2009 INTERNATIONAL ENERGY CONSERVATION CODE

(2009 IECC)

SINGLE FAMILY RESIDENTIAL CONSTRUCTION WORKSHOP

Village of Northbrook, Illinois

March 5, 2010

www.northbrook.il.us

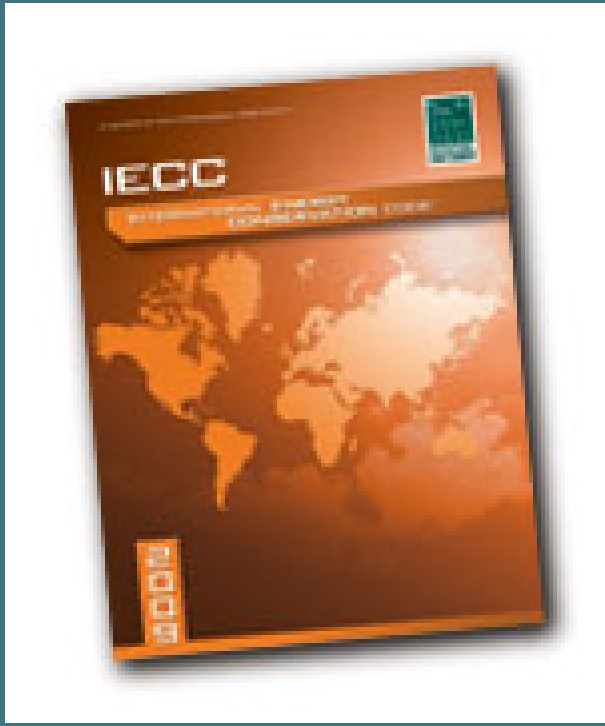
Energy Code

Effective January 29, 2010, compliance with the 2009 IECC is required for residential construction in Illinois.

Code book available from:

International Code Council

www.iccsafe.org



Structures Required to Meet Code

- ✓ All <u>new</u> 1 & 2 family residences
- ✓ <u>Addition</u> to existing residences
- ✓ <u>Altered portions</u> of existing residences

Exempt From Code

Not required to meet the 2009 IECC code:

- Areas that are not conditioned
  - Unconditioned attics
  - Unconditioned basement areas
  - Unconditioned crawl spaces
- Historic Buildings
- Very Low Energy Use Buildings

Important to Know…

Most important concept to understand and demonstrate:

- **Building Thermal Envelope:**

  The enclosure of conditioned space by foundation, walls, floors, ceilings & roofs

Other important concepts:

- **Conditioned Space:**

  Areas that are provided with heat & cooling

- **Unconditioned Space:**

  Areas without heat & cooling

- **R-Value** (larger is better) R=1/U
- **U-Factor** (smaller is better) U=1/R

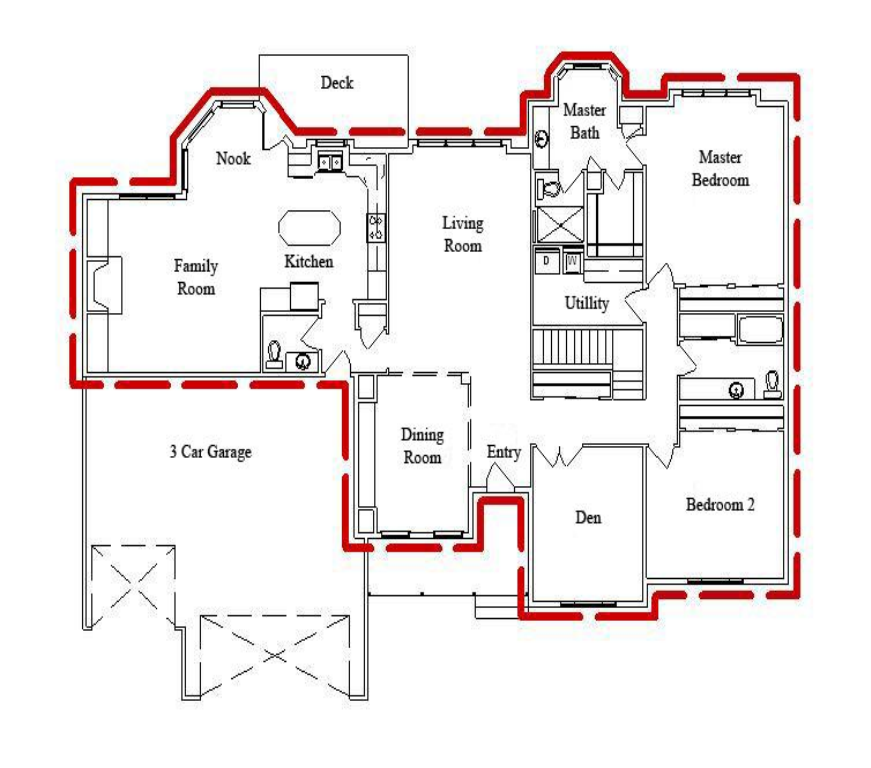
Building Thermal Envelope

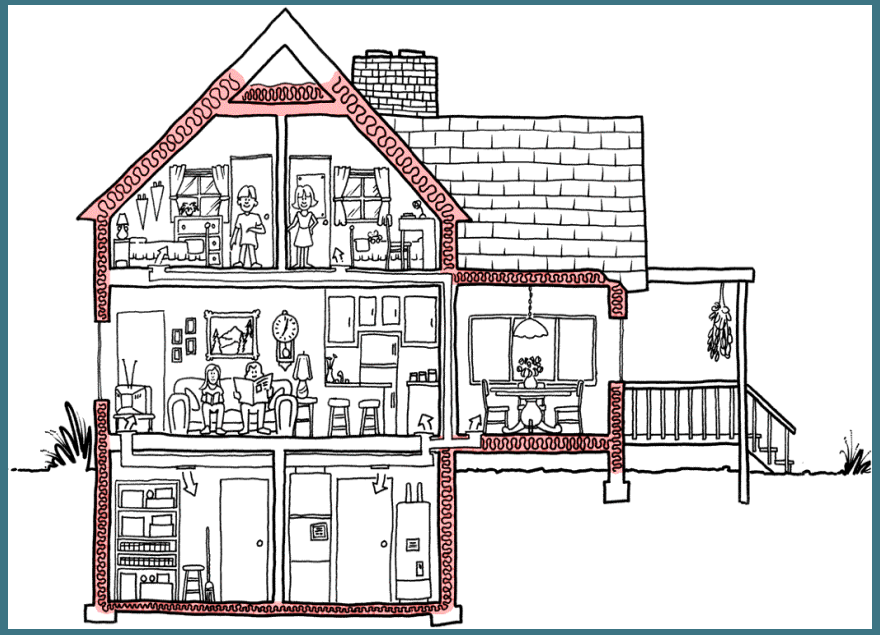
The building thermal envelope identifies the line between conditioned and unconditioned space. The envelope is required to be shown graphically on the permit drawings for compliance review.

The thermal envelope is made up of the following building components:

- Walls
  - Foundation
  - Exterior above grade
- Ceilings
  - Flat
  - Vaulted/Sloped
- Floors (over unconditioned spaces)
- Roofs

Thermal Envelope





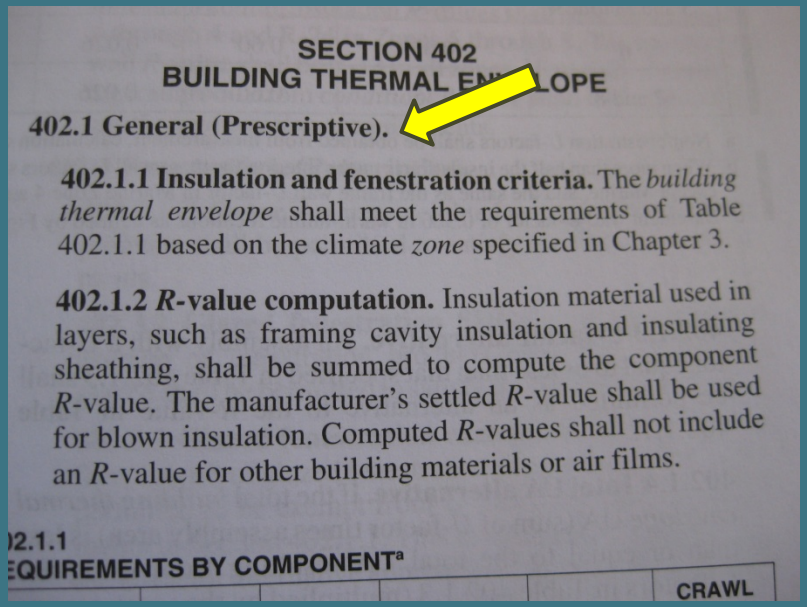
Images from Building Energy Codes Online Training

REScheck 101 Training-2006 IECC

Methods for Compliance

Compliance may be by either of these methods:

Prescriptive (Rx) or ***Performance***



SECTION 402
BUILDING THERMAL EN[illegible]LOPE

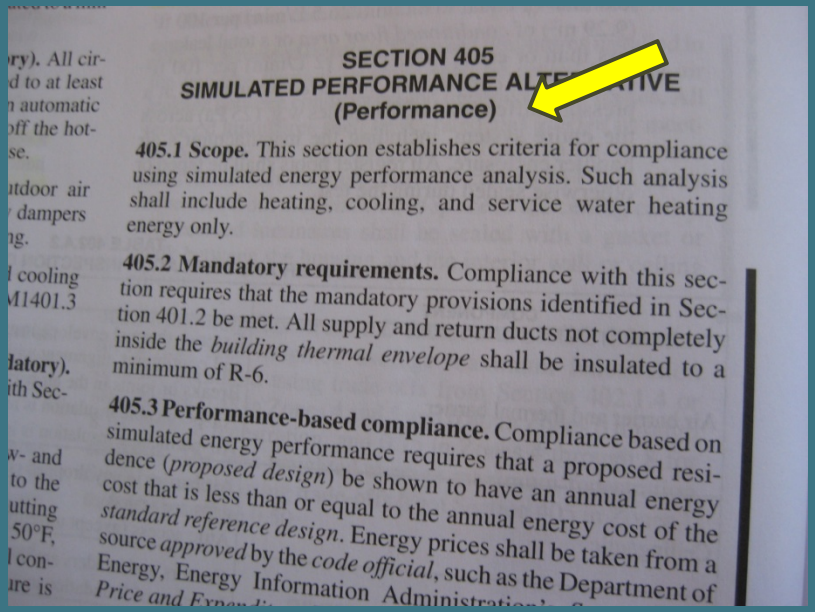
402.1 General (Prescriptive).

402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Table 402.1.1 based on the climate *zone* specified in Chapter 3.

402.1.2 *R*-value computation. Insulation material used in layers, such as framing cavity insulation and insulating sheathing, shall be summed to compute the component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

)2.1.1
EQUIREMENTS BY COMPONENT[a]

CRAWL



SECTION 405
SIMULATED PERFORMANCE ALT[illegible]IVE
(Performance)

405.1 Scope. This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling, and service water heating energy only.

405.2 Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section 401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

405.3 Performance-based compliance. Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's

Can't switch between paths… follow one or the other!

Prescriptive Method

In the Prescriptive Method, compliance is by components

The components are required to meet the values in the "Insulation & Fenestration Requirements by Component" Table 402.1.1

Prescriptive Method- Insulation & Fenestration Criteria

The prescriptive method utilizes the building components for specific requirements found this table…

2009 IECC TABLE 402.1.1

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT [a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR [b]	SKYLIGHT [b] *U*-FACTOR	GLAZED FENESTRATION SHGC [b e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE [i]	FLOOR *R*-VALUE	BASEMENT [c] WALL *R*-VALUE	SLAB [d] *R*-VALUE & DEPTH	CRAWL SPACE [c] WALL *R*-VALUE
5	0.35	0.60	NR	38	20 or 13+5 [h]	13/17	30 [g]	10 / 13	10, 2 ft	10 / 13

We are in **Climate Zone 5**

Prescriptive Method- Insulation & Fenestration Criteria

Table 402.1.1 summarized for Climate Zone 5:

- Foundation wall R-10 or R-13
- Wall (frame) R-20 or 13+5
- Ceiling R-38
- Floor over unconditioned space R-30
- Doors / Windows U=.35 max
- Skylights U=.60 max
- See code for footnotes and mandatory requirements

When using this method, no supporting documentation is required beyond what is necessary to show compliance on the submitted permit drawings.

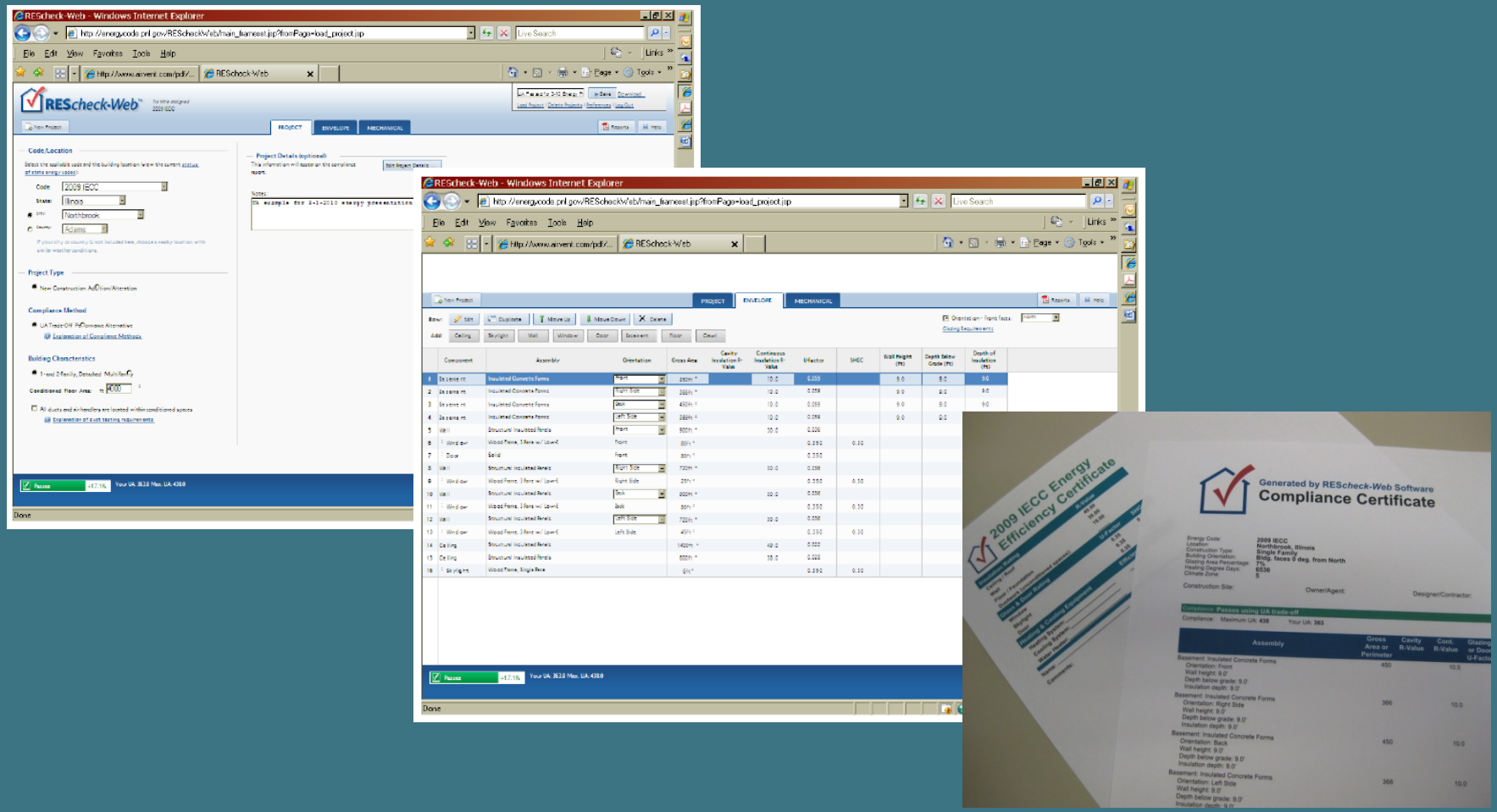
Performance Method

If the prescriptive method cannot be met, documentation by a simulated energy performance software program is required.

ResCheck (from the U.S. Department of Energy) is an example of a commonly used software program.

ResCheck example follows…

Performance Method- ResCheck



Mandatory Requirements

Apply to both methods

Areas governed are:

- Air Leakage
- Building Envelope
- Fenestration U-factor
- Mechanical
  - Controls
  - System Pipe Insulation
  - Ventilation
  - Duct Sealing
  - Outdoor Air Intakes
  - Equipment Sizing
- Circulating Hot Water System
- Swimming Pools
- Snow Melting
- Fireplaces

trol that will allow shutoff when the outdoor temperature is above 40°F.

403.9 Pools (Mandatory). Pools shall be provided with energy-conserving measures in accordance with Sections 403.9.1 through 403.9.3.

403.9.1 Pool heaters. All pool heaters shall be equipped with a readily *accessible* on-off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas shall not have continuously burning pilot lights.

403.9.2 Time switches. Time switches that can automatically turn off and on heaters and pumps according to a preset schedule shall be installed on swimming pool heaters and pumps.

Exceptions:

1. Where public health standards

For Both Methods of Compliance…

On the Permit Drawings

Graphically Indentify:

- ✓ **Thermal Envelope** (in Plan)
  - Walls
  - Floors, Ceilings (Roofs) Above
  - Pipes/Ducts in Exterior Walls/Ceilings

In Note or Drawing Format Indentify:

- ✓ **Insulation R-Values in Plan** (and sections/details as applicable)
- ✓ **Door, Window, Skylight U-Factors**
- ✓ **Mechanical Efficiencies Including AFUE & SEER**
- ✓ **Mechanical Insulations & Sealing**

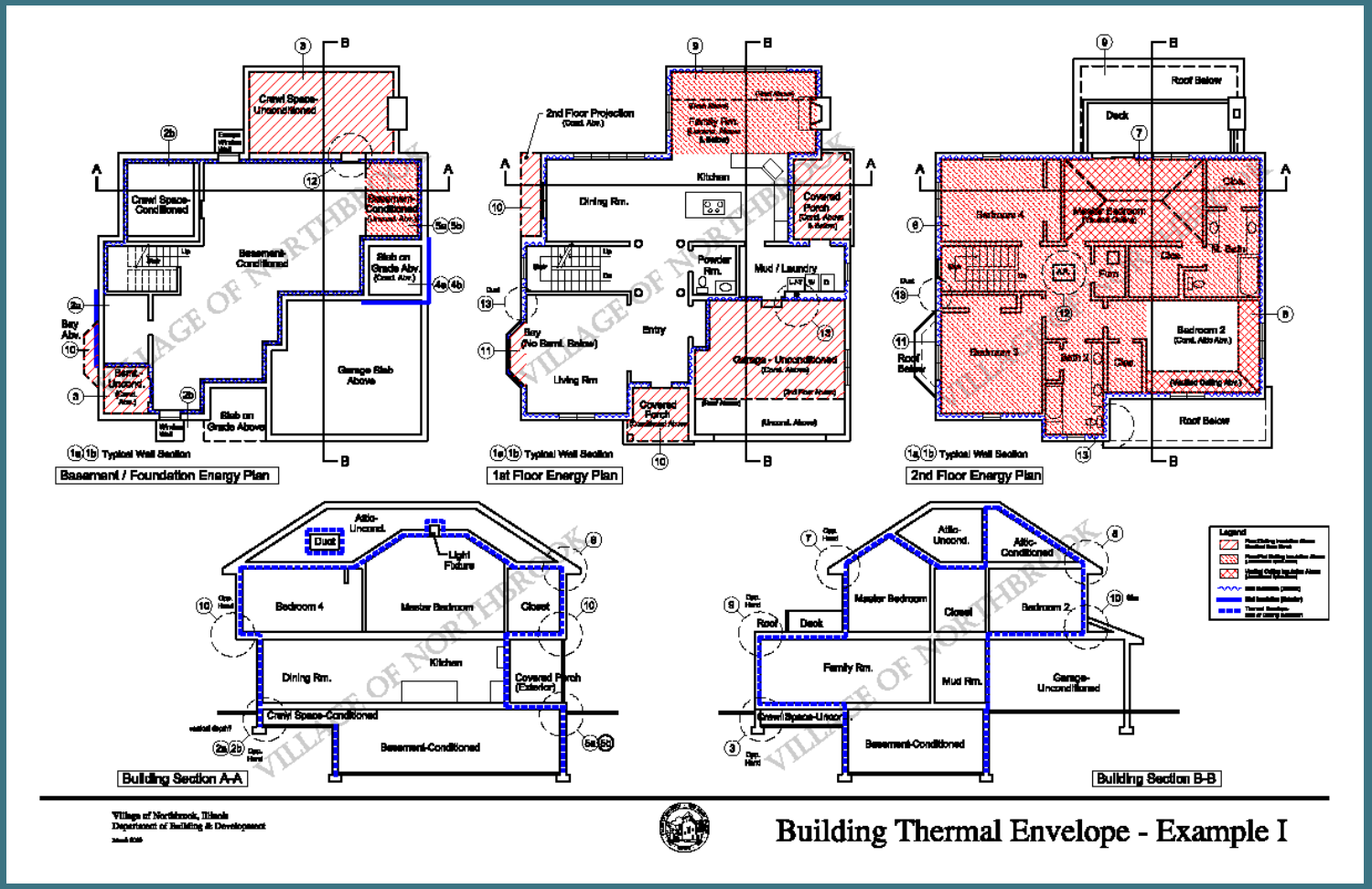
Graphic Documentation Examples

The following drawing examples are a way to document the necessary information to facilitate permit review for code compliance.

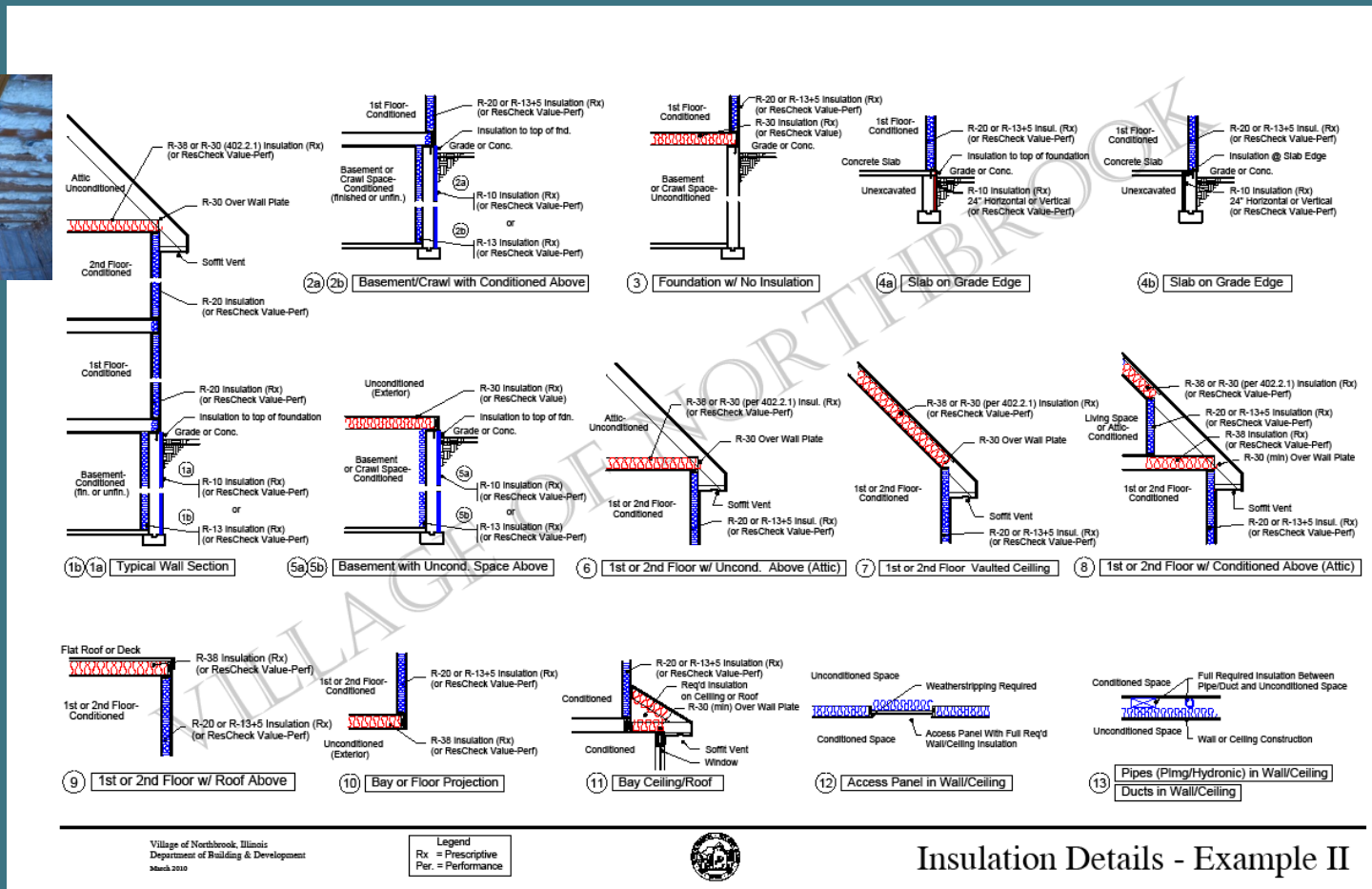
Show information on:

- Plans
- Sections (as required to fully explain thermal envelope)
- Details (as required to fully explain thermal envelope)

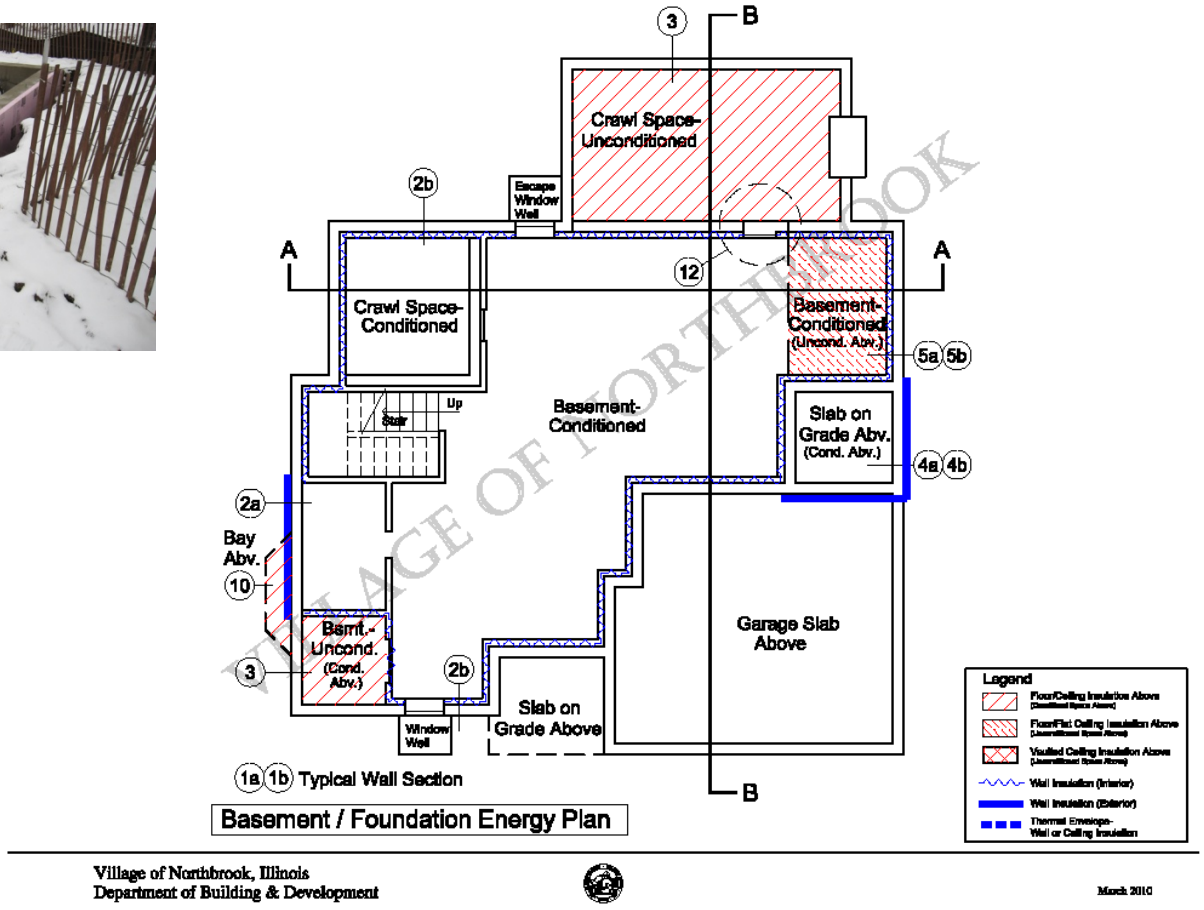
Energy Plans/Sections-Example I



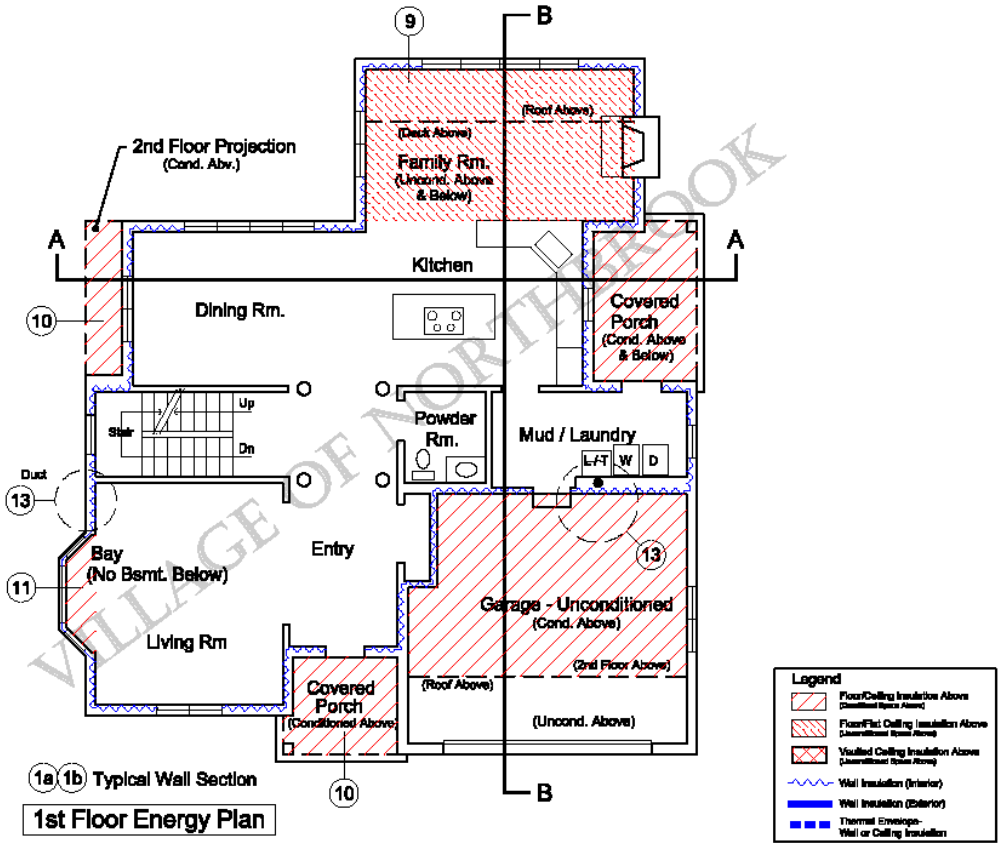
Insulation Details-Example II



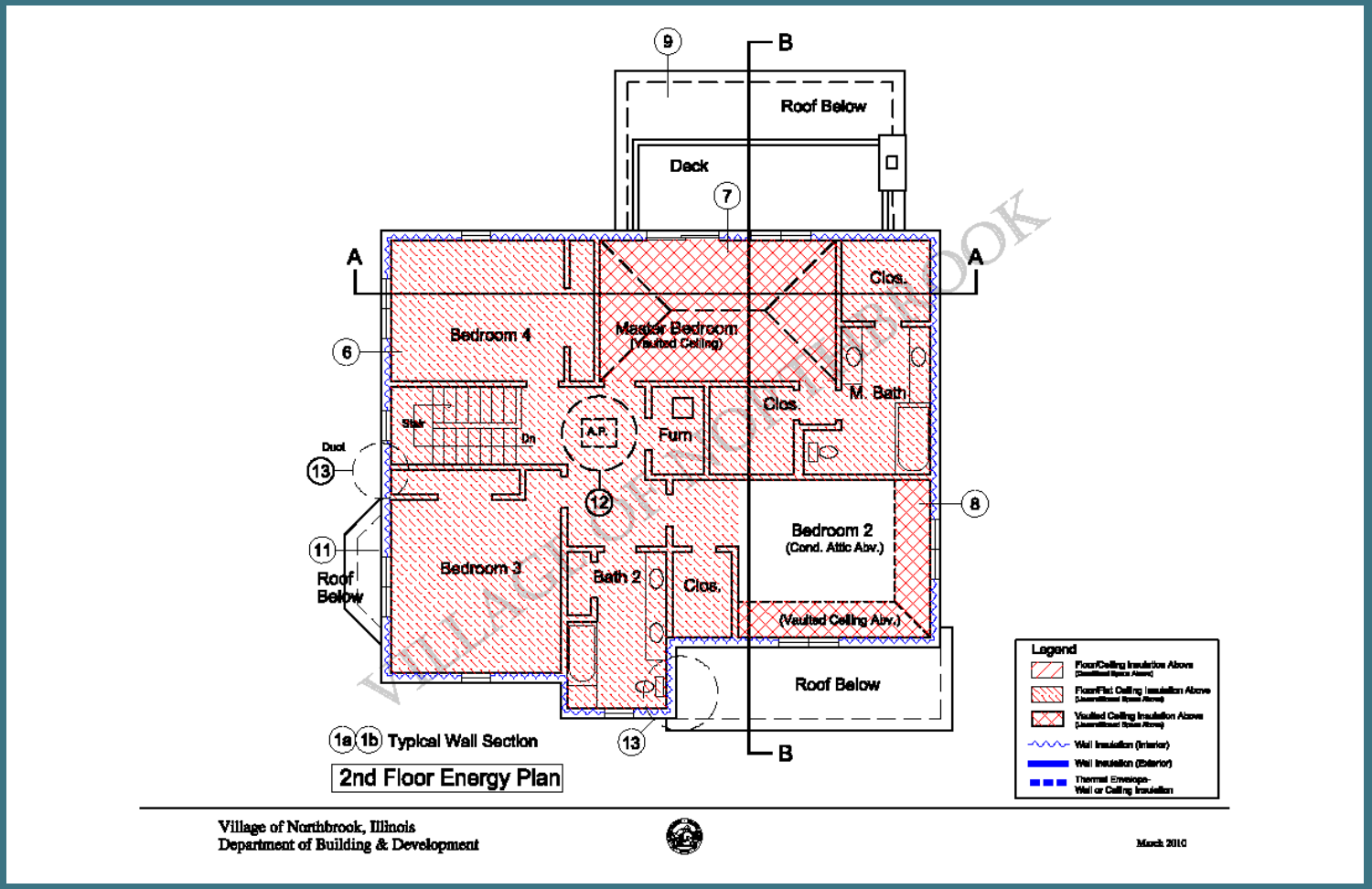
Basement/Foundation Energy Plan



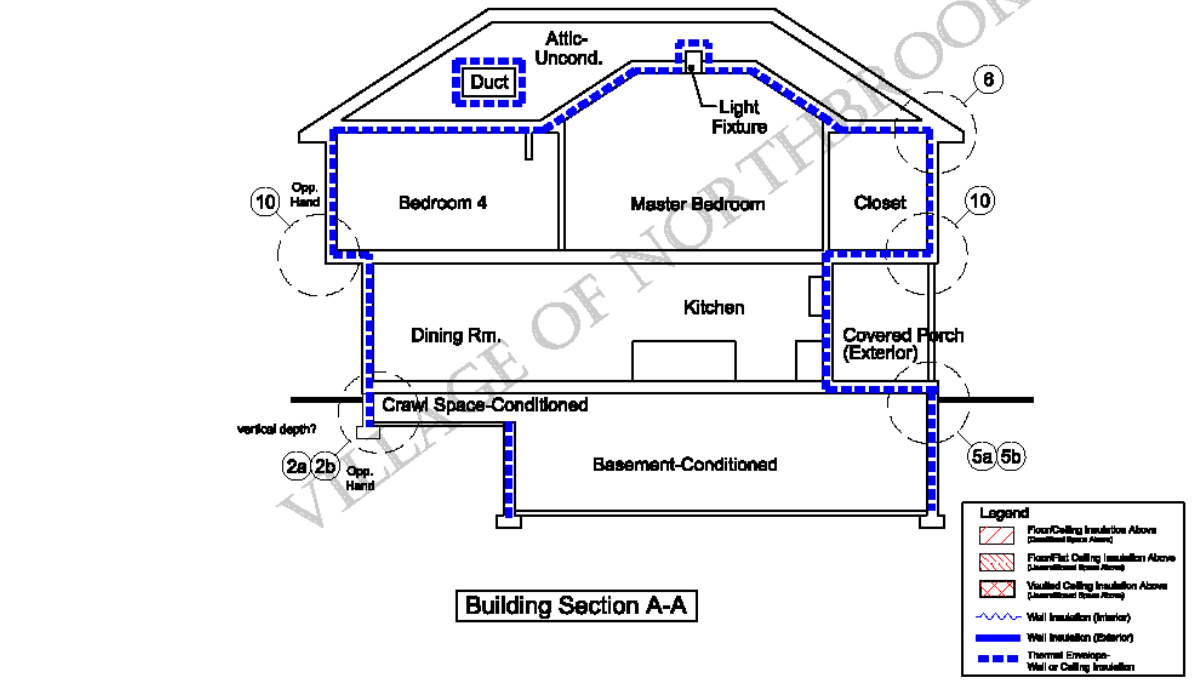
1st Floor Energy Plan



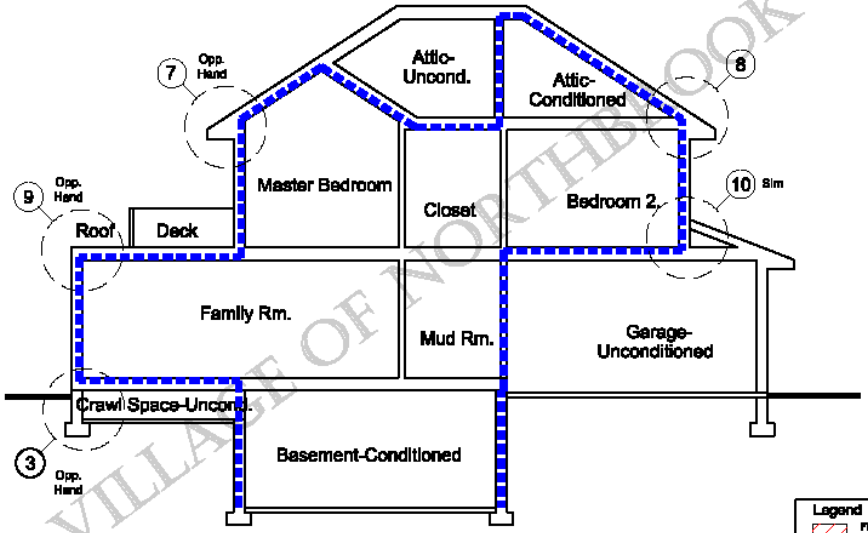
2nd Floor Energy Plan



Building Section A-A



Building Section B-B



Building Section B-B

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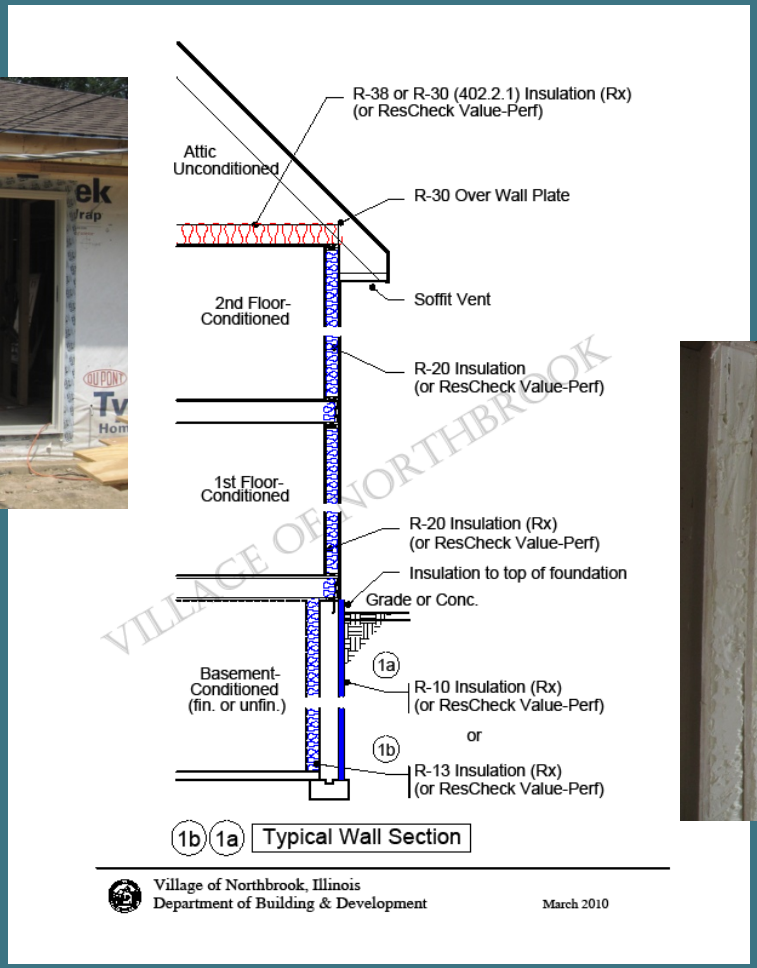
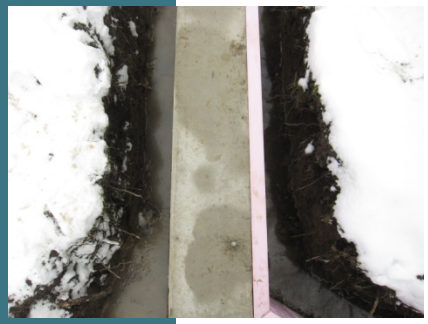
Department of Building & Development

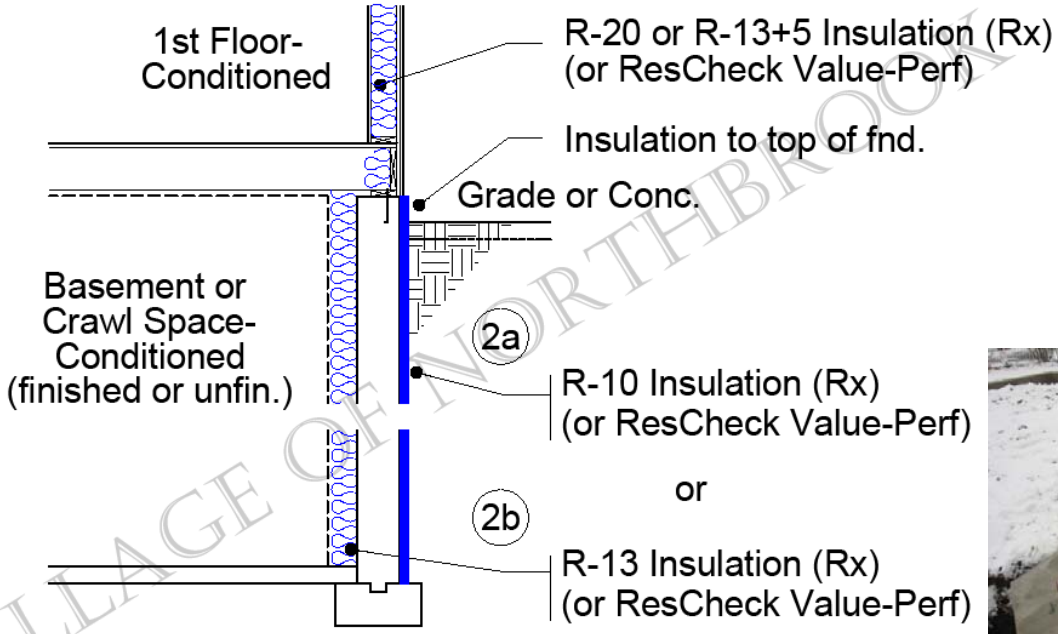
March 2010

Typical Exterior Wall Detail



Foundation Detail





2a 2b Basement/Crawl with Conditioned Above

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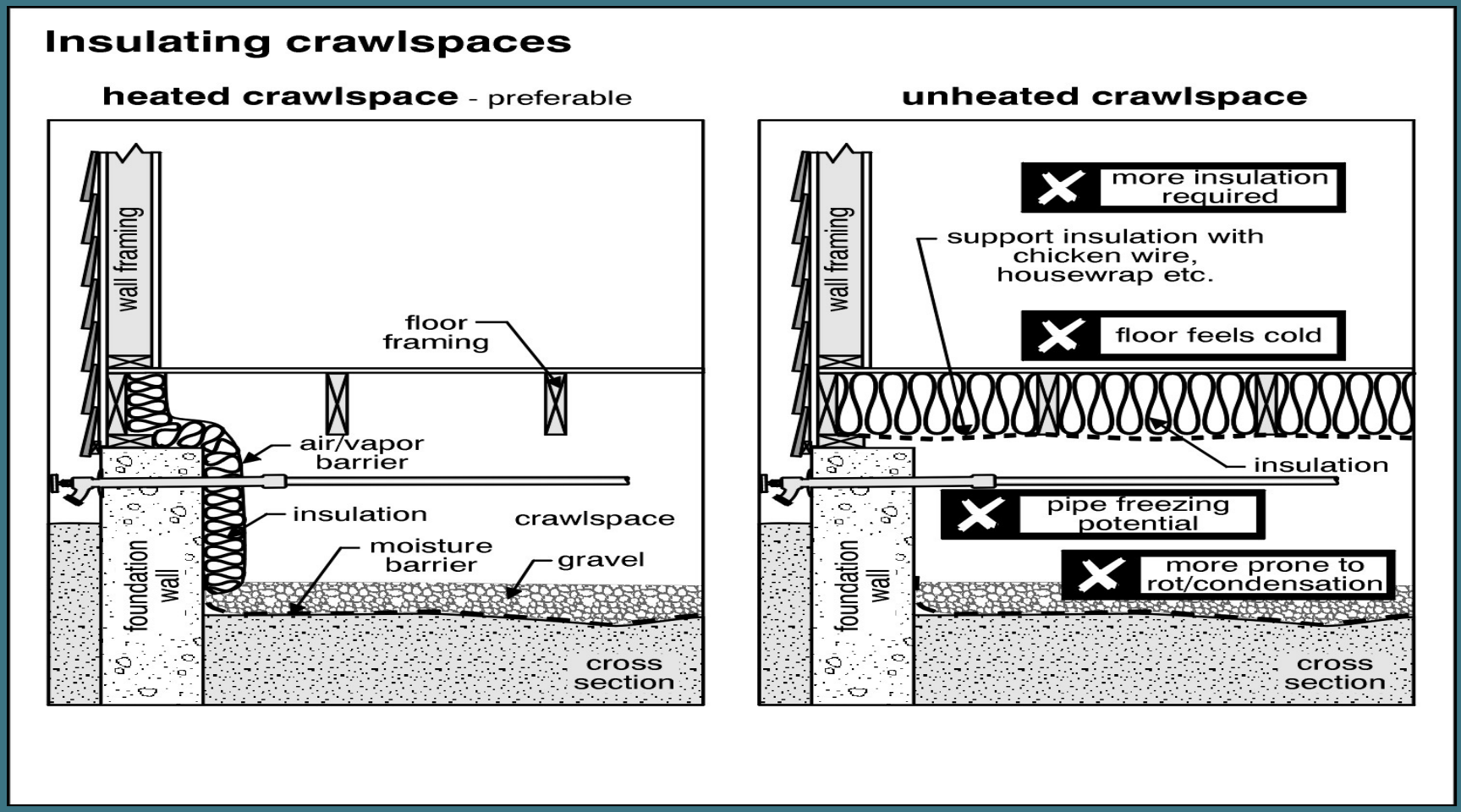
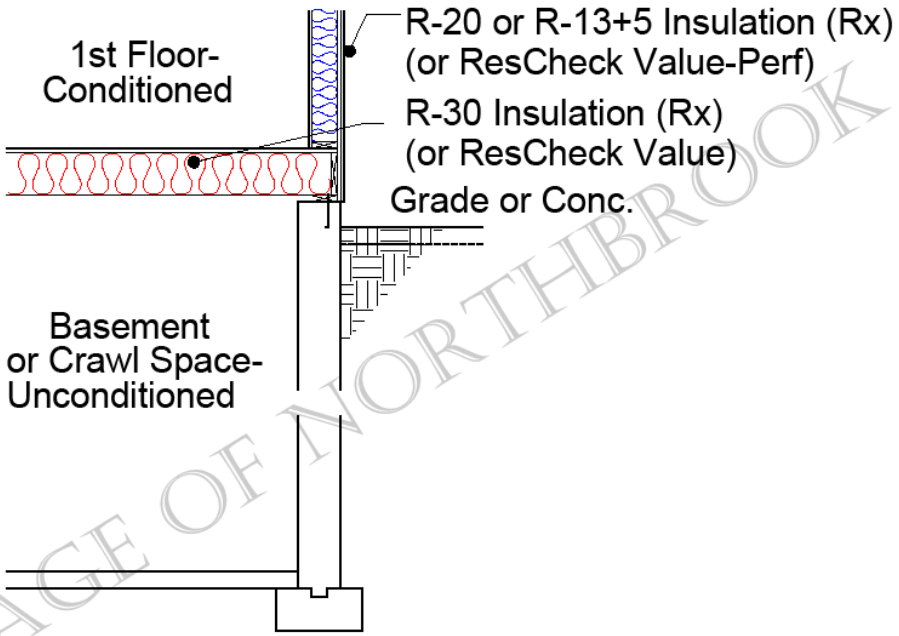
Conditioned vs. Unconditioned Crawl



Floor Over Unconditioned Detail



3 Foundation w/ No Insulation

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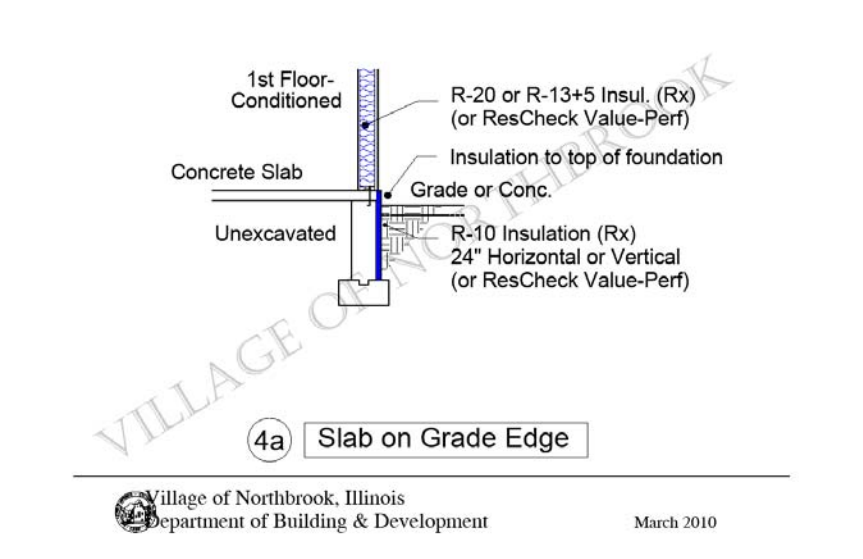
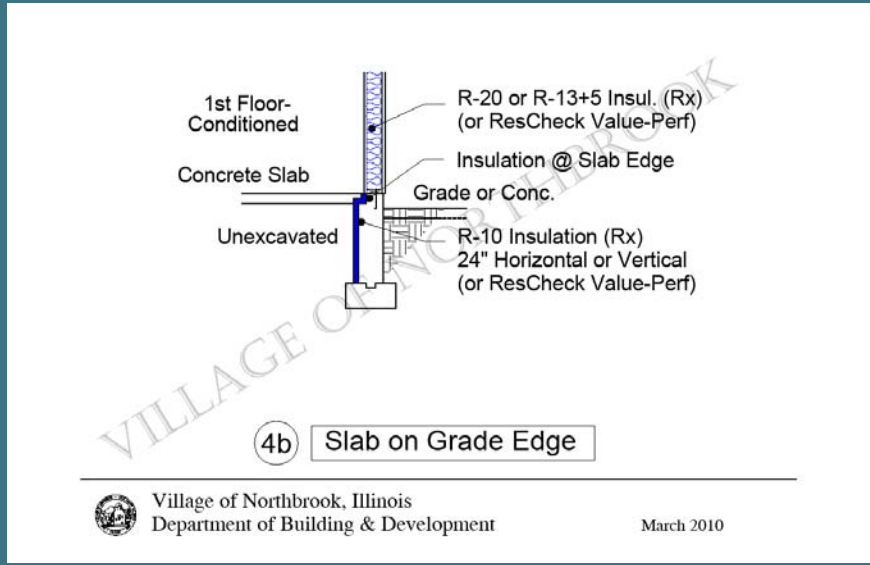
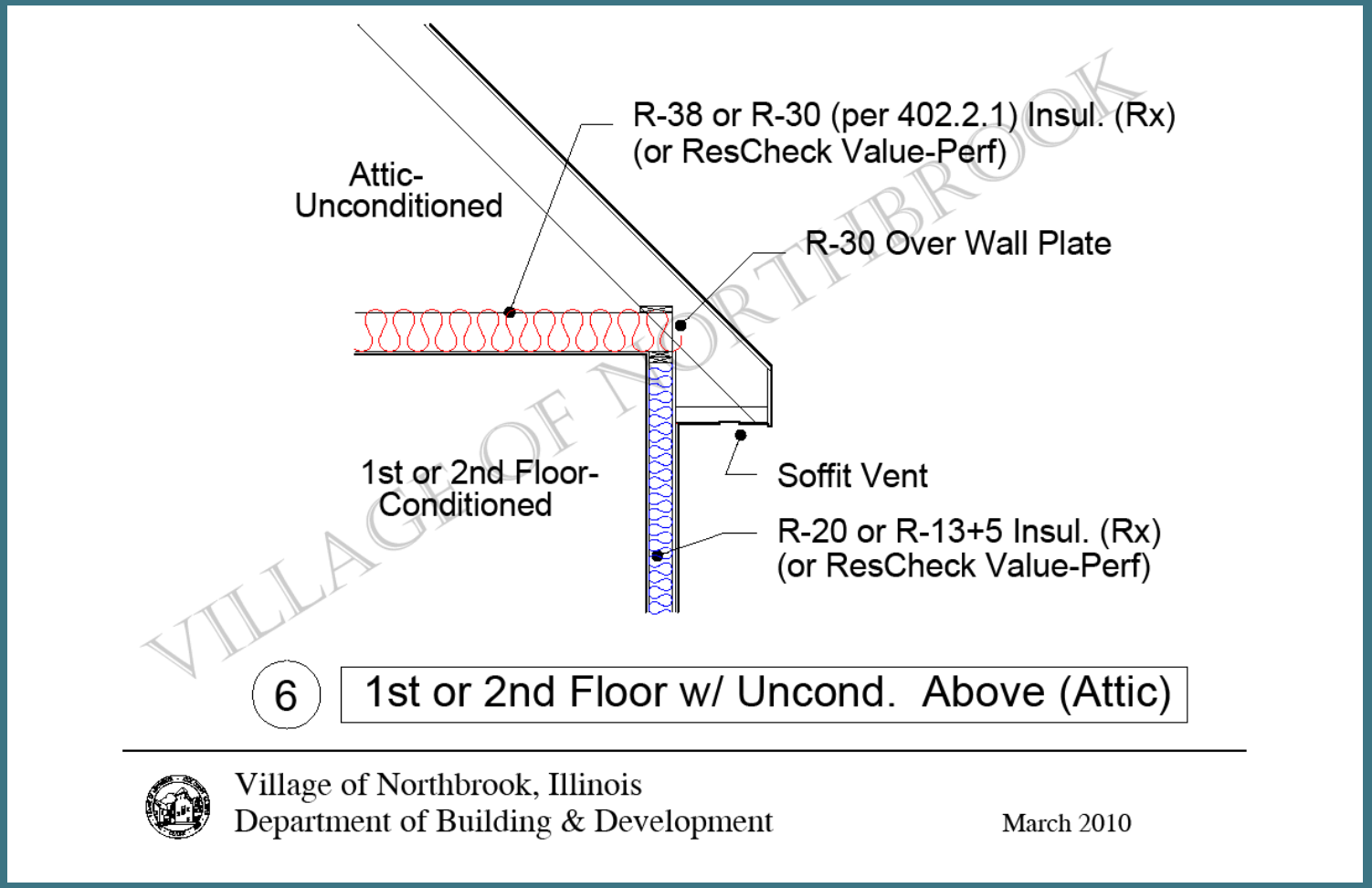
Conditioned Crawl Space

Concrete Slab-on-Grade Detail



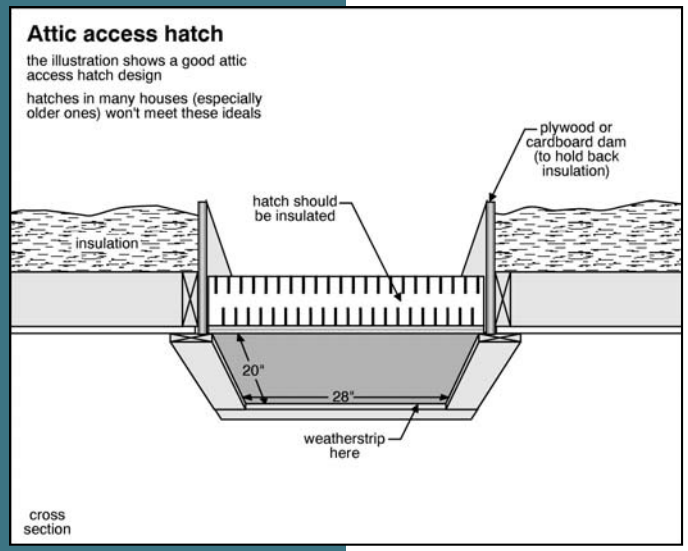


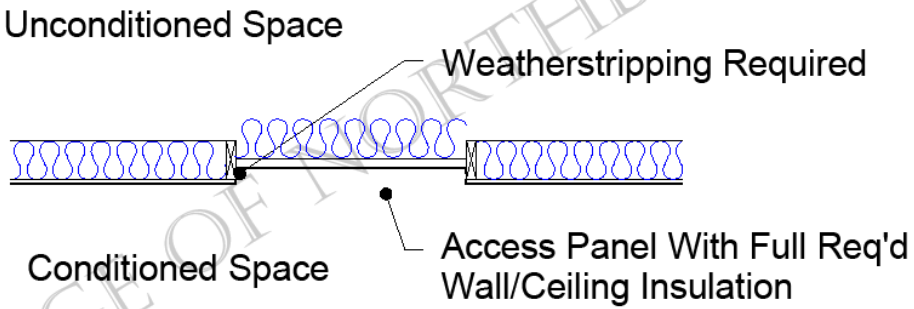
Unconditioned Attic Detail



Unconditioned Attic

Access Panel Detail





12 Access Panel in Wall/Ceiling

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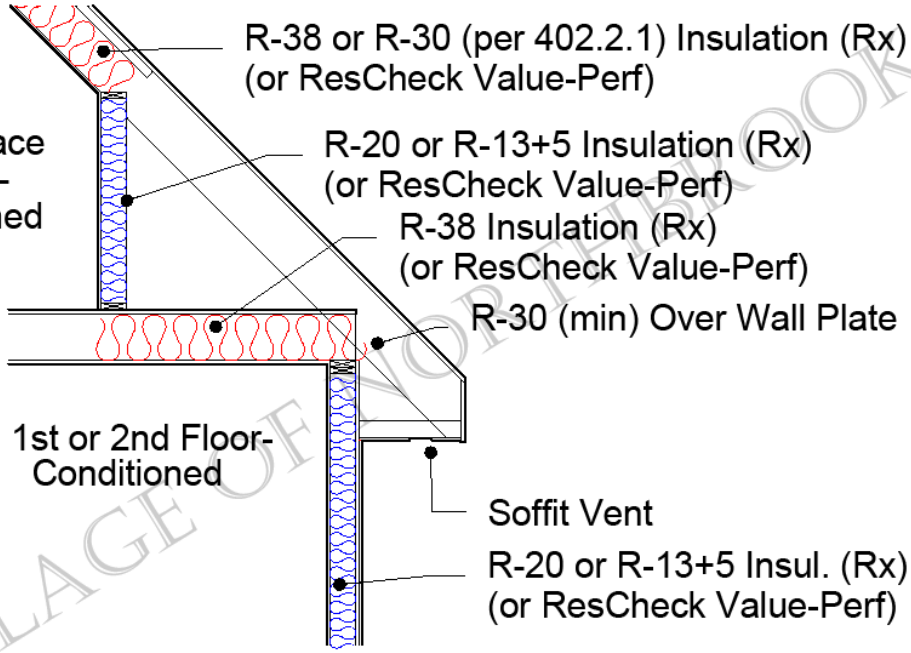
Conditioned Attic Detail



8 1st or 2nd Floor w/ Conditioned Above (Attic)

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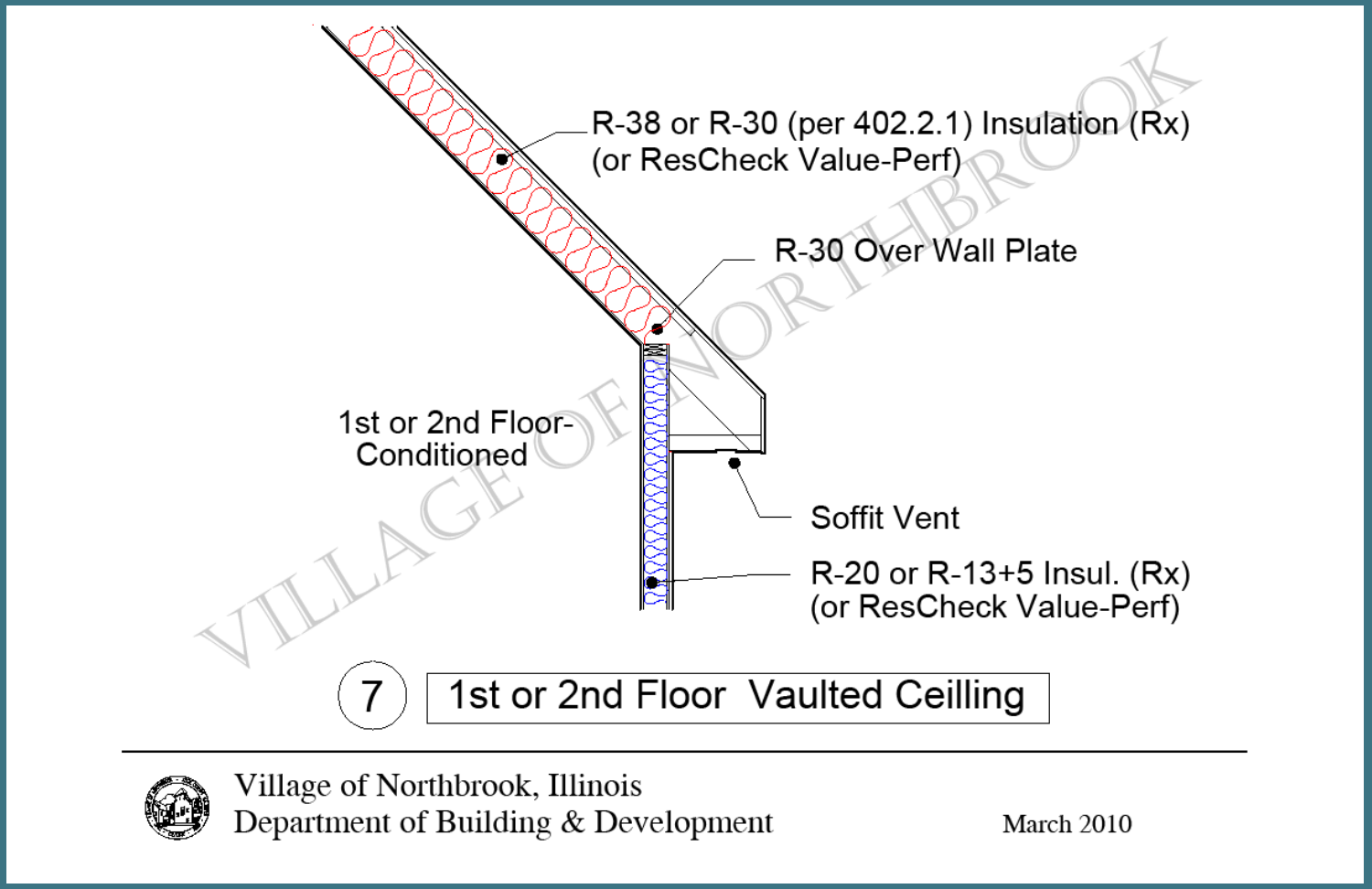
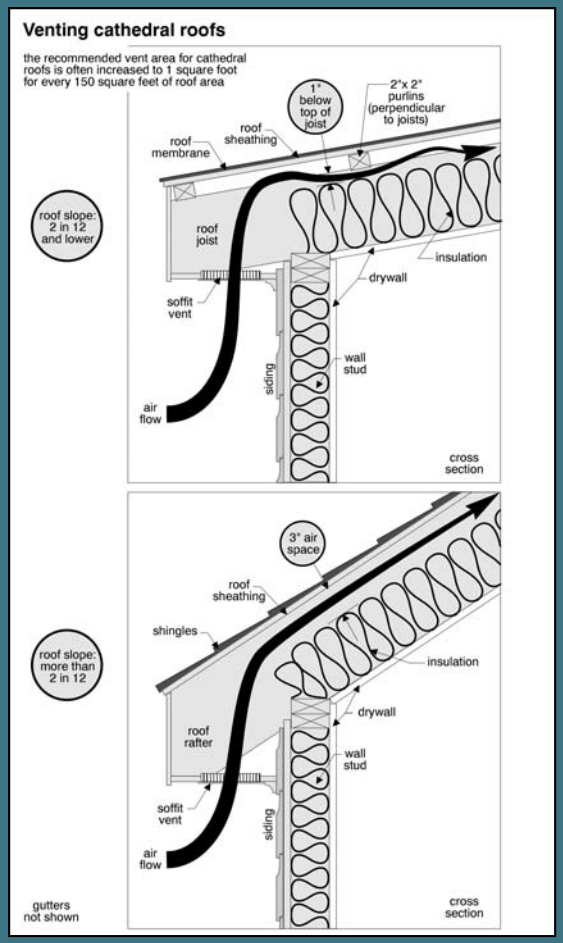
Vaulted Ceiling Detail



Vaulted Ceiling Venting



During Construction…

Inspections are required before finishes can be installed!

Note: To be considered within the conditioned space, ducts & pipes must have the full required R-Value between them and the exterior

Remember During Construction…!

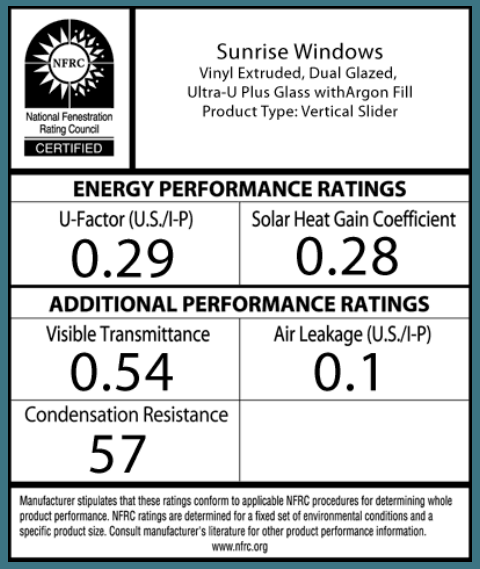
The Building Thermal Envelope Must Be Maintained

Insulation Required Between Ducts/Piping and the Exterior

Inspecting for Compliance

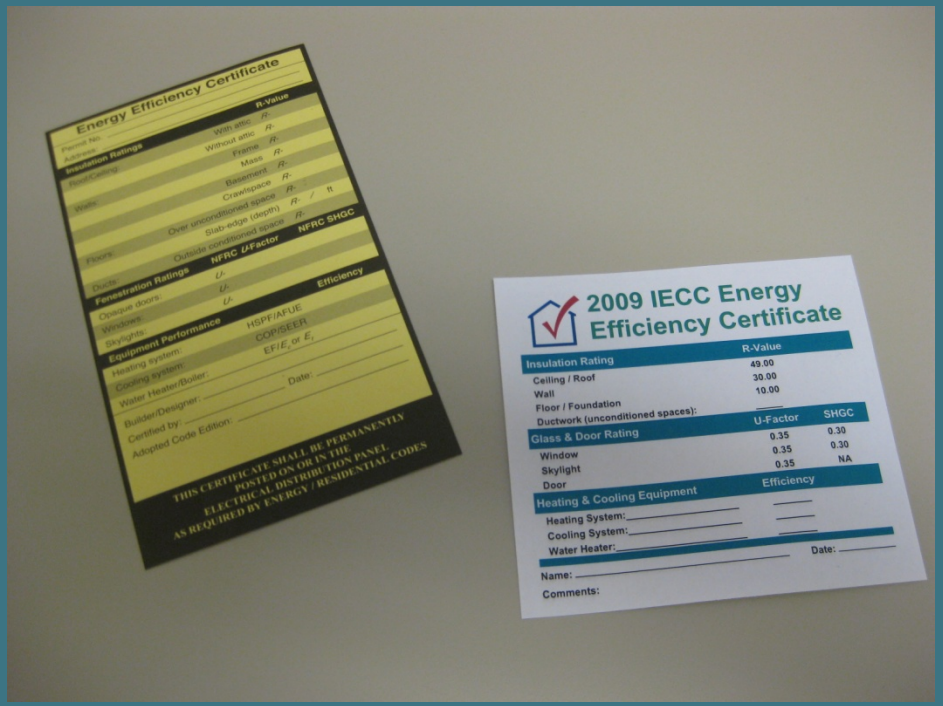
These items must conform with the approved permit drawings that are on the construction site:

- ✓ Building Thermal Envelope (integrity of)
- ✓ Insulation R-Values
- ✓ Window / Door / Skylight U-Factors
- ✓ Vapor Retarder
- ✓ Mechanical Equipment
- ✓ Air Leakage
  - Visual Inspection or
  - Blower Door Test
- ✓ Presence of Energy Certificate



Energy Certificate

The energy certificate included with the permit documents must be mounted in, or near, the electrical panel.



Additional Resources

DOE Resource Center:

http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter

DOE Compliance Tools:

http://www.energycodes.gov/compliance_tools.stm

ResCheck

http://www.energycodes.gov/rescheck/

Changes between the 2006 & 2009 IECC

www.energycodes.gov/training (see presentation-.ppt by Mark Halverson)

Inspecting for the Residential Provisions of the IECC:

http://www.energycodes.gov/rescheck/pdfs/iecc_00_plancheck.pdf

Additional Resources (continued)

DOE Training / Education:

http://www.energycodes.gov/training/

http://www.energycodes.gov/training/pdfs/iecc_res_wb.pdf

DOE EERE Building Energy Codes Program Information:

http://www.energycodes.gov/implement/state_codes/reports/residential/Residential_Illinois.pdf

EnergyStar/HERS Index (prevailing minimum federal efficiency)

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_HERS

Village of Northbrook – Department of Building & Development

http://www.northbrook.il.us

The End

Thank you for attending