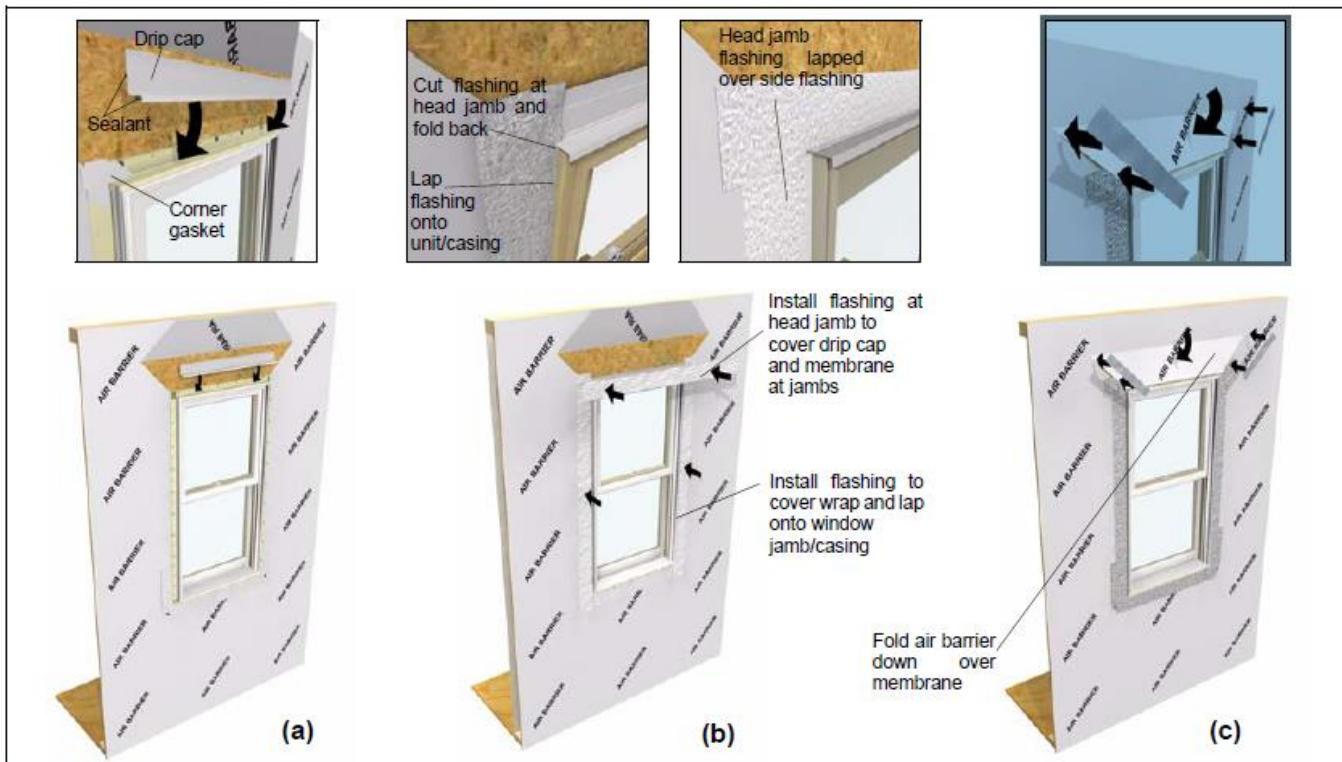


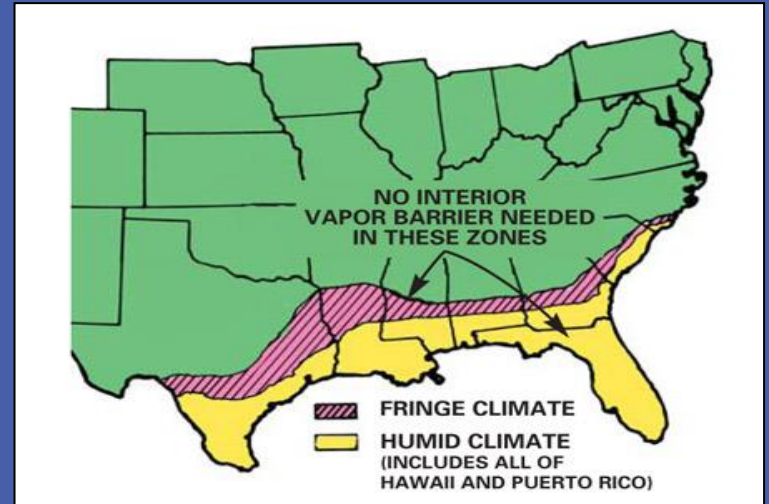
Figure 11 Sealing the Installation in air barrier applications.





# Building Envelope Thermal Envelope

Type I Vapor Retarders  
(0.1 perms or less)



Type II Vapor Retarders  
( $>0.1$  and  $\leq 1.0$  perms)



Type III Vapor Retarders  
( $>1.0$  and  $\leq 10$  perms)





# Building Envelope Thermal Envelope

## Types of Wall Insulation



**Batt Insulation  
Frame Wall**



**Foam Insulation  
Frame Wall**



**Foam-in-Place  
Masonry Wall**



**Reflective Insulation  
Masonry Wall**





# Building Envelope Thermal Envelope

## Types of Attic Insulation



**Blown-in Insulation  
Vented Attic**



**Foam Insulation  
Conditioned Attic**



**+ Radiant Barrier**





# Building Envelope Thermal Envelope

## Review—Thermal envelope

- What is the building envelope?
- What is an air barrier?
- How is that different from a moisture barrier?
- What is a thermal boundary?



# Building Envelope Durability

## Learning Objectives—Durability

- Define durability
- Durability applies to more than just the building.
- What is sustainability, and how is it different from durability?



# Building Envelope Durability

## Why focus on Durability?

- Avoid warranty claims and callbacks
- Reduce the need for costly repairs later on
- Sustainability is not possible without durability



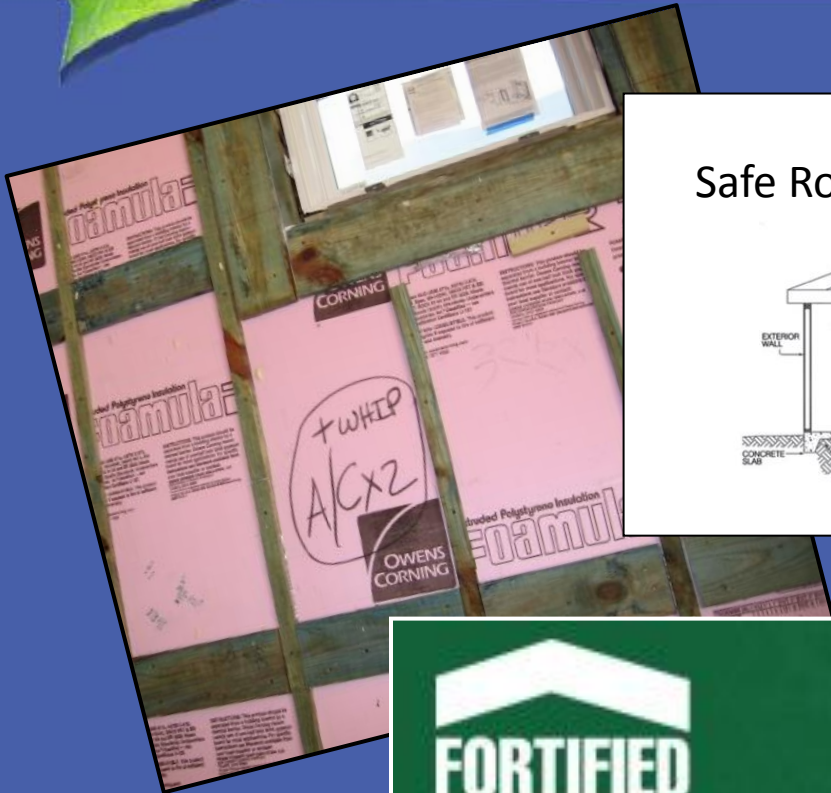


# Building Envelope Durability

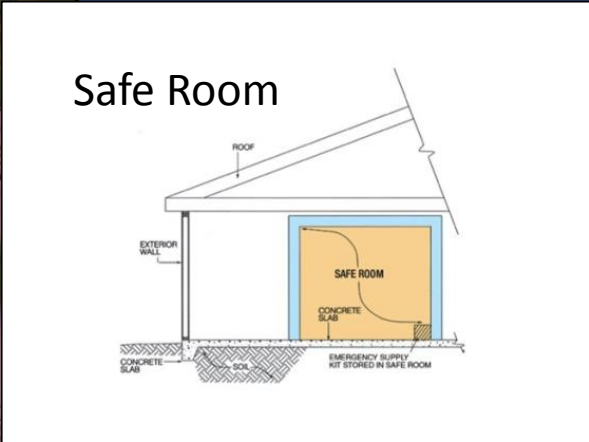
## Sustainability

“Simply Stated, the ability to meet needs of our present generation, without compromising the needs of our future generations.”

# Building Envelope Durability



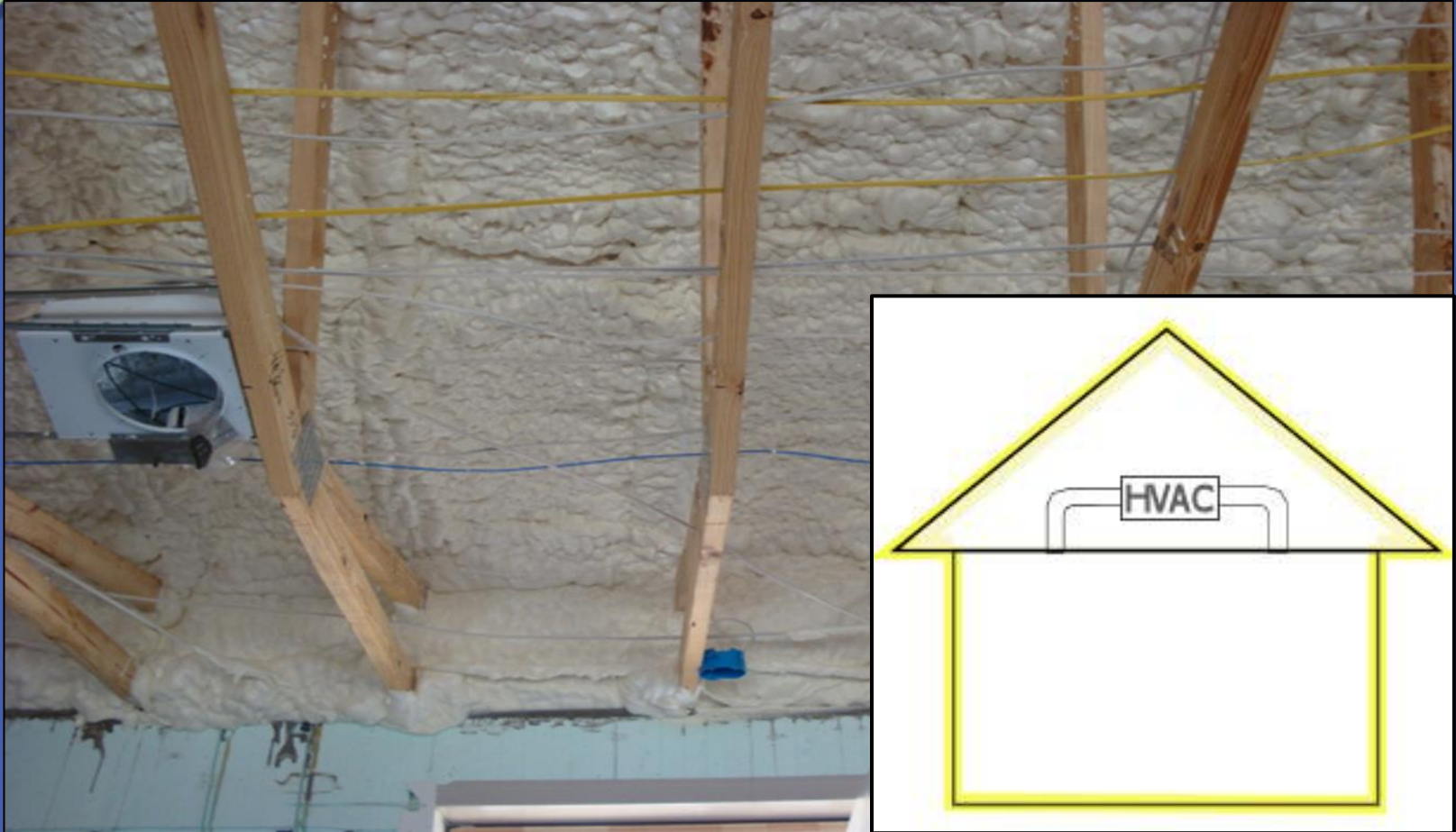
Extra framing



Extra brackets

**FORTIFIED**  
...for safer living.  
A program of the Institute for Business & Home Safety

# Building Envelope Durability







# Building Envelope Durability

## Types of Attic Baffles – Soffit Ventilation

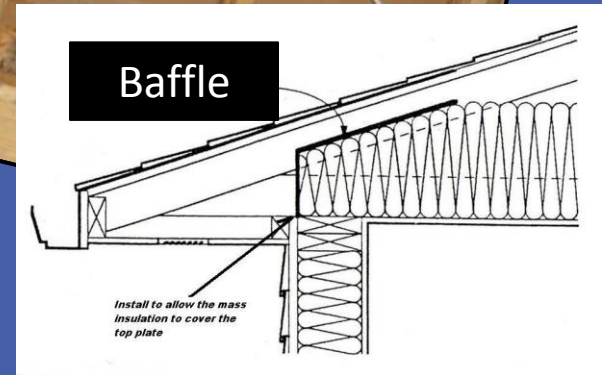
Foil Baffles



Cardboard Baffles



Plastic Baffles







# Building Envelope Durability



Approved Shutters

Not Approved as Shutters  
in Miami-Dade County...





# Building Envelope Durability

**WIND ANALYSIS -- 120 MPH** Wind Velocity or as Interpolated (Calculations Attached)

**Building Jurisdiction:** Wakulla County Activity # \_\_\_\_\_

Calculations as per Section 1605, Florida Building Code, 2010, ASCE 7-10, or as per 2010 F.B.C. with 2011 - 2012 supplements (see instructions below)

**Attachments Required:**

1. The applicable building floor plan with EACH Wind Analysis, a reduced legible plan may be provided.
2. Indicate location of all vaulted or high ceilings (ceilings over 8'-0") on floor plan.
3. A truss layout plan from truss engineer will be required. The layout will indicate all interior bearing walls or posts.

Job Address: Cooper 2042 whitetail Date: 05.08.2012  
 Contractor: Premier Construction Subdivision/Lot/Block:  
 Prepared By: HB ENGINEERING & CONSTRUCTION Design Professional FL Lic. #: 16987  
 HB-Eng File #: 12031-001-000

Importance Factor: 1.0 Exposure: 'B'  
 Internal Pressure Coefficient: +0.18, -0.18  
 Plans may be used as a master plan by the above contractor: Yes or No (Circle One) Initials: M.T.B.

Species for Top Plate:	SPF	Stud Species:	SPF
End Zone Length:	3'-0"	Max stud hl. (excluding gable end)	N/A
Roof Slope:	7/12	Stud Spacing:	N/A
Mean Roof:	18'-3"	Max Overhang Length: (excluding porches)	24"

**HURRICANE CLIPS (HC)**

Brand:	Truss Span or Location:	Model # @	Model # @
<u>Simpson</u>	<u>Simpson H3 Hurricane Clip per Each Bearing Location</u>	End zone: HC <u>1-H3 @ Each</u>	Interior zone: HC <u>1-1H3 @ Each</u>
		Bearing Location	Bearing Location
		(see end zone locations on wind zone area diagram)	

**ROOF SHEATHING MATERIAL:** 7/16" OSB (be specific such as 7/16" OSB)

Fastener	<u>8d Ring Shank</u>	NAILING PATTERN:	Edges (perimeter) 6" o.c.	Field 6" o.c.
----------	----------------------	------------------	------------------------------	------------------

**WALL BRACING:** 15/32" OSB\* Strips 100% Continuous or as required: See Note 1, below.

Fastener	<u>10d Ring Shank</u>	NAILING PATTERN:	Edges (perimeter) 3" o.c.	Field 6" o.c.
----------	-----------------------	------------------	------------------------------	------------------

**STRAPS:** \*15/32" OSB MAY BE USED IN LIEU OF RSP4(1),(2)  
 Brand-SIMPSON SIMPSON INSIDE: PORCH COLUMNS (SEE DRAWING)  
 Model: CM5T14  
 Nailing: 10d Common All 10ex Filled

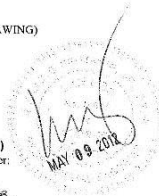
BRAND-SIMPSON  
 MODEL: RSP4(1), RSP4(2) 48" O.C. (TYP)

\*9'-0" Cut to Length Sheathing in Lieu of RSP4(1),(2) Must be 100%

Continuous All Exterior Walls as Indicated on Drawing Provided

\*Typical Nailing Pattern for Sheathing in Lieu of Straps\* (SEE DRAWING ATTACHED)

ANCHOR BOLTS: 1/2" dia., x 10" LONG w/ 2" washers Along Wall: From Each Corner:  
 2" SQ. HD WASHERS IN PORCH COLUMNS Spacing 48" o.c. 6"



# Building Envelope Durability

Secondary water barrier on roof





# Building Envelope Durability

Issue: Standing Water



Garage floor below living floor



Grade for proper drainage



Permit indicates home not in 100 year floodplain





# Building Envelope Durability



Fire resistant materials





# Building Envelope Durability

The Green Difference:  
Residential Fire  
Sprinklers and  
the Environment

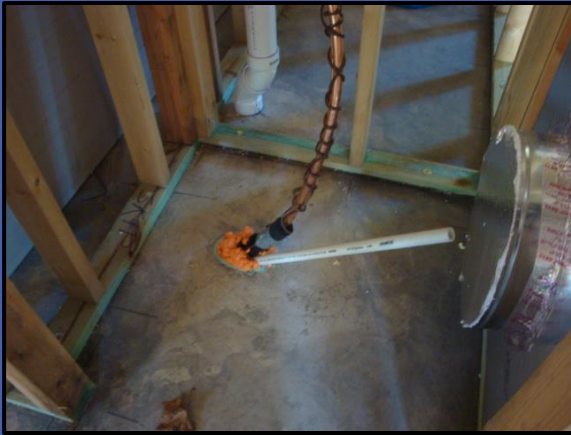




# Building Envelope Durability

## Reduce pest infestations

- Seal floor penetrations
- Move plants/turf minimum of 2 feet from foundation
- Place sprinklers/emitters 2 feet from foundation





# Building Envelope Durability



FOUNDED 1949  
**FLORIDA PEST CONTROL**  
 SINCE 1949

DEC 4 10 2011  
 P.O. BOX 5389  
 111 N.W. 10TH AVENUE  
 GAINESVILLE, FL 32603-5389  
 (352) 376-2661  
 FAX (352) 376-2791

CORPORATE HEADQUARTERS  
 SCIENTIFIC PEST CONTROL DIRECTED BY GRADUATE ENTOMOLOGISTS

Complete Pest Control Service  
 Member Florida & National Pest Control Associations

Reply to: 4970 Capital Cir NW  
 Tallahassee, FL 32303  
 Phone (850) 222-6853 Fax (850) 222-0961

1-28658

## TERMITE TREATMENT CERTIFICATION

Owner:	Permit Number: TBR111575
Loc:	Block:
Subdivision:	Street Address: 1551 KELLY ST
City:	County: Leon
Tallahassee General Contractor:	Area Treated: EXTERIOR/PERIMETER
HABITAT FOR HUMANITY	Time: 9:30 AM
Date:	Applicator ID Number: 180838
12/7/11	Number of gallons used: 30
Name of applicator: WAYNE HANKS	
Product Used: Active Ingredient: % Concentration Premise: Imixta/loprid: 0.10%	

Method of termite prevention treatment: Soil treatment  
 The building has received a complete treatment for the prevention of subterranean termites. Treatment is in accordance with rules and laws established by the Florida Department of Agriculture and Consumer Services.  
 This form is proof of complete treatment for Certificate of Occupancy or Closing.  
**THIS IS PROOF OF WARRANTY**  
 Warranty and Treatment Certifications Have Been Issued  
 Authorized Signature: [Signature] Date: 12/13/11

BRANCHES:  
 • Crystal River • Daytona Beach • Ft. Walton Beach • Jacksonville South • Jacksonville West • Lake City • Milton • Ocala • Orlando • Panama City • Pensacola • Starke • St. Augustine • Tallahassee • Winter Haven • Leesburg • Kissimmee •



# Building Envelope Durability

**Insulation Fact Sheet**

This is Applegate Bora-Spray Stabilized Cellulose Insulation

Applegate Bora-Spray Stabilized Cellulose Insulation has been installed with the manufacturer's recommendations to provide a value of R-\_\_\_\_ using \_\_\_\_\_ bags of insulation to cover \_\_\_\_\_ square feet of area at a thickness of \_\_\_\_\_ (in).

*1500 Meadowbrook Drive*

Building Address: *1500 Meadowbrook Drive*  
City, State, Zip: *Atlanta, GA 30338*

Signature of Installer: *[Signature]*  
Company Name: *DKA Insulation LLC*  
Company City, State, Zip: *Douglasville, GA 30119*

Date Installed: *11-8-11*

R-Value	Ins. Installed Thickness (Inches)	Minimum Stabilized Thickness (Inches)	Coverage per Bag (Square Feet)	Bags per Thousand Square Feet	Weight per Square Foot (pounds)
11	3.3	3.1	82.6	12.1	0.32
13	3.8	3.7	69.9	14.3	0.38
19	5.8	5.4	47.8	20.9	0.55
22	6.5	6.2	41.3	24.2	0.64
24	7.2	6.8	37.7	26.5	0.70
28	7.8	7.4	34.8	28.7	0.76
30	9.0	8.5	30.2	33.1	0.88
32	9.6	9.0	28.3	35.3	0.94
38	10.9	10.2	24.0	41.7	1.26
40	11.5	10.7	20.0	50.1	1.33
46	12.9	12.0	17.7	56.4	1.49
48	13.8	12.8	16.6	60.1	1.59
49	14.1	13.1	16.3	61.4	1.63
50	14.4	13.4	16.0	62.7	1.66
55	15.8	14.7	14.5	68.9	1.83
60	17.2	16.0	13.3	75.2	1.99

APPLAGATE MANUFACTURING FACILITY  
1000 Highway 120  
Douglasville, GA 30135-2827  
800-877-7324

1241 Meadowbrook Drive  
Easton, GA 30538  
706-427-7324

3801 Jackson Street  
Monroe, LA 70130-3227  
504-384-3207

**Read This Before You Buy**  
What You Should Know About R-Values  
The chart shows the R-Value of this insulation. The greater the R-Value, the greater the insulating power. Compare insulation R-Values to determine which has the best insulating power.

The boron-based flame retardants have the added benefit of being toxic to insects and other pests that might be attracted to your home.



**Material Safety Data Sheet**  
Effective Date: November 6, 2007  
Manufacturer's Name, Address, & Phone Number:  
Applegate Insulation Systems of GA, LLC  
1241 Meadowbrook Drive  
Easton, GA 30538  
(706) 779-0035 fax: (706) 779-0072

**Product Name:** Bora-Spray Cellulose Insulation  
**Product Composition:** Manufactured out of secondary fiber paper stock and boric acid. Does not contain any hazardous fiberglass, rockwool, sulfates, or formaldehyde.

**Health Hazard Information**  
**Ingestion:** Not considered toxic. If ingested, rinse mouth and drink large amounts of water.  
**Inhalation:** Dust inhalation may irritate nose or throat.  
**Skin Contact:** Does not normally itch or irritate skin.  
**Eye Contact:** Dust may cause eye irritation upon eye contact.  
**Carcinogenicity:** No.

**Physical Information**  
**Appearance & Odor:** Milled paper fibers. Slight damp paper odor, if any.  
**Permissible concentrations:** Particulates not otherwise listed: 15 mg/m<sup>3</sup>; OSHA PEL total dust: 15 mg/m<sup>3</sup>; respirable dust: 5 mg/m<sup>3</sup>; ACGIH TLV total dust: 10 mg/m<sup>3</sup>.

**Handling Information**  
**In Case of Spill:** Shovel or sweep up and place in container for disposal.

**Respiratory & Eye Information**  
**Where dusty conditions exist:** Use a NIOSH approved dustmask or respirator. If dust is annoying, use dust goggles. Follow good personal hygiene and housekeeping practices.

**Waste Disposal Information**  
**Dispose of in accordance with all applicable federal, state and local environmental regulations.** Applegate cellulose is not considered toxic.

**Fire & Explosion Information**  
**Extinguishing Media:** Water or any standard agent may be used.  
**Special Fire Fighting Procedures:** Use standard procedures as dictated by the given situation. Material contains fire retardants and has a critical radiant flux greater than or equal to 12 w/cm<sup>2</sup> and smoldering combustion less than or equal to 15%, per ASTM C-739. Full protective clothing and self-contained breathing apparatus should be used by firefighters.  
**Unusual Explosion Hazards:** None.  
**Unusual Fire Hazards:** None. However, material should not be applied where temperatures may exceed 180° F. (i.e. Make sure duct work is sealed and maintain clearance around recessed lights, exhaust flues of furnaces and other heat producing devices, per National Electrical Code.)

**Additional Information**  
**This MSDS applies only to the identified product as of the effective date of this MSDS and the contents may not be valid if the product is altered or combined with other products, or used in an unsafe manner or for other than its intended purpose.**  
The Manufacturer has endeavored to disclose accurate and current information, as of the effective date of this MSDS. However, the Manufacturer *disclaims* any warranties, express or implied, representations or guarantees of any kind, regarding accuracy of this information or the properties, fitness, or safety of the product identified herein. The user shall have the sole responsibility for the proper use of the information and for the establishment of proper conditions for, and the safe use of, the product identified herein.  
**Disclaimer:** This MSDS is offered for your information and consideration only, and is not intended for any other person or purpose. It is your responsibility to conduct such investigations as you deem appropriate under the circumstances. Although the identified product is generally not considered to be "toxic", and to the best knowledge of the Manufacturer, there are no known serious health hazards related to its normal and intended use, except as may be disclosed, this product (as a whole) has *not* been tested by the Manufacturer for all potential health hazards or effects. There may be health hazards related to its components.

*For every house is built by someone, but the builder of all things is God. Hebrews 3:4*  
Copyright 2007 Applegate Insulation Systems of GA, LLC





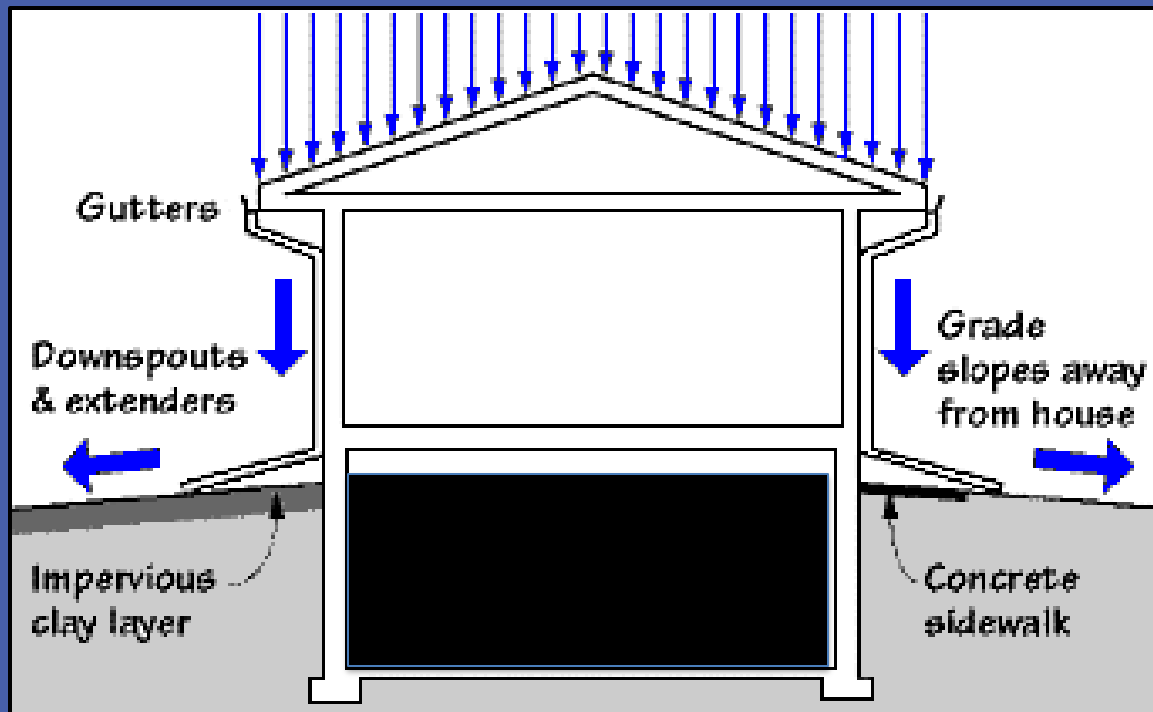
# Building Envelope Durability

Overhangs, gutters and downspouts

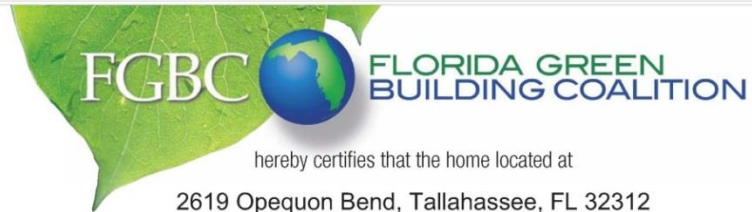




# Building Envelope Durability



# Building Envelope Durability



hereby certifies that the home located at  
2619 Opequon Bend, Tallahassee, FL 32312

Submitted by  
Tallahassee Homes

Has successfully attended to energy efficiency, resource conservation, health, and durability.  
This home has successfully met the Green Building Standards to become a

## Certified Florida Green Home

5483

Certificate #

# SILVER

151

Score

*Cindy Hall*

President, Florida Green Building Coalition

1/7/2013

Date

Certifying Agent, Florida Green Building Coalition

This certification is provided by an individual who has been accredited by the Florida Green Building Coalition to perform Green Home Evaluations.  
Any questions, comments, or complaints regarding the individual performing this service may be directed to the Florida Green Building Coalition.

# Building Envelope Durability

## Home Owner's Manual



Address:

Builder:

### Table of Contents

Build Green Certification Standard	3
Introduction	4
Optimizing Outdoor Water Use	4
Optimizing Indoor Water Use	6
Optimizing Energy Use	7
Recycling	8
Disposing of hazardous materials	8
Alternative Transportation	8
Water, Power, and Gas Shutoffs	9
Maintenance checklist	9
Operation of Equipment	10
Warranty	11
Green Home Certification & Green Features	Exhibit A
Appliance manuals	In pockets





# Building Envelope Durability

- New homes built today are expected to last at least 75 to 100 years
- Materials used in homes need to be durable.
  - Inherent material characteristics make them more durable.
  - Design, installation, and treatment of materials is what truly enhances durability and creates a material's greatest efficiency.



# Building Envelope Durability

## Review—Durability

- Define durability
- Durability applies to more than just the building.
- What is sustainability, and how is it different from durability?



THANK YOU

Questions & Answers





# FLORIDA RESOURCES

Florida Green Building Coalition  
<http://www.floridagreenbuilding.org/>

Two Trails - <http://www.twotrails.com/>

Masonry Association of Florida  
<http://www.floridamasonry.com/>

Fi-Foil Company, Inc.  
<http://www.fifoil.com>

As well as your local Home Builders Association