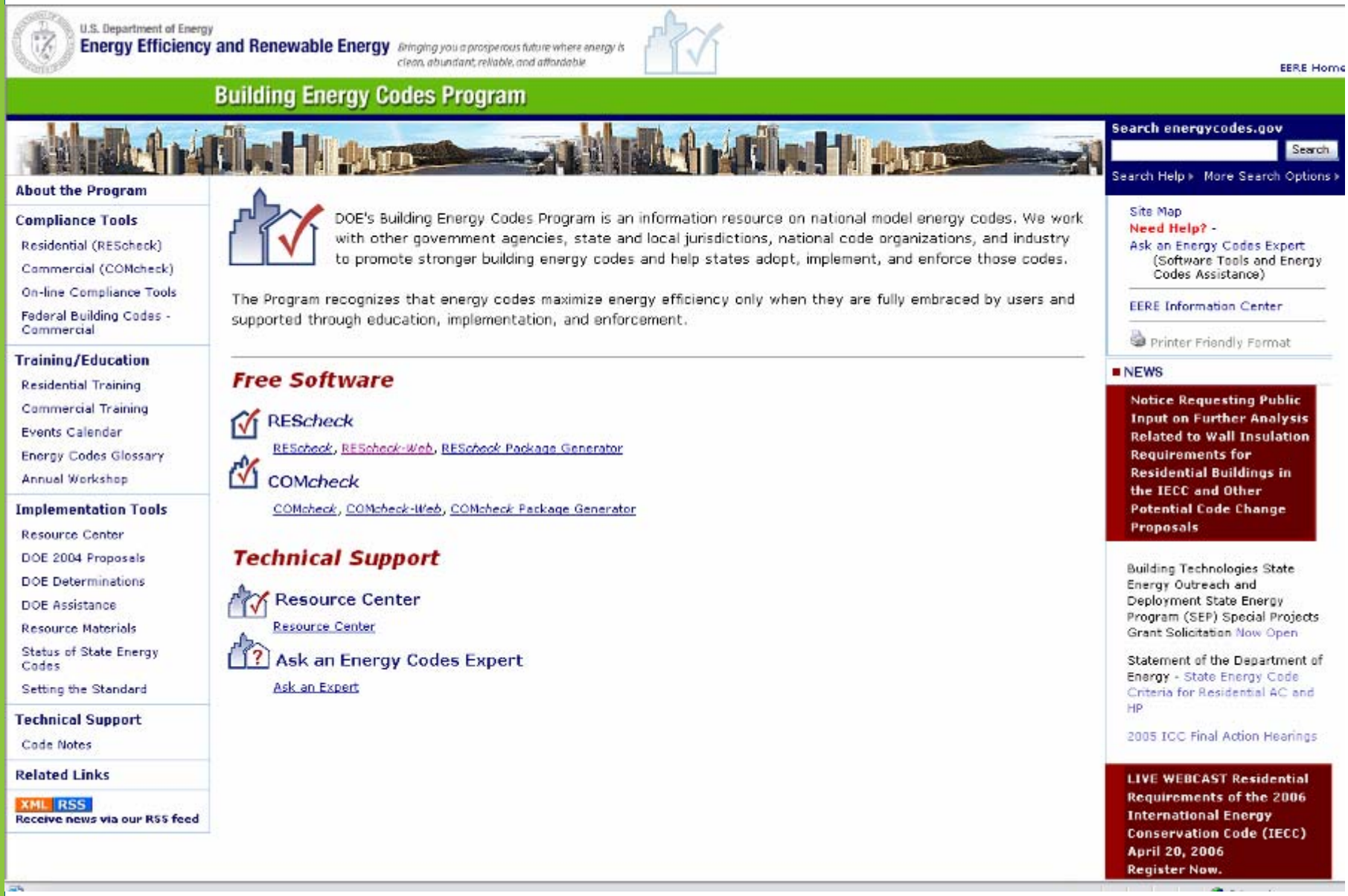
U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Building Energy Codes

How to Use RES*check* Energy Code Compliance Software

U.S. Department of Energy
Building Energy Codes Program

www.energycodes.gov
techsupport@becp.pnl.gov



Residential Compliance Tools

Desktop Software Tools

Web-Based Tools

Free

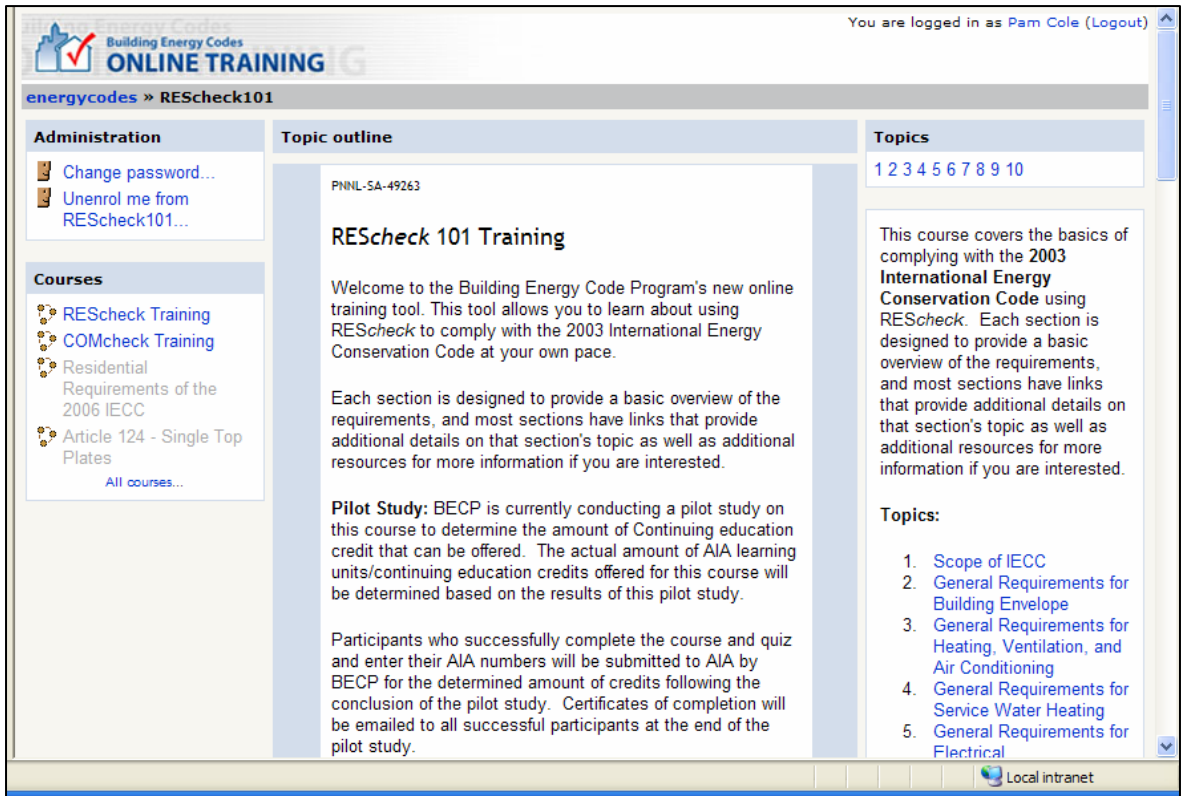
Printed Materials

Compliance Guides

Prescriptive Tables

Training Tools

- PowerPoint presentations with faculty notes
- Case studies
- Online training
- Online videos



Building Energy Codes
RESOURCE CENTER

SEARCH: All Media FOR: » SEARCH BROWSE: Select a Topic... » GO!

Home | About the Resource Center | Ask a Question | Advanced Search | Help

Welcome to the Building Energy Codes Resource Center

This system has been developed to provide users with information about energy codes and beyond code technologies. You can SEARCH by keyword, or BROWSE the available topics. Start your research using the toolbar at the top of the page.

Resources are available in a variety of different media types, including Articles, Graphics, Online Tools, Presentations, and Videos. The BECP Resource Center gathers content not only from our own archives, but also provides links to energy code resources from around the web. Learn more about the Resource Center.

NEW MATERIALS

- Article #1529: Energy Policy Act 2005 and Tax Credits
- Article #1533: Appropriate Use of Building Energy Simulation Software
- Article #1484: Vestibule Case Study

POPULAR RESOURCES

- Article #139: Insulating Suspended Ceilings
- Building Energy Codes Glossary
- Article #1420: Energy Code Climate Zones
- Article #1469: How Do I Enter Non-Uniformly Insulated Basement Walls in REScheck?

Local intranet

What Residential Code Compliance Tools does BECP offer?

Prescriptive Approach

- Simple, fast and easy
- Generally most stringent

- Requires minimum input
- Based on climate and WWR
- Uses a prototype building

1 Printed guides on www.energycodes.gov

or

2 REScheck™ Package Generator

Trade-off Approach

- Trade-off between components
- Provides design flexibility

- Requires area & U/R-factors
- Uses UA calculation (RES*check*)

Free

1 REScheck™

Desktop Versions:

Windows
Mac

or

2 REScheck•Web™

All RES*check* tools available from www.energycodes.gov

When does RES*check* apply?

Residential New Construction and Additions

- 1-2 single family dwellings
- Multifamily dwellings: 3 or more attached dwelling units 3 stories or less

State Dependent

- Not all states have the same code, some states have state-specific energy codes
- Check to see what code is applicable in your state and if RES*check* is accepted
- Status of State Codes
  - http://www.energycodes.gov/implement/state_codes/index.stm

Residential Requirements

1) Mandatory Requirements:

- Moisture Control
- Air Leakage - Recessed Lighting Fixtures
- Infiltration Control
- Solar Heat Gain Coefficient
- Building Mechanical Systems and Equipment
- Service Water Heating

2) Climate Specific Requirements:

- Foundations
  - Crawlspaces
  - Slabs
  - Basements
- Above Grade Walls
- Skylights, Windows, and Doors
- Roofs
- Duct Insulation

Case Study – RES*check* Software

Jones Residence

What Do I Need to Know?

Information you need to use RES*check*:

1. General Understanding of Windows-based Computer Programs
2. Basic Information about the Builder and Home to be Constructed
3. House Plans including Exterior Wall Areas, Glazing Areas, Roof/Ceiling Areas, Basement Wall Areas, etc.
4. Insulation R-Values, NFRC Glazing and Door U-Values, etc.
5. Heating and Cooling System Efficiencies


Microsoft Outlook
Internet Explorer
Firefox Setup 1.0PR
ETR
Microsoft Photo Editor
Mozilla Firefox
Adobe Reader 6.0
Work_Pkg
URL's and Emails
Software Analysis
URL's
Attendee_List
Microsoft PowerPoint
Link Check
Implementati...
Microsoft Word
Desktop Stuff
COMcheck-EZ 3.0 Release 1a
Microsoft Outlook
Emails
Microsoft Excel
Articles
PhotoStudio 5
Adobe Acrobat 6.0 Professi...
REScheck™
DOE's Building Energy Codes Program
Internet Address: www.energycodes.gov
Technical Support: techsupport@becp.pnl.gov
Energy Efficiency and Renewable Energy · U.S. Department of Energy
Loading...
Recycle Bin
Drawing Pad
start
Inbox - Micro...
Windows Me...
2 Microsoft ...
EZ-Casestud...
Microsoft Pho...
Untitled.rck - ...
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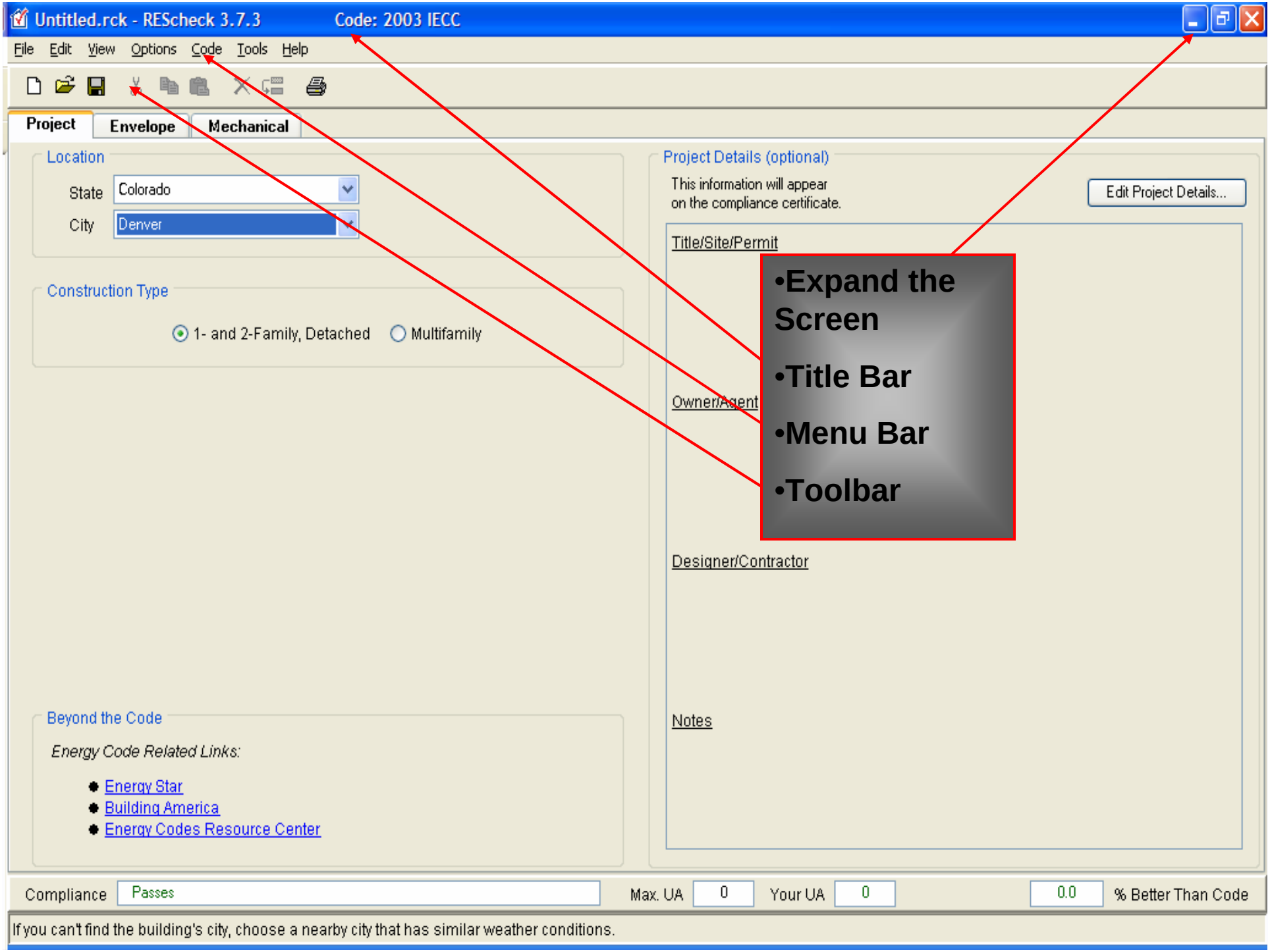
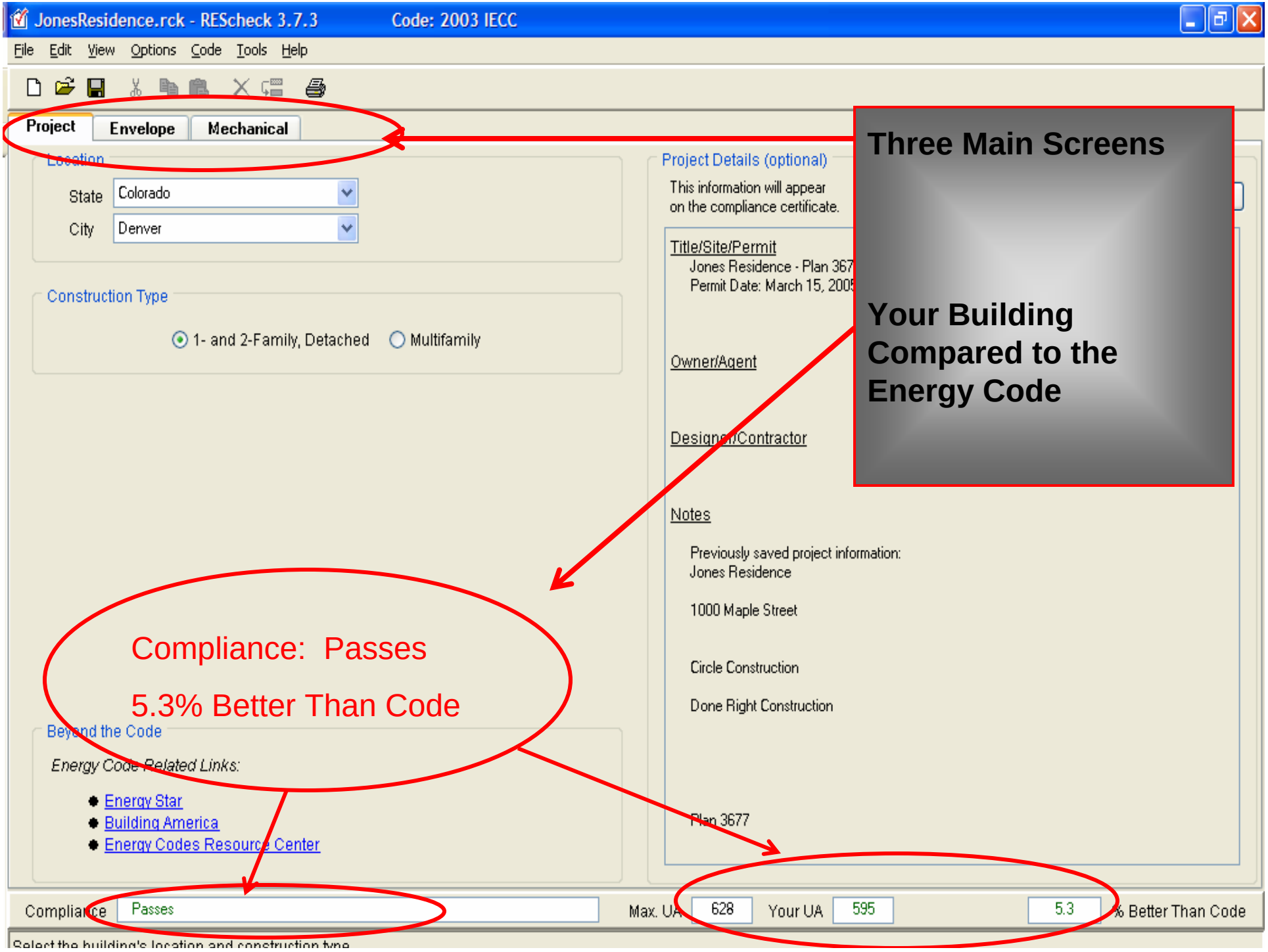
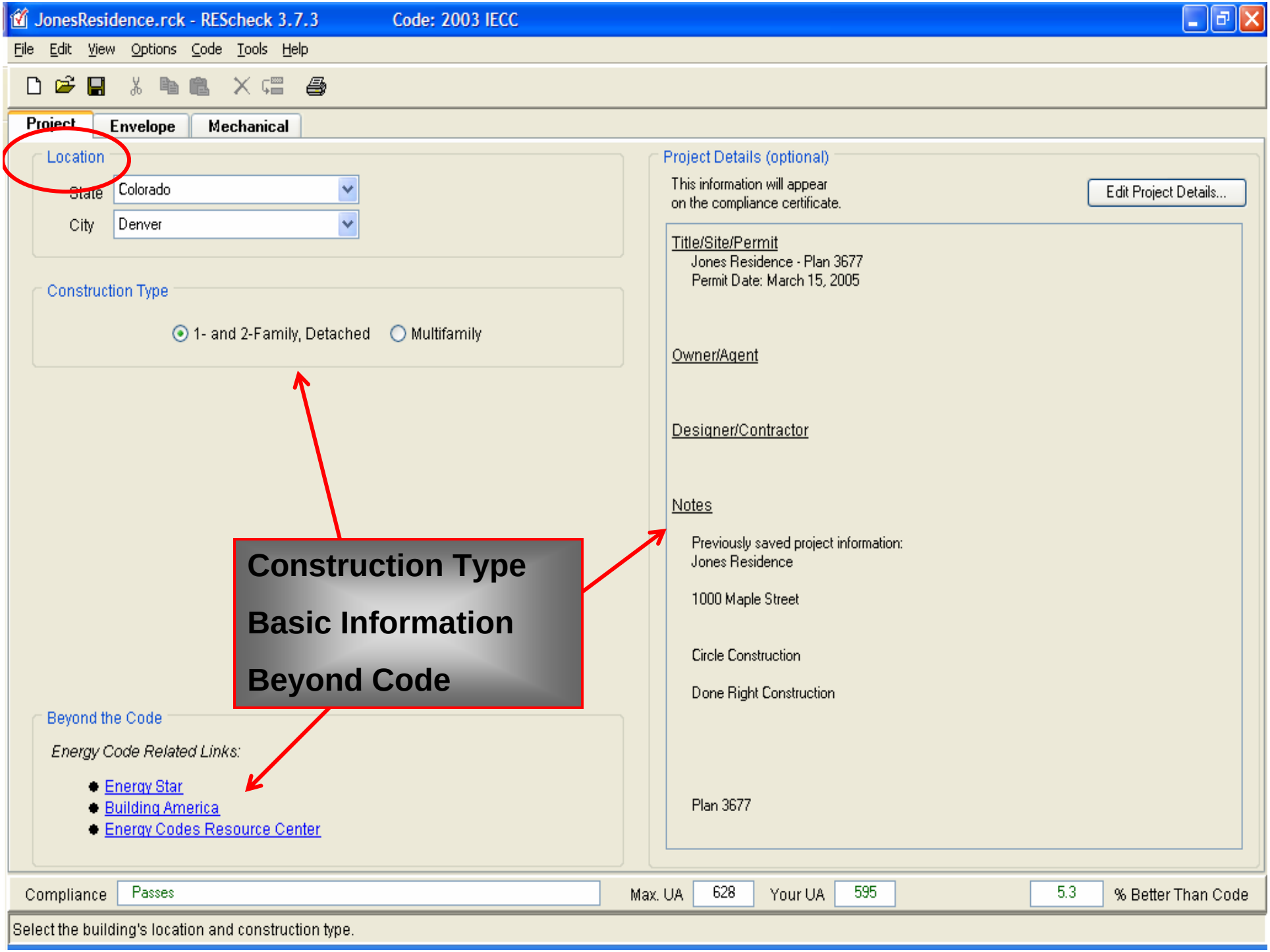
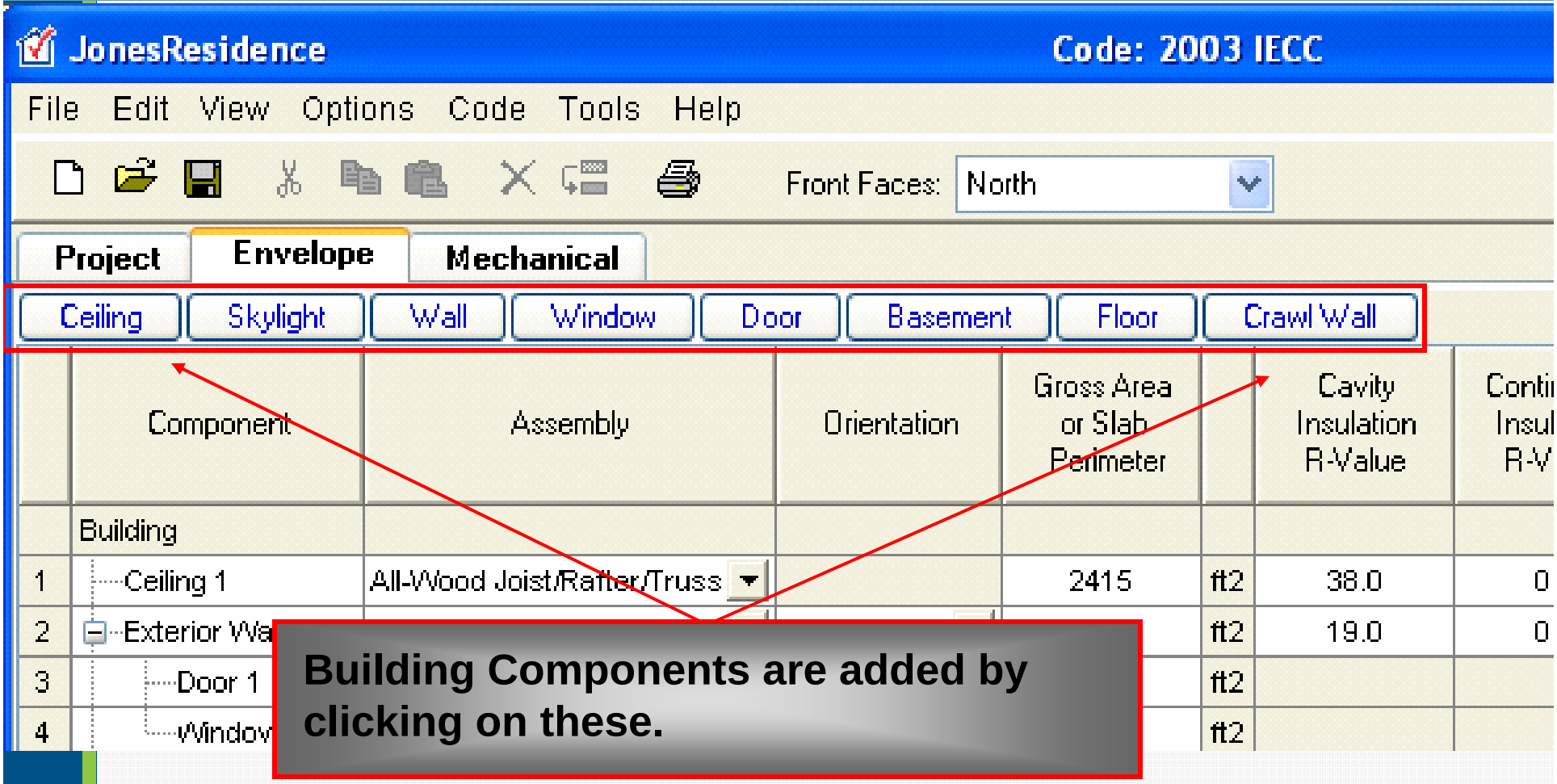

Untitled.rck - REScheck 3.7.3
Code: 2003 IECC
File Edit View Options Code Tools Help
Project
Envelope
Mechanical
Location
State Colorado
City Denver
Construction Type
1- and 2-Family, Detached
Multifamily
Beyond the Code
Energy Code Related Links:
Energy Star
Building America
Energy Codes Resource Center
Project Details (optional)
This information will appear on the compliance certificate.
Edit Project Details...
Title/Site/Permit
Owner/Agent
Designer/Contractor
Notes
•Expand the Screen
•Title Bar
•Menu Bar
•Toolbar
Compliance Passes
Max. UA 0
Your UA 0
0.0
% Better Than Code
If you can't find the building's city, choose a nearby city that has similar weather conditions.


JonesResidence.rck - REScheck 3.7.3
Code: 2003 IECC
File Edit View Options Code Tools Help
Project
Envelope
Mechanical
Location
State Colorado
City Denver
Construction Type
1- and 2-Family, Detached
Multifamily
Project Details (optional)
This information will appear on the compliance certificate.
Title/Site/Permit
Jones Residence - Plan 367
Permit Date: March 15, 200
Owner/Agent
Designer/Contractor
Notes
Previously saved project information:
Jones Residence
1000 Maple Street
Circle Construction
Done Right Construction
Plan 3677
Three Main Screens
Your Building Compared to the Energy Code
Compliance: Passes
5.3% Better Than Code
Beyond the Code
Energy Code Related Links:
Energy Star
Building America
Energy Codes Resource Center
Compliance Passes
Max. UA 628
Your UA 595
5.3
% Better Than Code
Select the building's location and construction type


JonesResidence.rck - REScheck 3.7.3 Code: 2003 IECC
File Edit View Options Code Tools Help
Project
Envelope
Mechanical
Location
State Colorado
City Denver
Construction Type
1- and 2-Family, Detached
Multifamily
Beyond the Code
Energy Code Related Links:
Energy Star
Building America
Energy Codes Resource Center
Project Details (optional)
This information will appear on the compliance certificate.
Edit Project Details...
Title/Site/Permit
Jones Residence - Plan 3677
Permit Date: March 15, 2005
Owner/Agent
Designer/Contractor
Notes
Previously saved project information:
Jones Residence
1000 Maple Street
Circle Construction
Done Right Construction
Plan 3677
Construction Type
Basic Information
Beyond Code
Compliance Passes
Max. UA 628
Your UA 595
5.3
% Better Than Code
Select the building's location and construction type.

Envelope Section



Mechanical Requirements

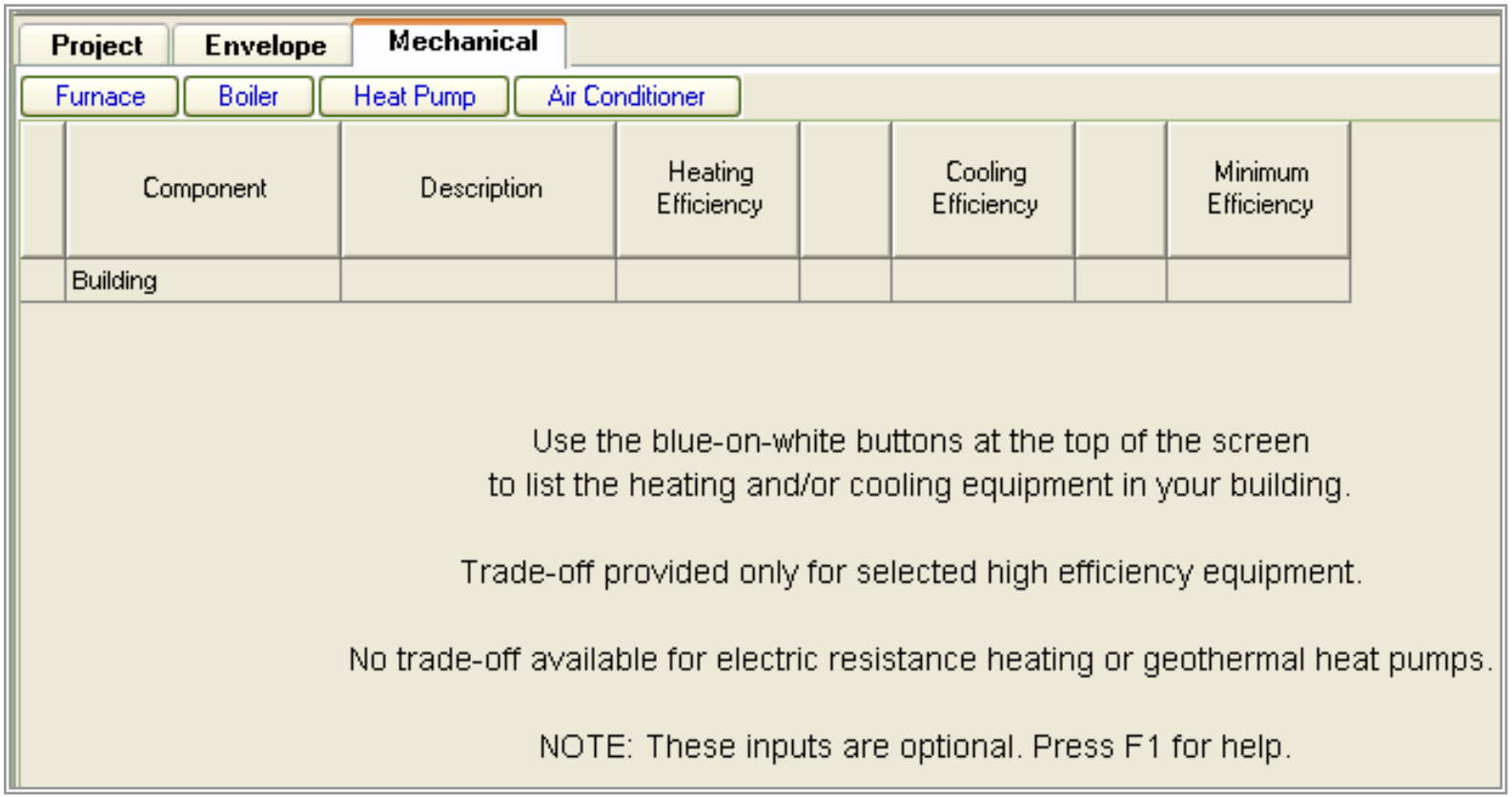
- Mandatory requirements such as duct insulation are listed in the Inspection Checklist
- The Checklist is automatically prepared by the software based on user-entered inputs such as applicable code and building location

Duct Insulation:
Return Ducts in unconditioned spaces must be insulated to R-4
Supply Ducts outside the building must be insulated to R-8

|
| **Duct Insulation:**
[ ] | Supply ducts in unconditioned attics or outside the building must be insulated to R-8.
[ ] | Return ducts in unconditioned attics or outside the building must be insulated to R-4.
[ ] | Supply ducts in unconditioned spaces must be insulated to R-8.
[ ] | Return ducts in unconditioned spaces (except basements) must be insulated to R-2.
[ ] | Where exterior walls are used as plenums, the wall must be insulated to R-8.
| Insulation is not required on return ducts in basements.

Mechanical Inputs

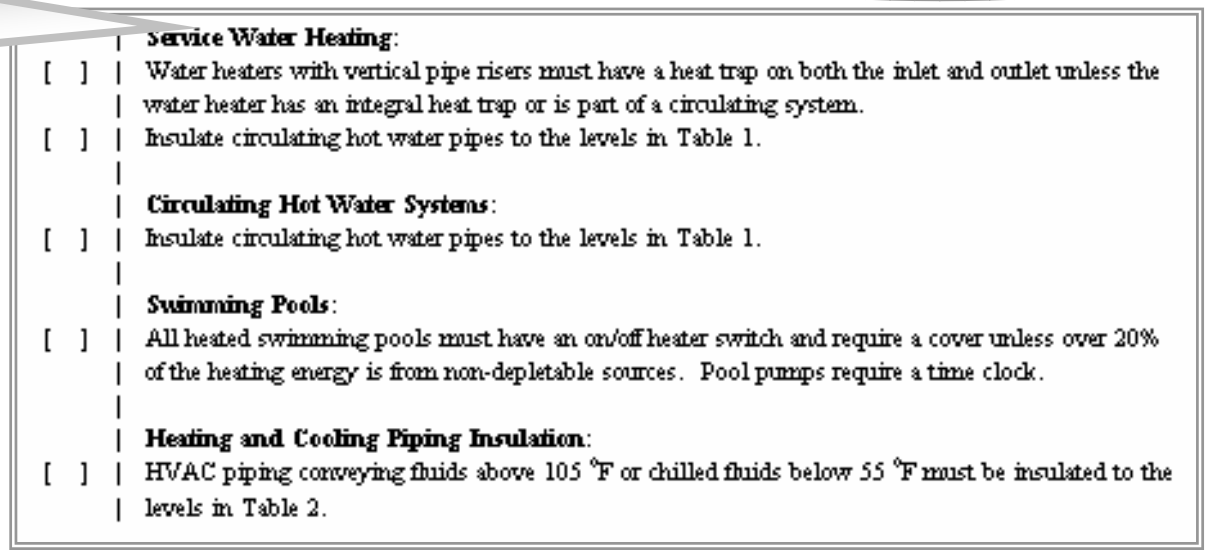
- No user entries are required
- Only get “credit” for high-efficiency equipment



SWH Requirements in RES*check*

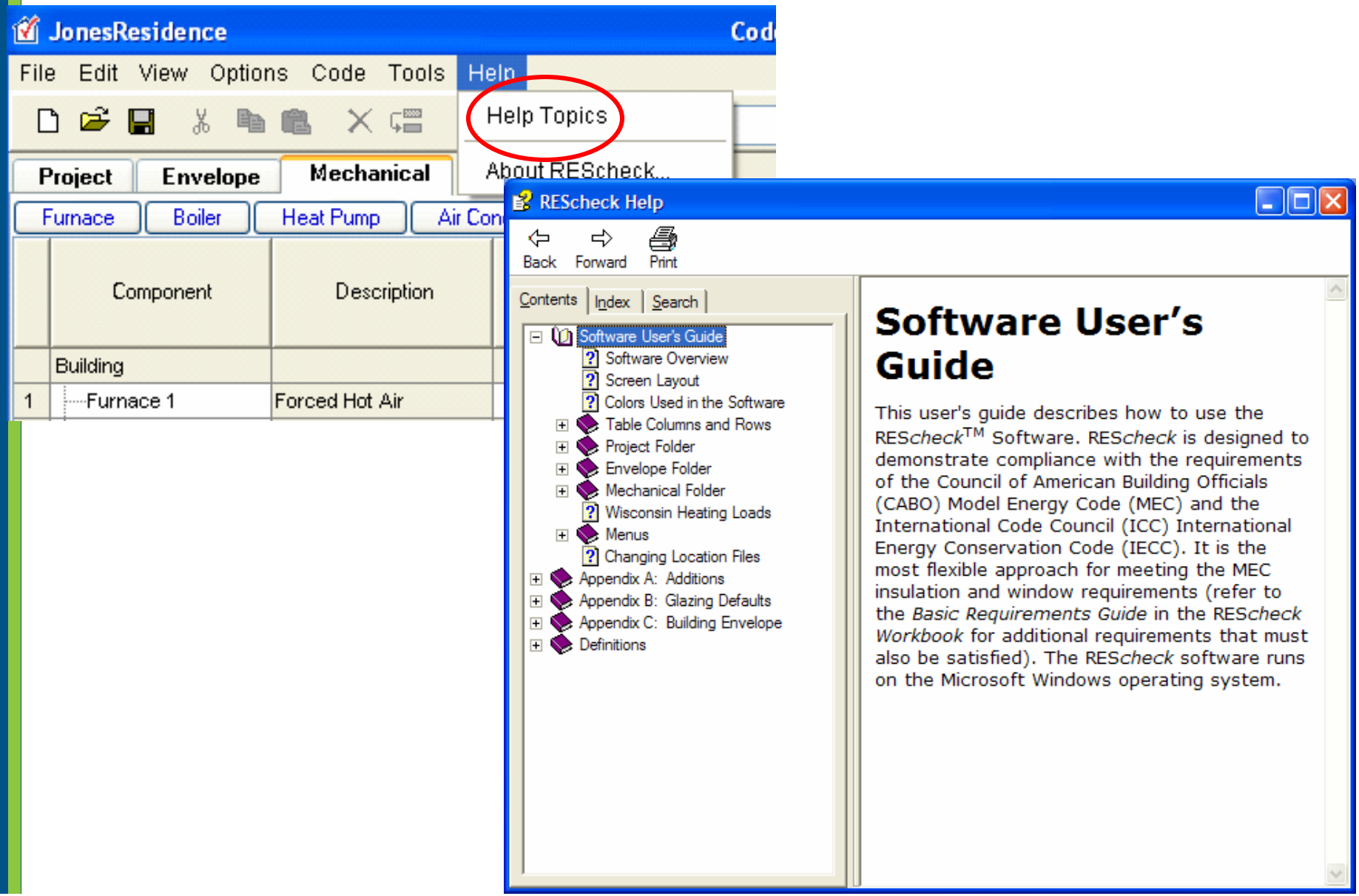
- Mandatory requirements such as heat traps are listed in the Inspection Checklist
- No software entries for Service Water Heating

Service Water Heating:
Water heaters with vertical pipe risers must have a heat trap on both the inlet and outlet unless the water heater has an integral heat trap or is part of a circulating system



		Service Water Heating:
[ ]	|	Water heaters with vertical pipe risers must have a heat trap on both the inlet and outlet unless the water heater has an integral heat trap or is part of a circulating system.
[ ]	|	Insulate circulating hot water pipes to the levels in Table 1.
	|	
	|	**Circulating Hot Water Systems**:
[ ]	|	Insulate circulating hot water pipes to the levels in Table 1.
	|	
	|	**Swimming Pools**:
[ ]	|	All heated swimming pools must have an on/off heater switch and require a cover unless over 20% of the heating energy is from non-depletable sources. Pool pumps require a time clock.
	|	
	|	**Heating and Cooling Piping Insulation**:
[ ]	|	HVAC piping conveying fluids above 105 °F or chilled fluids below 55 °F must be insulated to the levels in Table 2.

Need Help?


JonesResidence
File Edit View Options Code Tools Help
Help Topics
About REScheck...
Project Envelope Mechanical
Furnace Boiler Heat Pump
Component Description
Building
1 Furnace 1 Forced Hot Air
REScheck Help
Back Forward Print
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Software Overview
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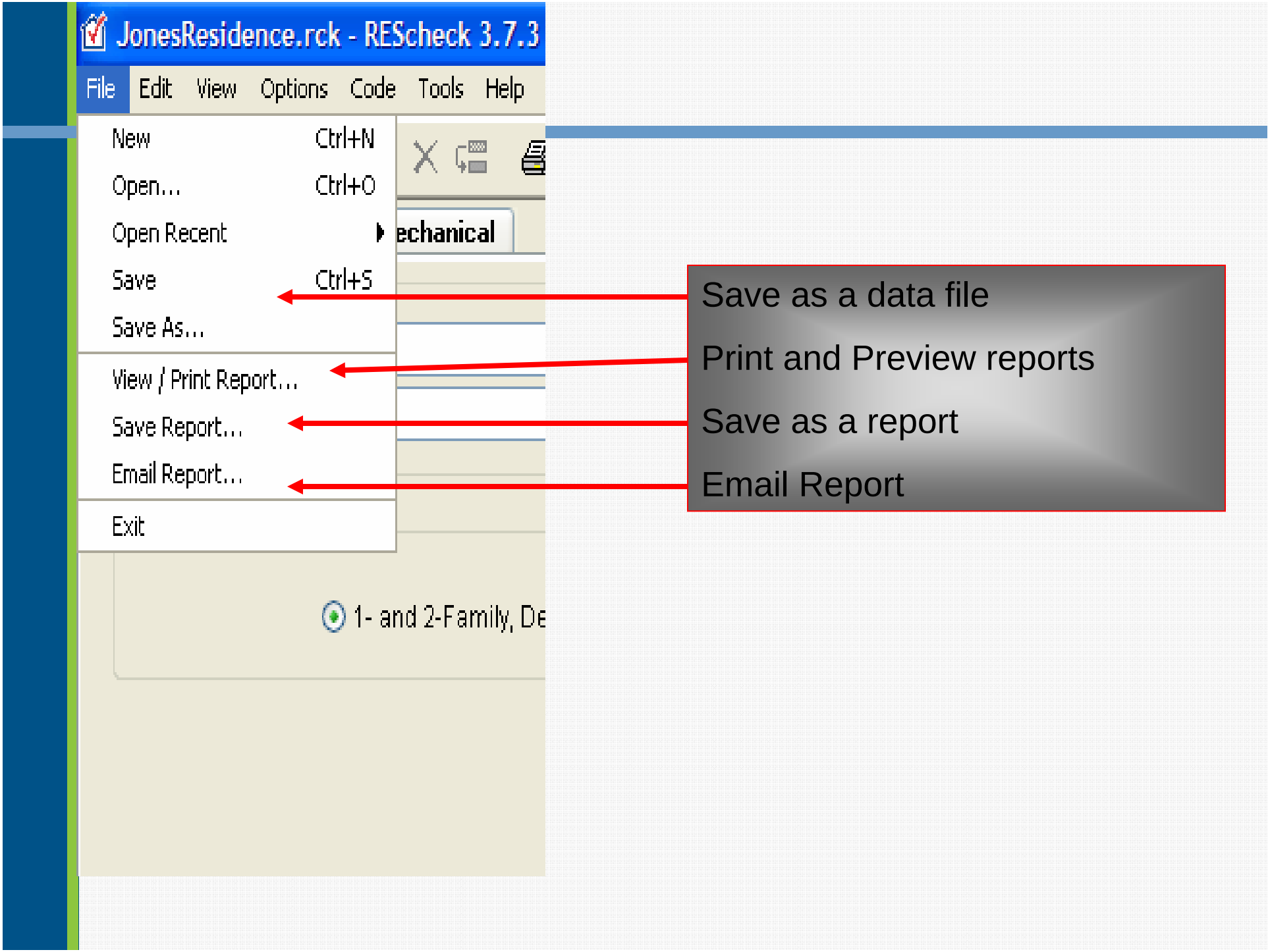
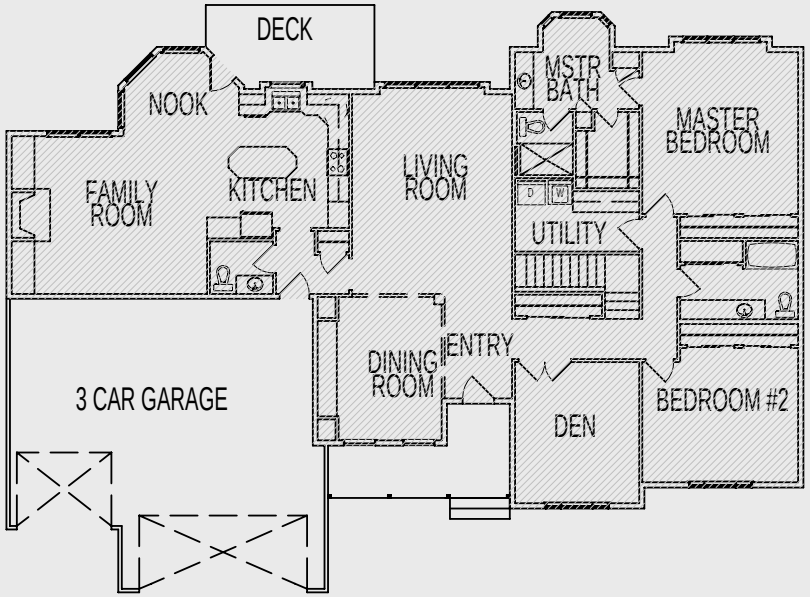
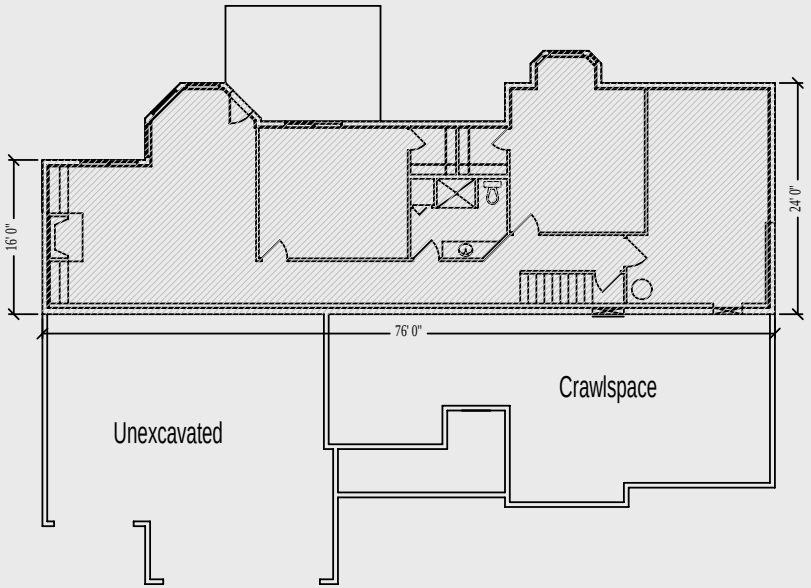
Colors Used in the Software
Table Columns and Rows
Project Folder
Envelope Folder
Mechanical Folder
Wisconsin Heating Loads
Menus
Changing Location Files
Appendix A: Additions
Appendix B: Glazing Defaults
Appendix C: Building Envelope
Definitions
Software User's Guide
This user's guide describes how to use the REScheck™ Software. REScheck is designed to demonstrate compliance with the requirements of the Council of American Building Officials (CABO) Model Energy Code (MEC) and the International Code Council (ICC) International Energy Conservation Code (IECC). It is the most flexible approach for meeting the MEC insulation and window requirements (refer to the Basic Requirements Guide in the REScheck Workbook for additional requirements that must also be satisfied). The REScheck software runs on the Microsoft Windows operating system.


JonesResidence.rck - REScheck 3.7.3
File
Edit
View
Options
Code
Tools
Help
New Ctrl+N
Open... Ctrl+O
Open Recent
Save Ctrl+S
Save As...
View / Print Report...
Save Report...
Email Report...
Exit
echanical
1- and 2-Family, De
Save as a data file
Print and Preview reports
Save as a report
Email Report

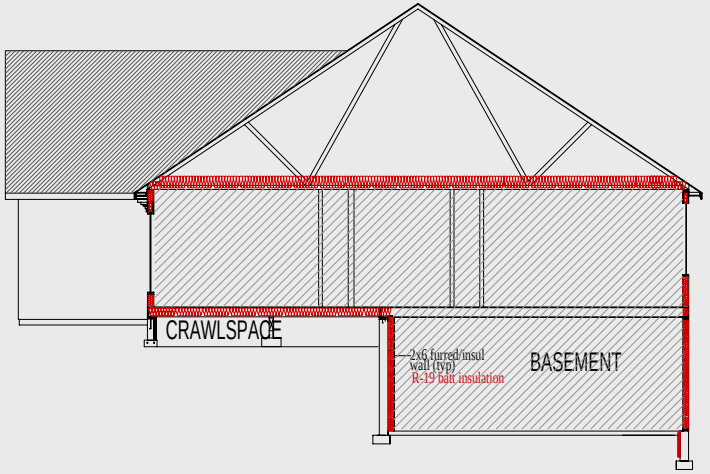
- Building Envelope



Conditioned Main Floor



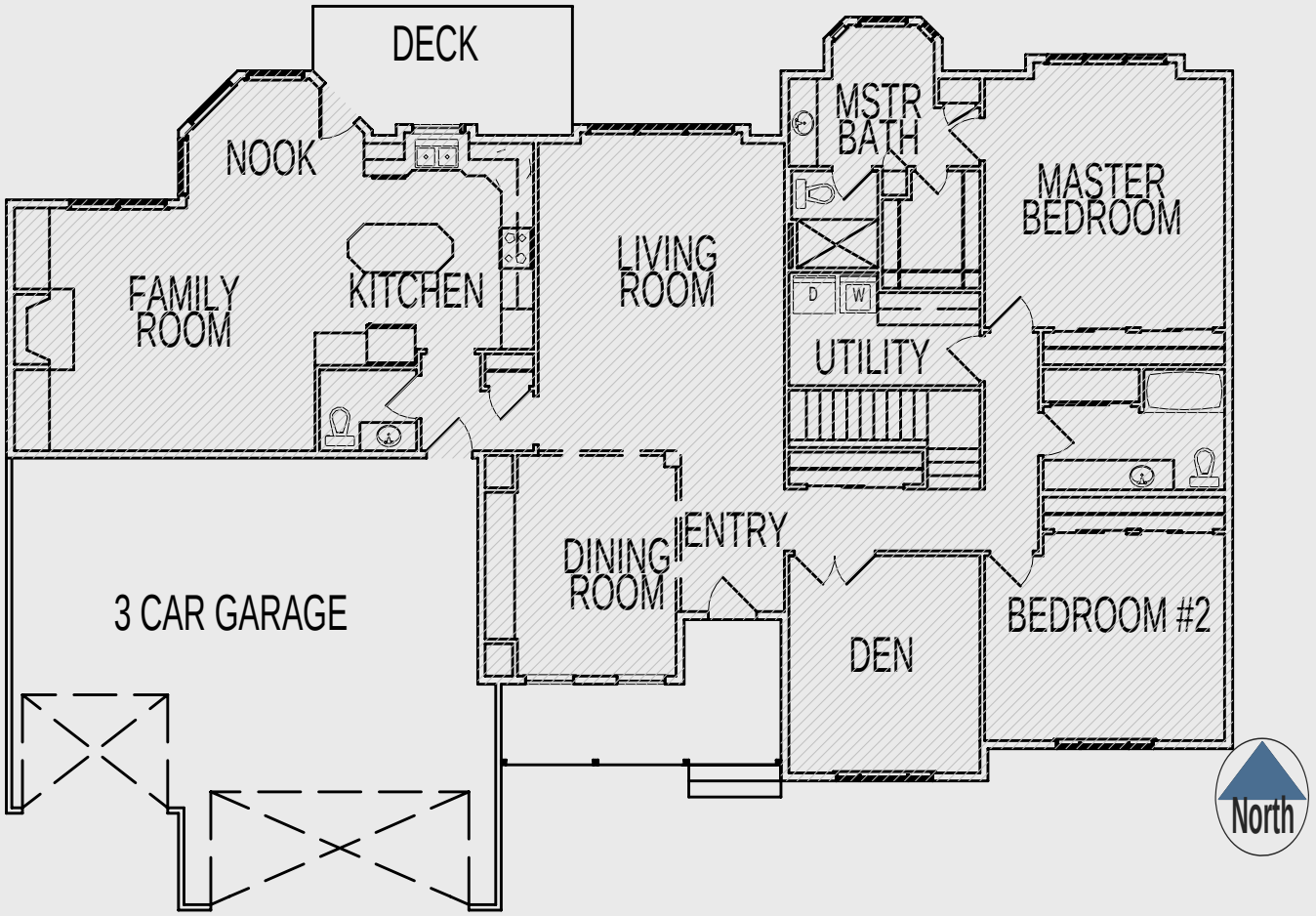
Conditioned Basement



Building Section

- Ceiling Area

Ceiling Area
2415 s.f.



Roofs in RES*check*

Project | Envelope | Mechanical

Ceiling | Skylight | Wall | Window | Door | Basement | Floor | Crawl Wall

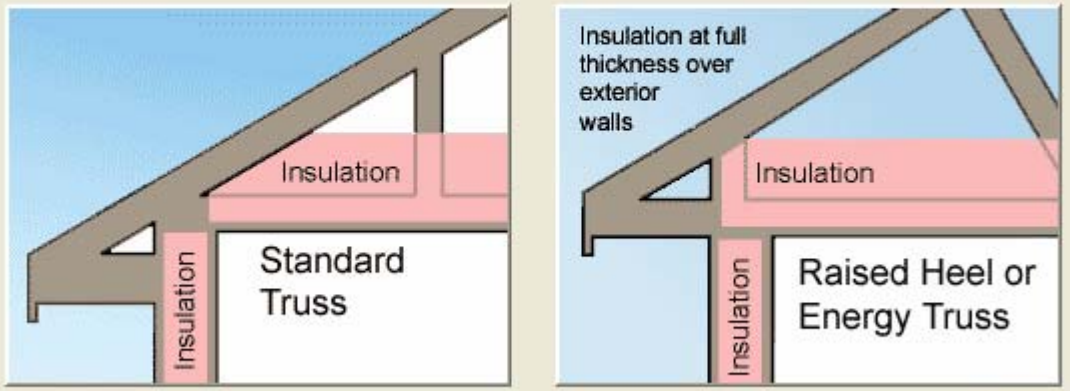
	Component	Assembly	Gro	Cavity	Continuous
	Building				
1	Ceiling 1	Raised or Energy Truss			

Help

Select the ***Ceiling*** button to add a ceiling component to the description of your design on the *Envelope* screen. Each unique ceiling assembly should be entered as a separate component, but multiple ceiling elements sharing the same construction may be entered as one component with appropriate total area.

Raised Heel or Energy Truss

To receive credit for a raised heel truss (often referred to as an energy truss) the insulation must achieve its full thickness over the exterior walls. Scissor trusses meeting this criteria may also be entered as a raised truss.



Do not display this message again

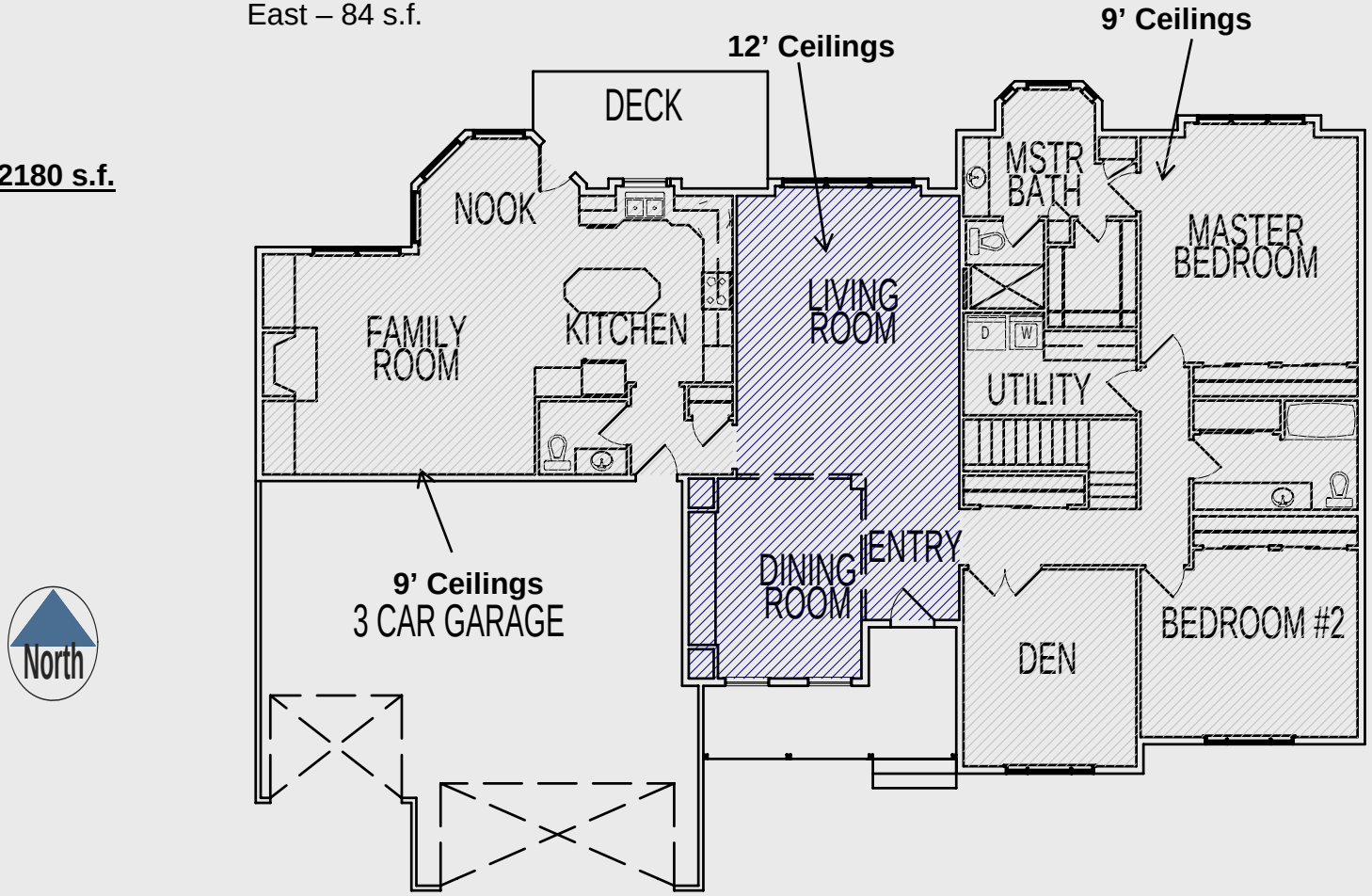
OK

- Exterior Wall Areas

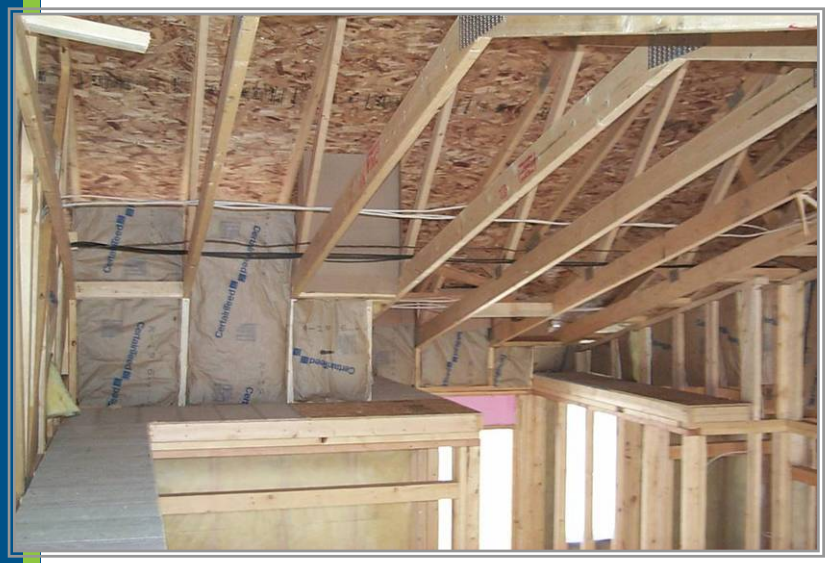
12’ Exterior Walls - **689 s.f.**
North – 221 s.f.
South – 234 s.f.
East – 52 s.f.
West – 182 s.f.

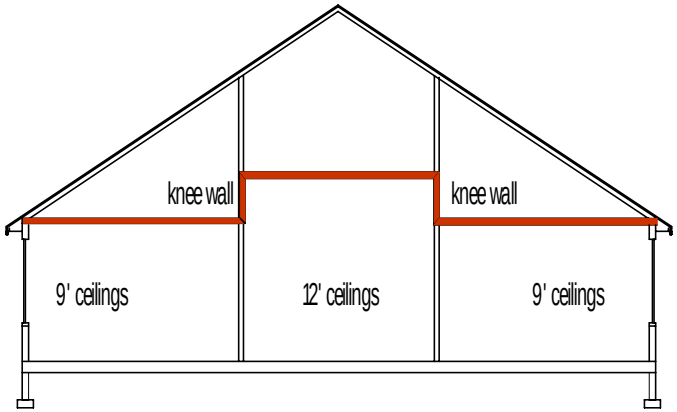
9’ Exterior Walls - **2180 s.f.**
North – 690 s.f.
South – 600 s.f.
East – 440 s.f.
West – 450 s.f.

3’ knee walls (between 9’&12’ sections) – **153 s.f.**
West – 69 s.f.
East – 84 s.f.



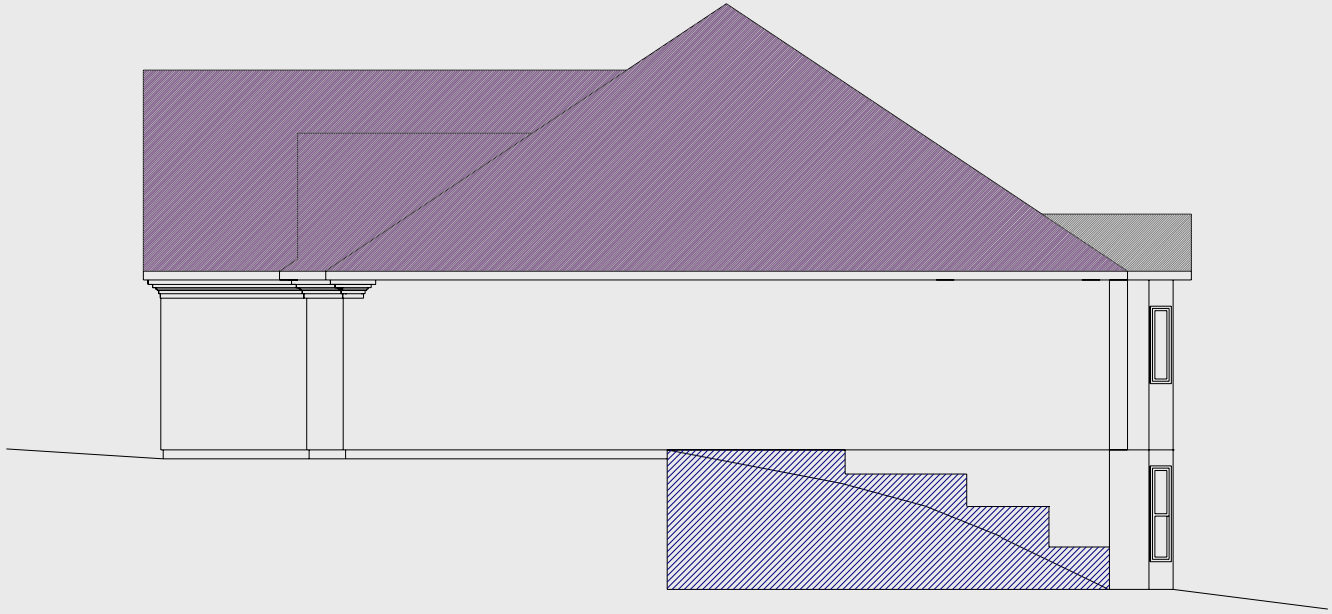
Knee Wall Insulation





No, No… Never cut the batts too short

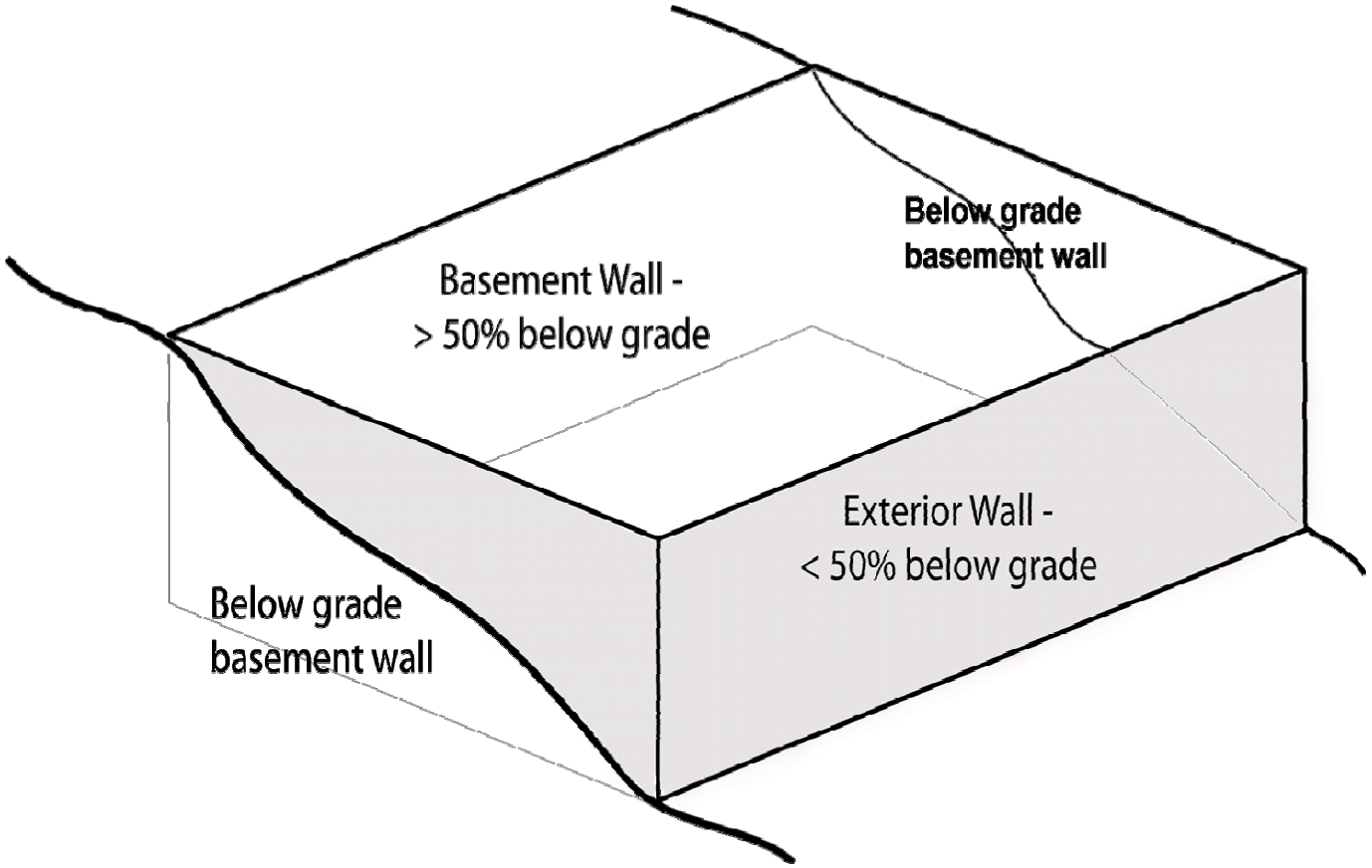
- Basement Walls -
  - below grade



>50% below grade =

below grade concrete basement wall

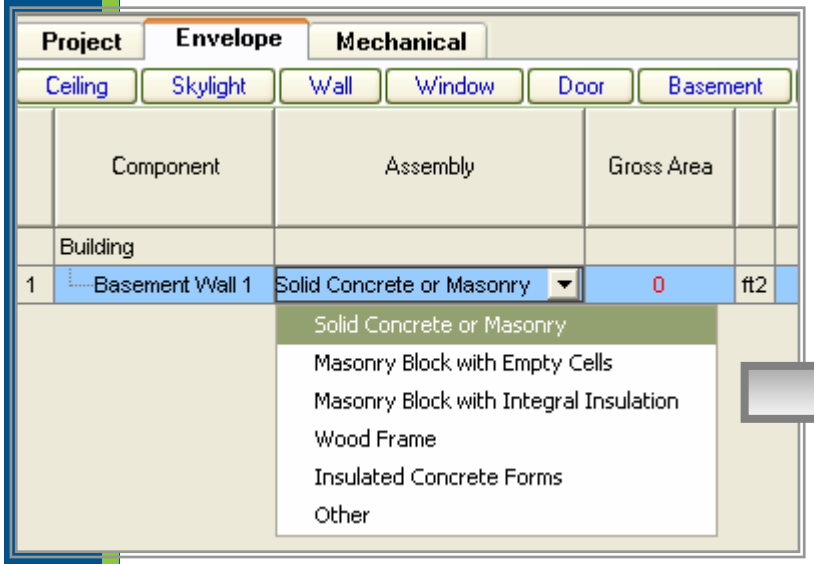
Defining Below-Grade Walls

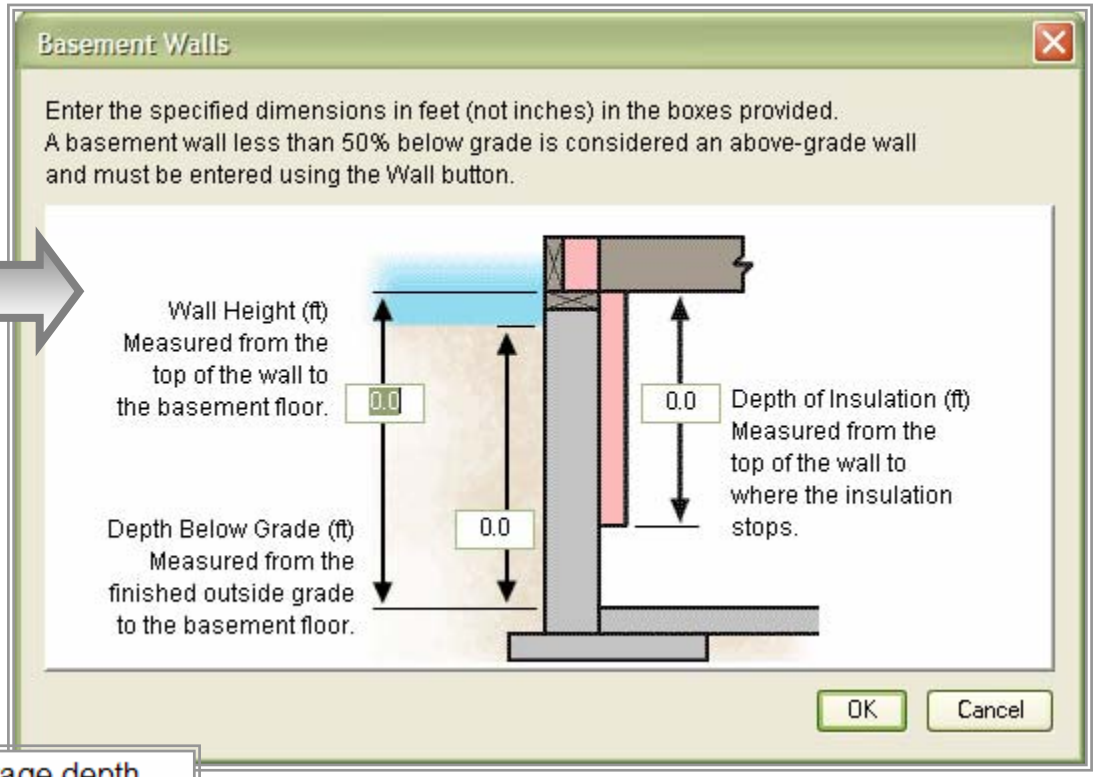


Ways to Insulate Basement Walls

Interior Studs w/batts

Below-Grade Walls in RES*check*

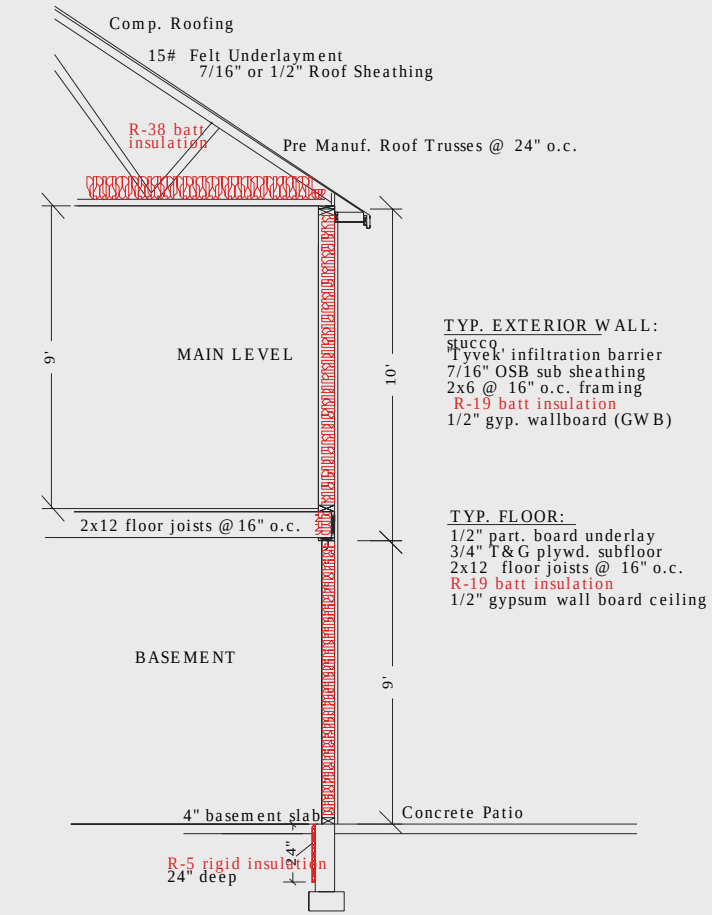




Help

Any individual wall of a conditioned basement with an average depth 50% or more below grade should be entered using the *Basement* button. Walls of conditioned basements with an average depth LESS than 50% below grade should be entered as an above-grade wall using the *Wall* button.

- Including Rim Joists in the Exterior Wall Area



BASEMENT SECTION @ EXTERIOR WOOD WALL

- Basement Wall Areas

Above Grade Bsmt Walls (exterior wood) = 837 s.f. (93’ x 9’)
(entered as wood frame wall not a basement wall)

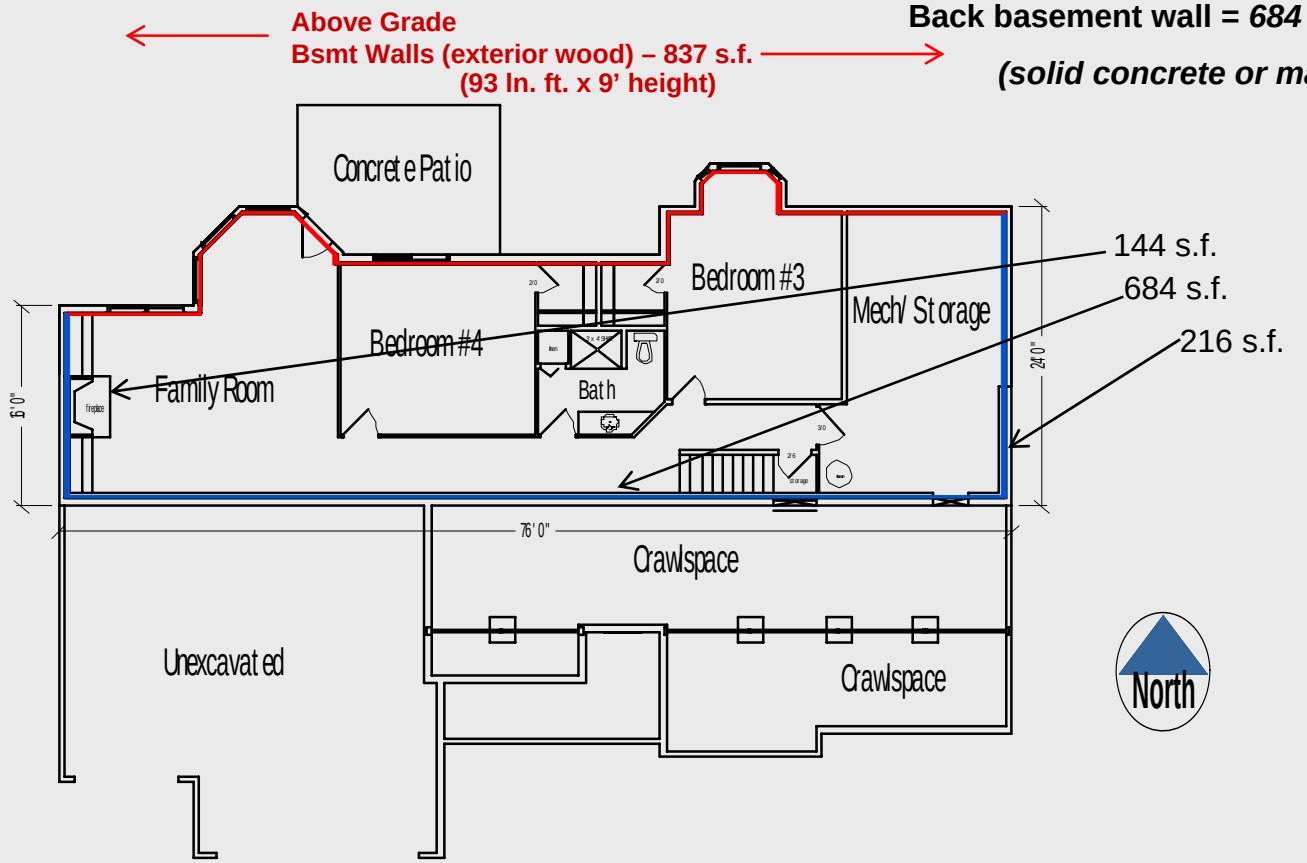
Below Grade Bsmt Walls = 1044 s.f.

Side basement walls = 360 s.f.

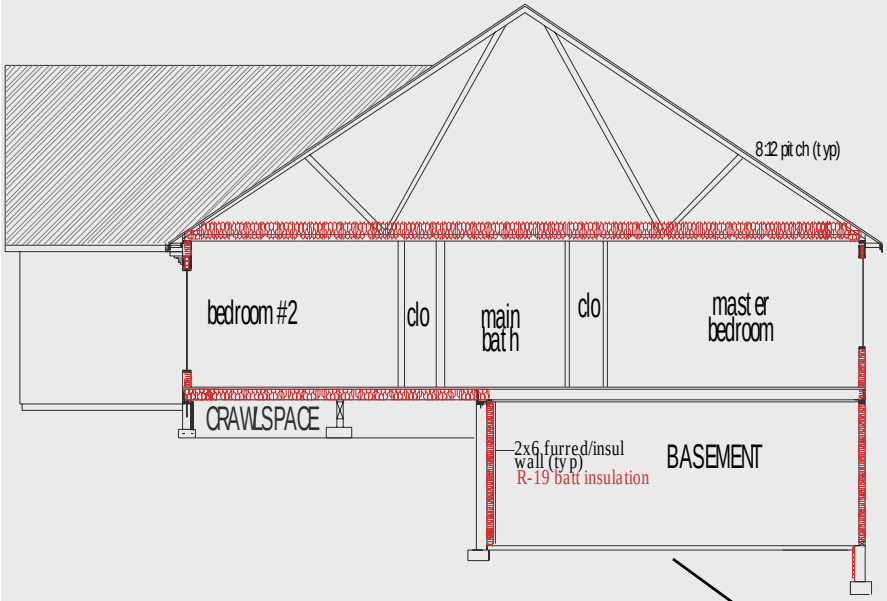
- ***West Wall – 144 s.f***
- ***East Wall – 216 s.f.***

Back basement wall = *684 s.f. (*76’x9’)

(solid concrete or masonry)

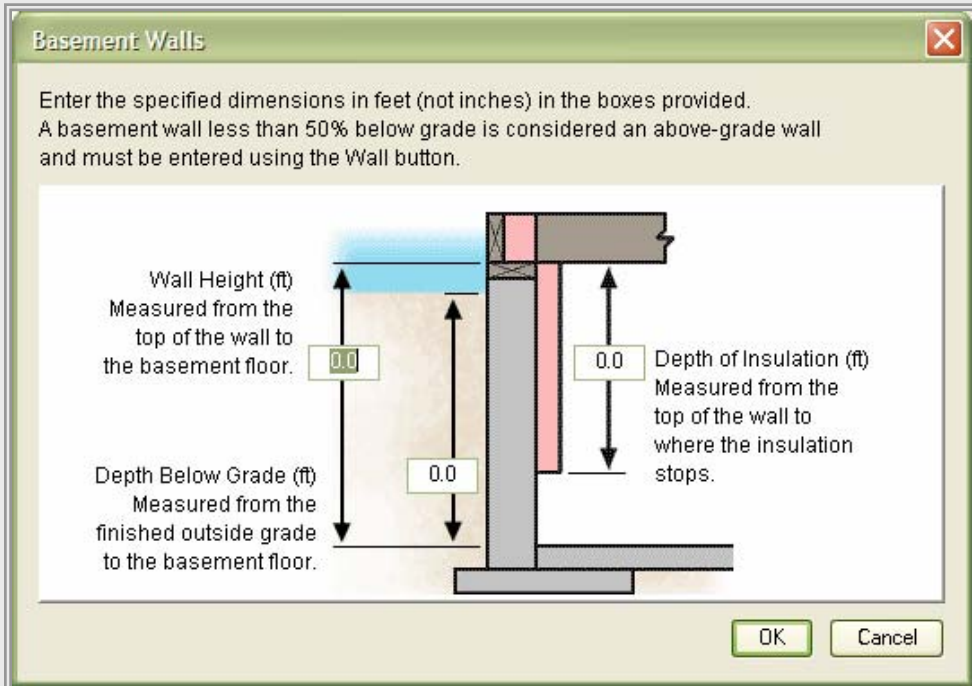


- Basement Walls

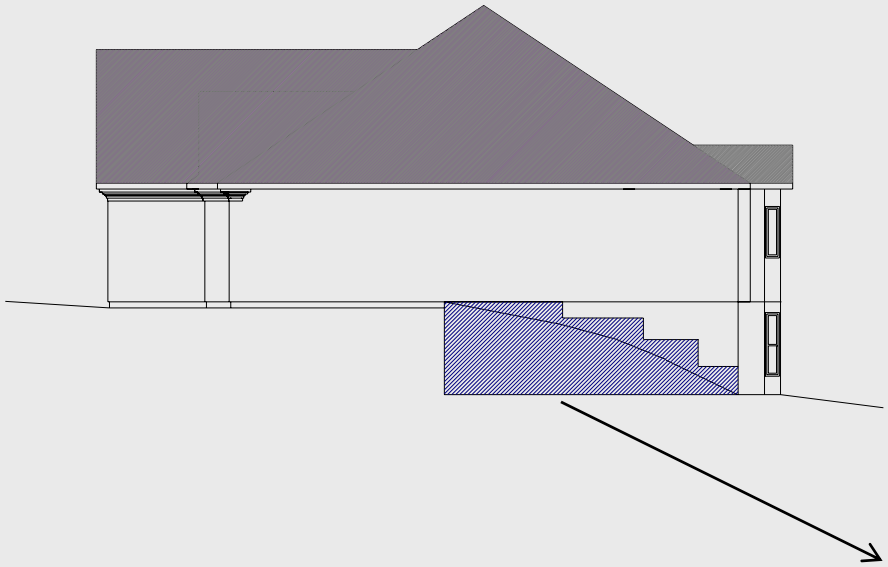


"back" below grade basement wall

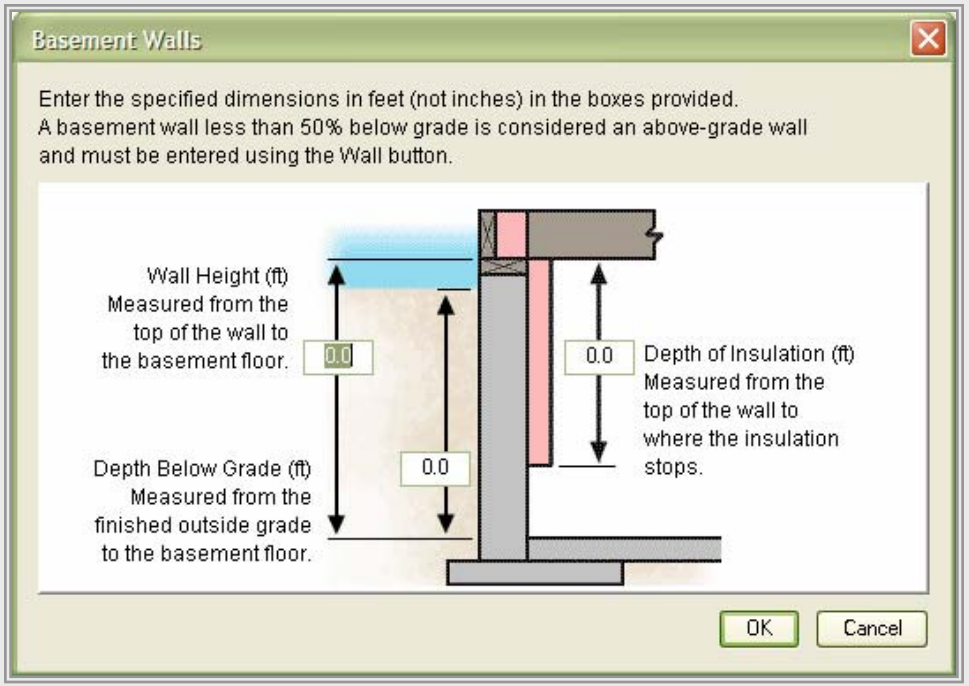
(entire back wall is adjacent to crawlspace



- Basement Walls

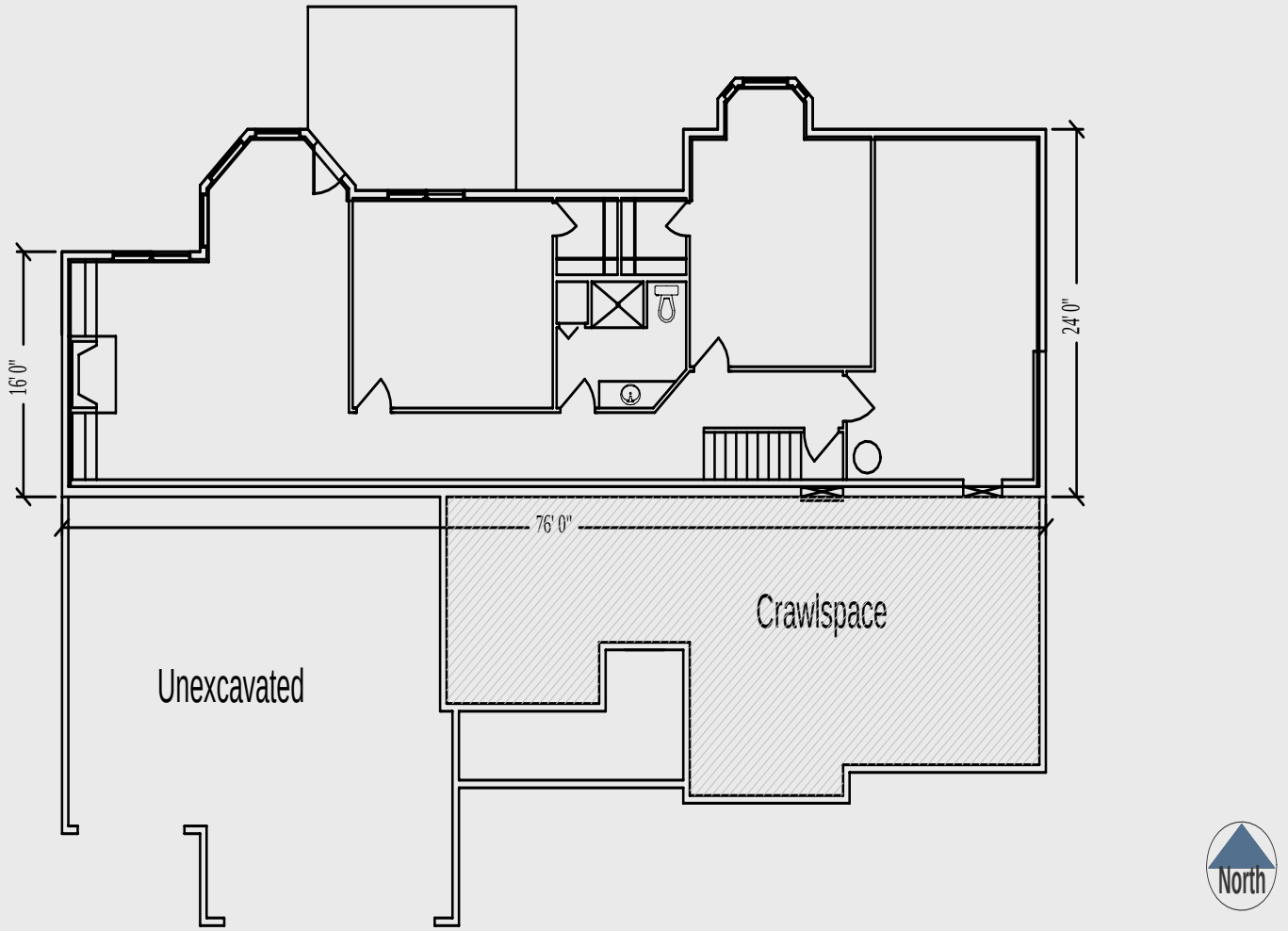


“side” below grade basement walls

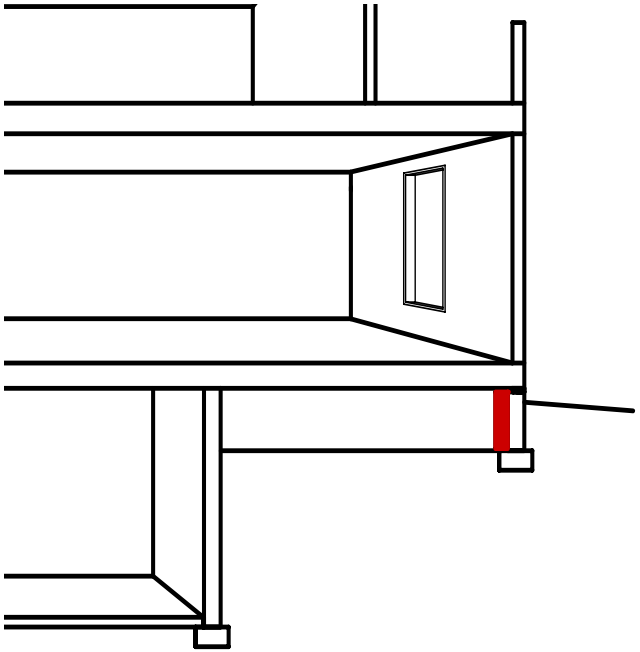


- Floor Area

Crawlspace Area - 783 s.f.



Crawlspace Wall Insulation

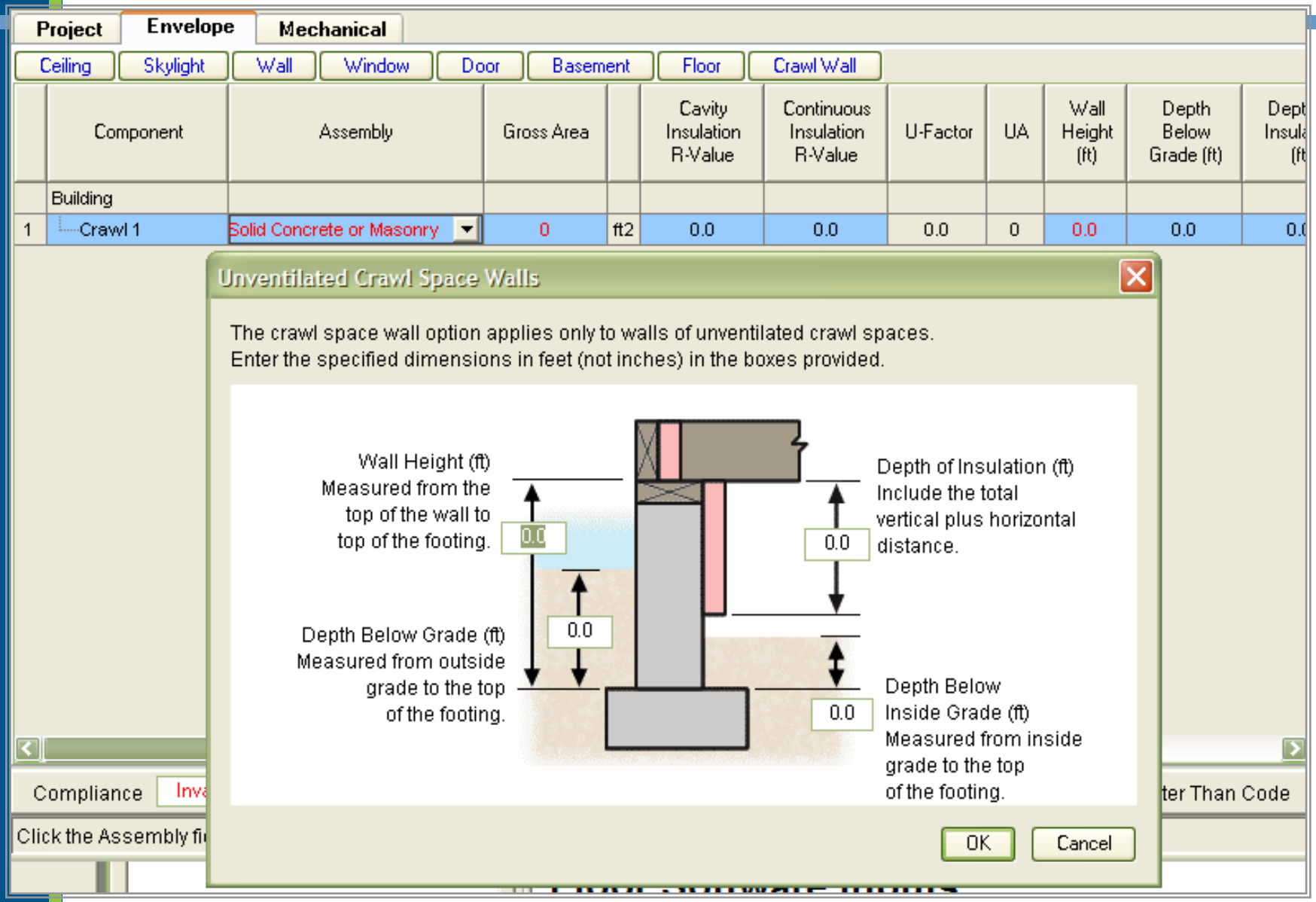


Insulated crawlspace wall =

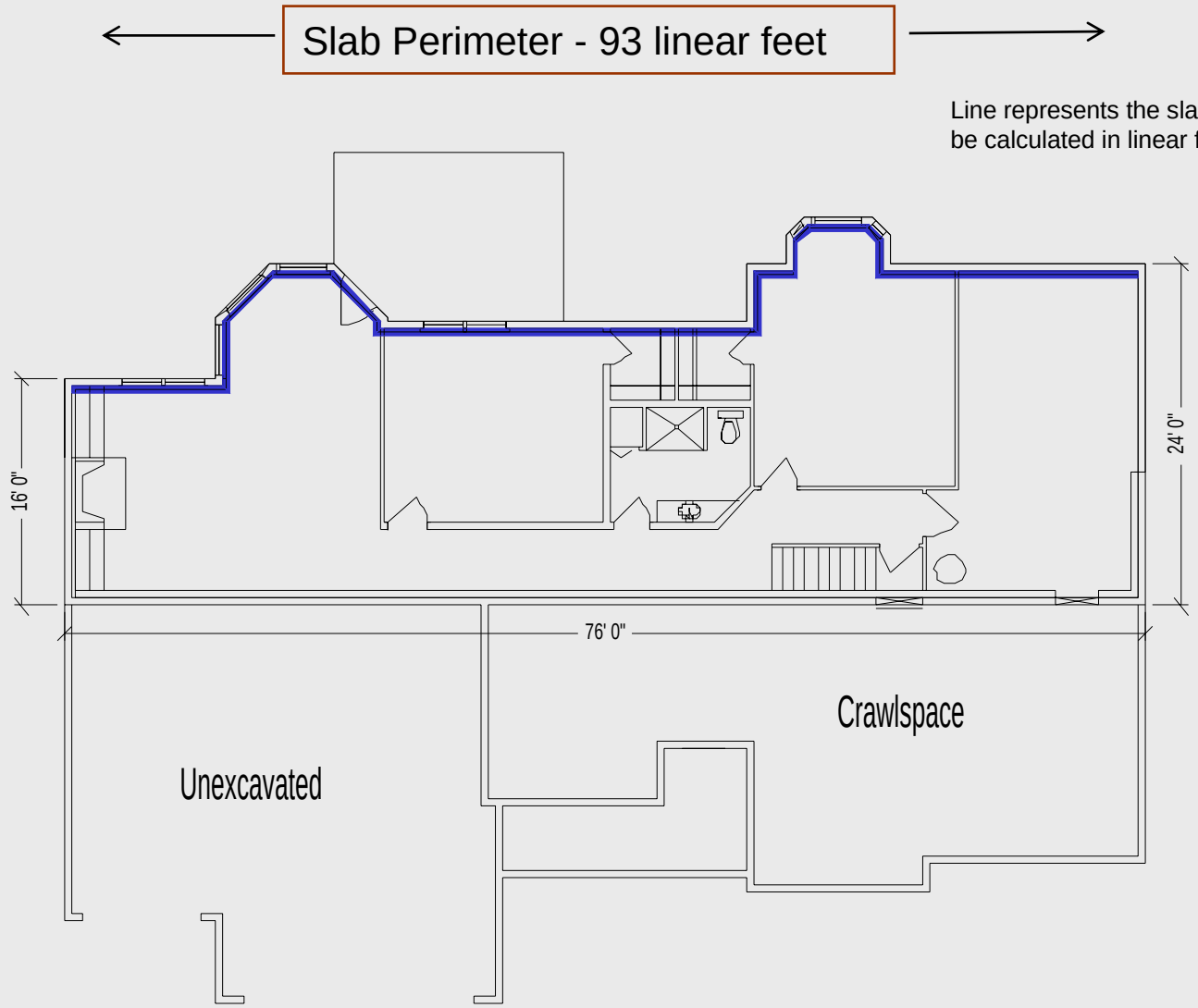
- **no foundation vents**

+ mechanically vented or conditioned

Crawlspace Walls in RES*check*

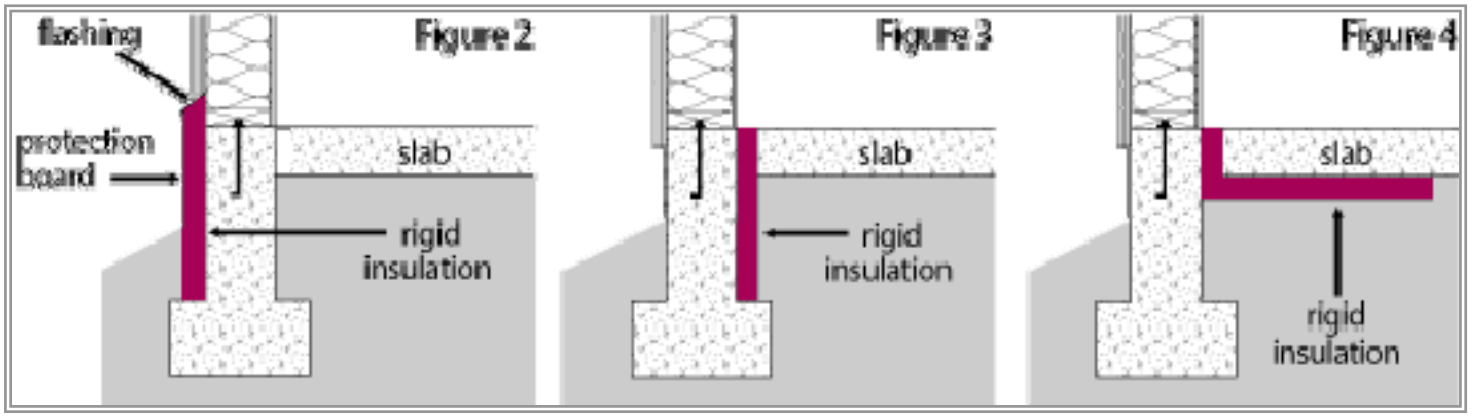


- Slab Perimeter

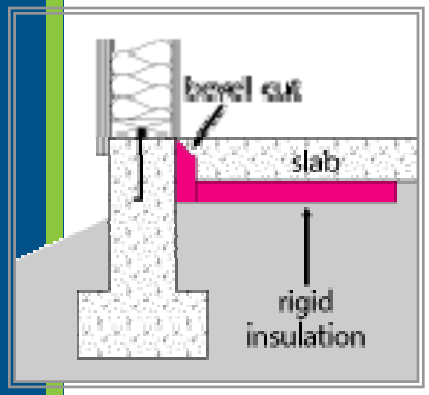


Slab Edge Insulation

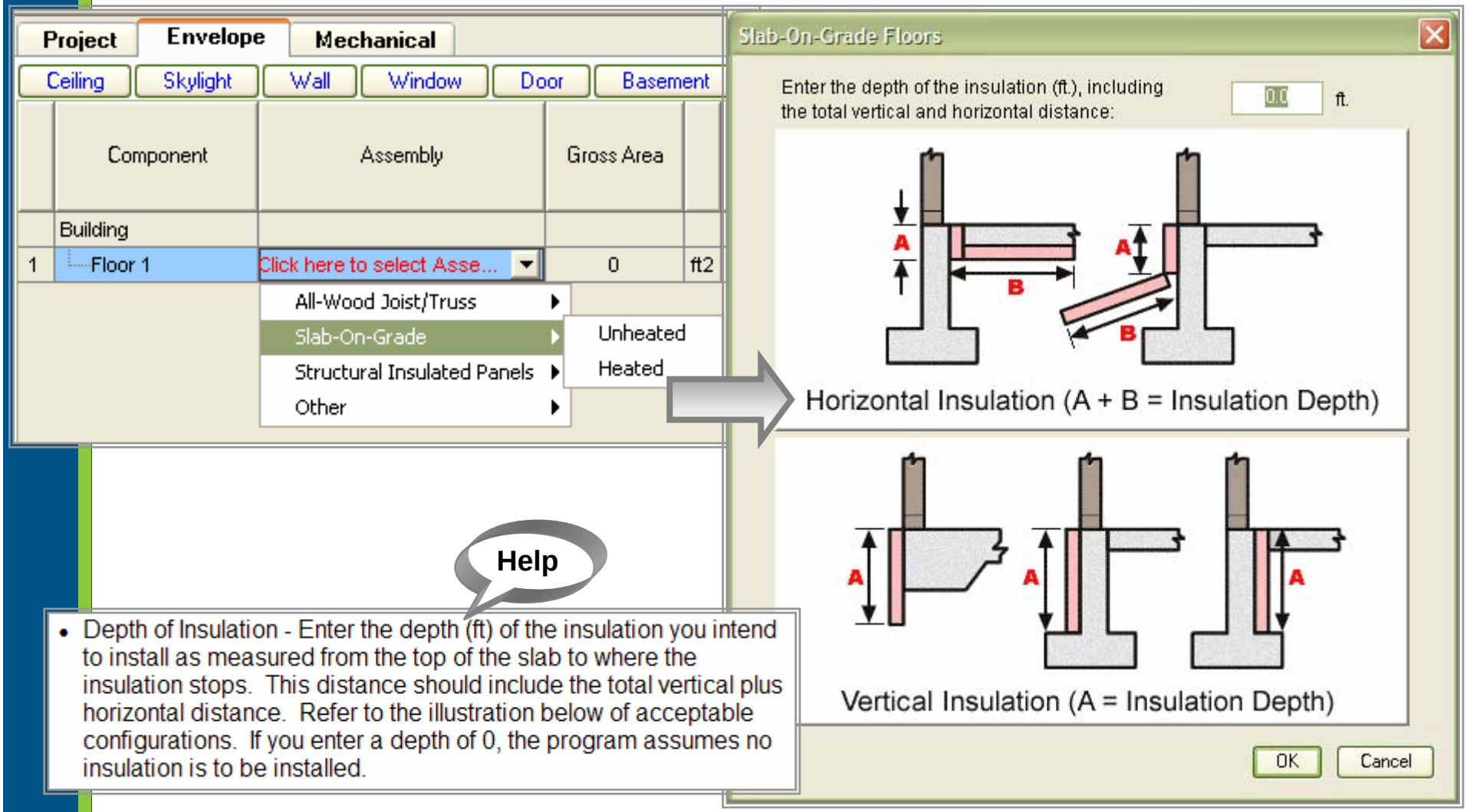
- Proposed R-value must meet or exceed
- Downward from top of slab a minimum of 24” (< 6000 HDD), 48” (> 6000 HDD)
- Downward to at least the bottom of the slab and then horizontally – 24” (< 6000 HDD), 48” (> 6000 HDD)



Slab Edge Insulation



Slabs in RES*check*



Help

- Depth of Insulation - Enter the depth (ft) of the insulation you intend to install as measured from the top of the slab to where the insulation stops. This distance should include the total vertical plus horizontal distance. Refer to the illustration below of acceptable configurations. If you enter a depth of 0, the program assumes no insulation is to be installed.

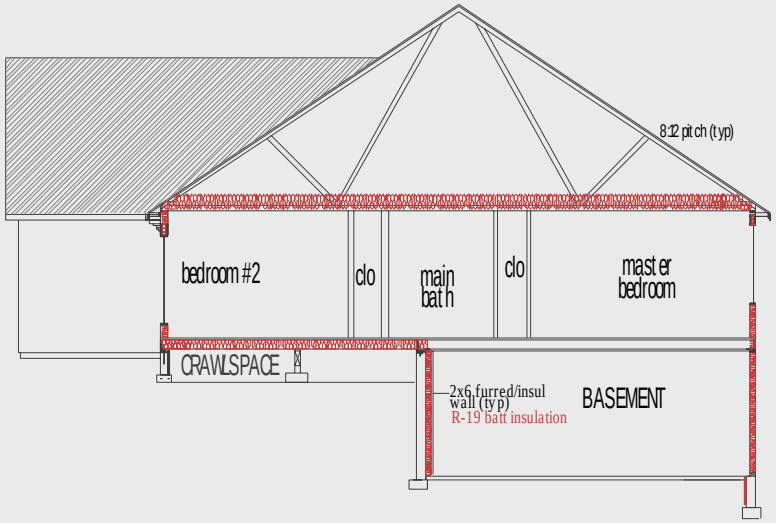
- Insulation Levels

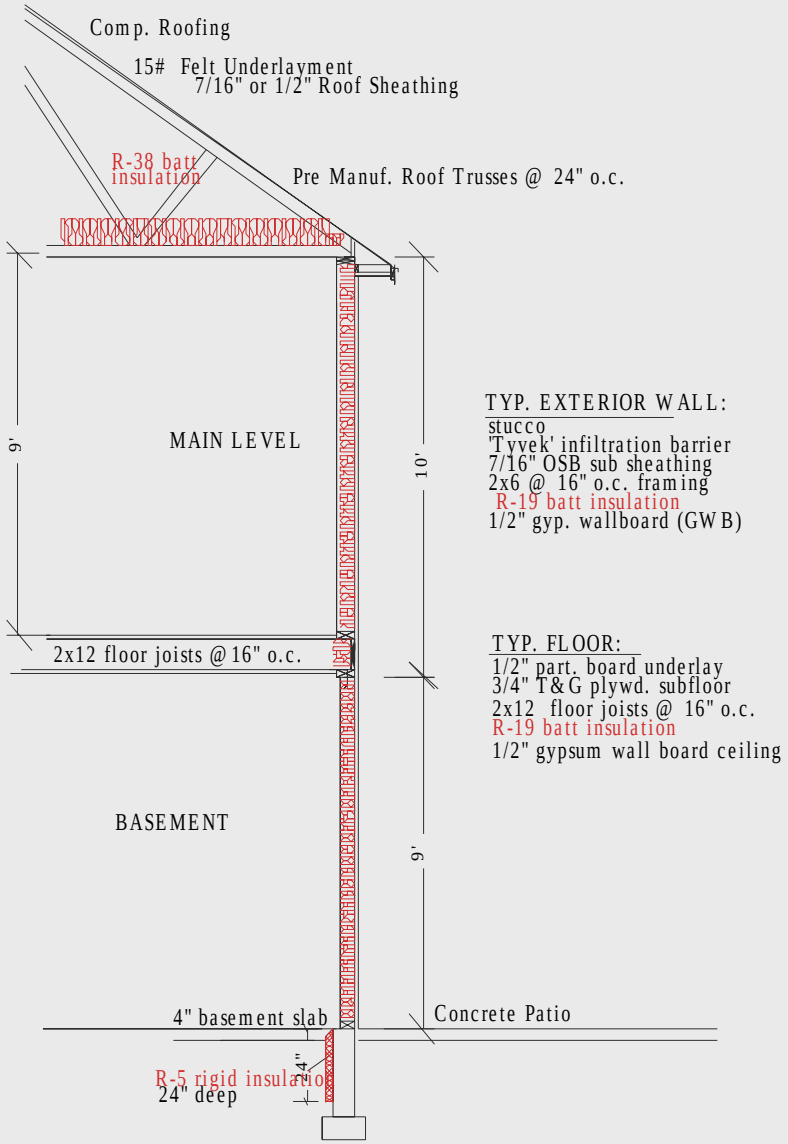
Roof/Ceiling - R-38 batts

Wall - R-19 batts

Floor - R-30 batts

Slab - R-5 rigid (24” vertical)





- Window/ Door Area

Window Area - 533 s.f.;

U-value = 0.35 & SHGC .40

North – 369 s.f.

South – 149 s.f.

West – 15 s.f.

Glass Doors <50% glass - 40 s.f.; U-value = 0.50

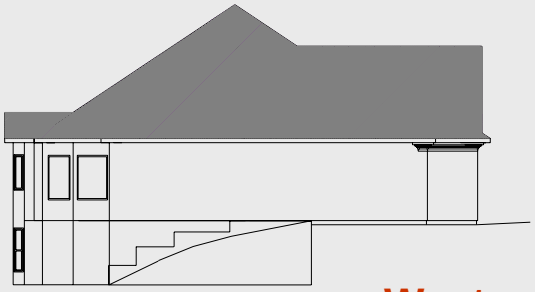
North – 40 s.f.

Opaque Doors - 40 s.f.; U-value = 0.50

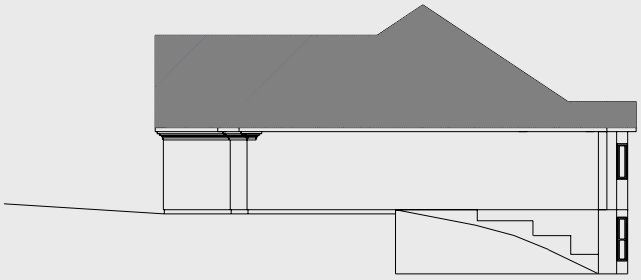
South – 40 s.f.

South

North

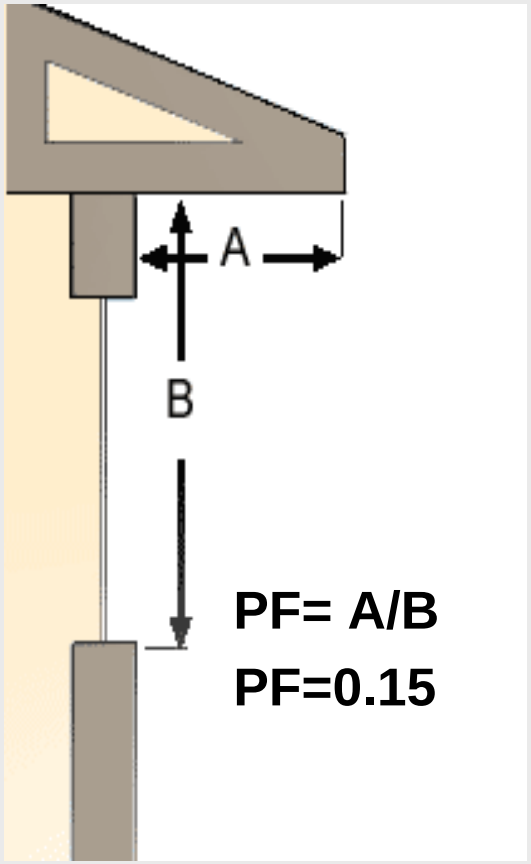


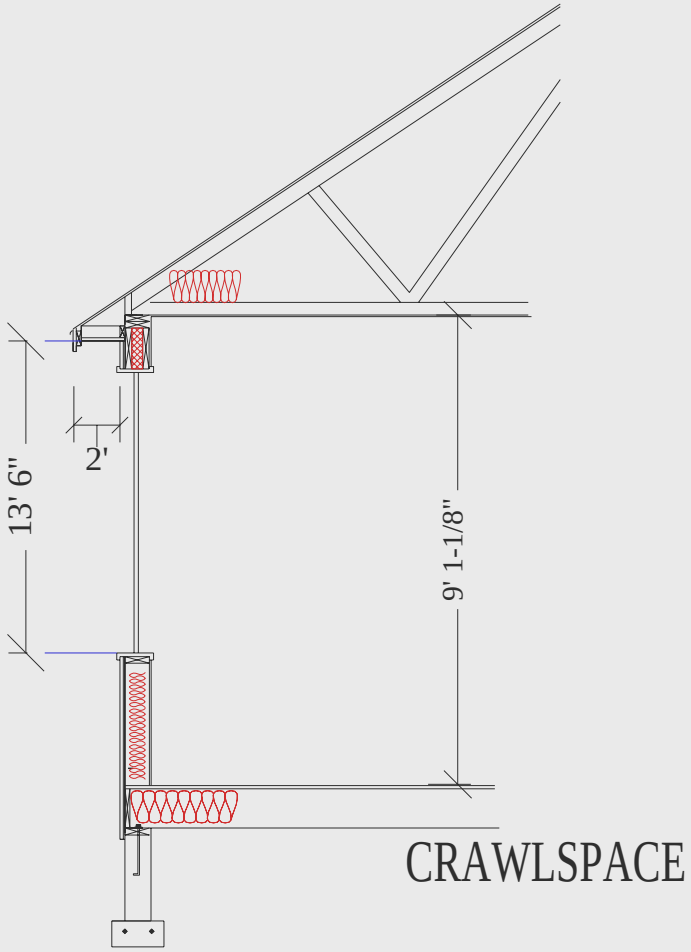
West



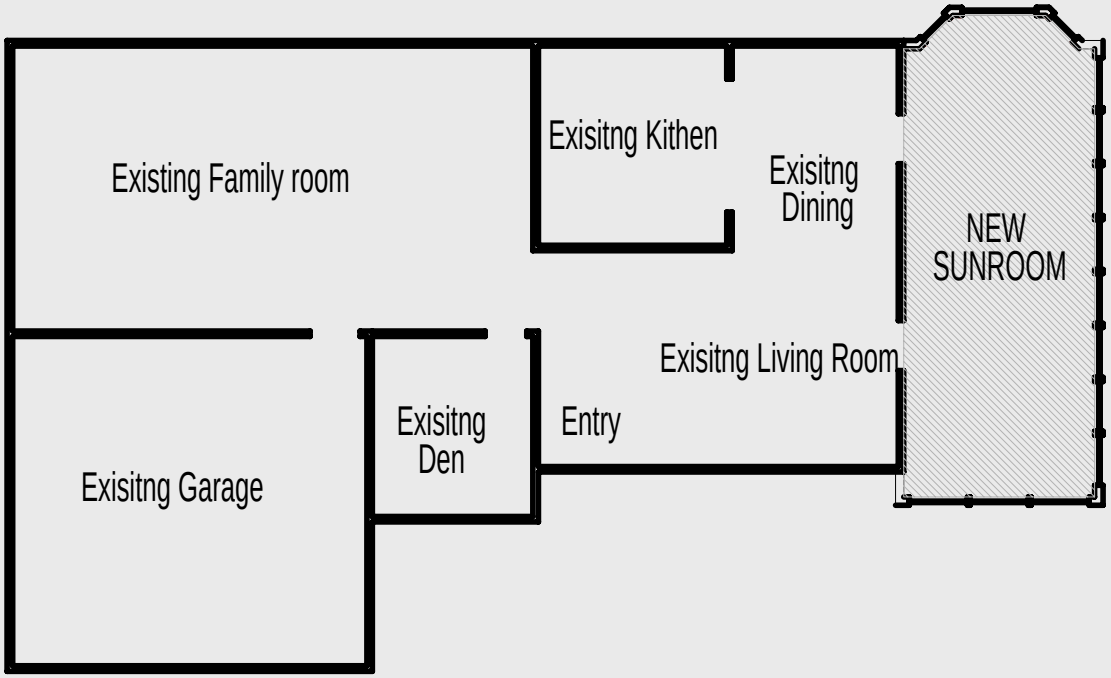
East

Overhang/Projection Factor (PF)





Sunroom Addition

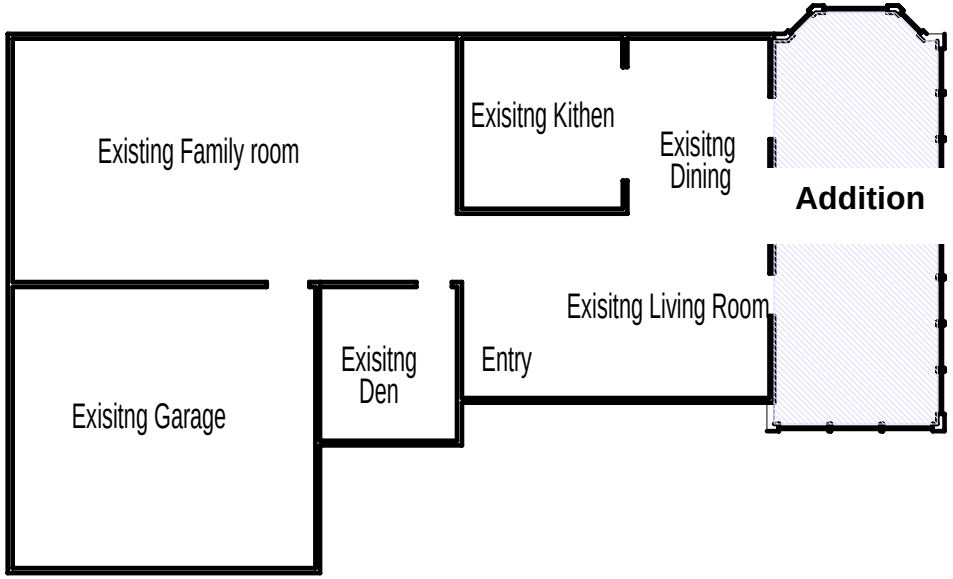


- **Ceiling – 350 s.f.**
- **East Wall – 18 s.f.**
- **West Wall – 252 s.f.**
- **West Windows – 144 s.f**
  - **(U-value .35/SHGC .40)**
- **North Wall – 112 s.f.**
- **North Windows – 63 s.f.**
  - **(U-value .35/SHGC .40)**
- **South Wall – 126 s.f.**
- **South Windows – 51 s.f.**
  - **(U-value .35/SHGC .40)**
- **Floor – 350 s.f.**

N

Additions

- Compliance options for additions
  - Treat as a stand-alone building
  - Bring entire building into compliance



Special Rules for Sunrooms

Sunroom addition defined:

- Area less than 500 ft^2
- Have > 40% glazing of gross exterior wall and roof area
- Separate heating or cooling system or zone
- Must be thermally isolated and not used as a kitchen or sleeping quarters

Sunroom/Addition Requirements

2003 IECC
Prescriptive Criteria Sunrooms

HDD	MAX	MINIMUM	
	Fenestration U-factor	Ceiling R-value	Wall R-value
0 – 1,999	.75	R-19	R-13
2,000 – 3,999	.50	R-19	R-13
4,000 – 5,999	.50	R-19	R-13
6,000 – 8,499	.50	R-24	R-13
8,500 – 12,999	.50	R-24	R-13

Prescriptive Criteria
Additions and Window Replacement

HDD	MAX	MINIMUM	
	Fenestration U-factor	Ceiling R-value	Wall R-value
0 – 1,999	.75	R-26	R-13
2,000 – 3,999	.50	R-30	R-13
4,000 – 5,999	.40	R-38	R-18
6,000 – 8,499	.35	R-49	R-21
8,500 – 12,999	.35	R-49	R-21

All other components have the same requirements

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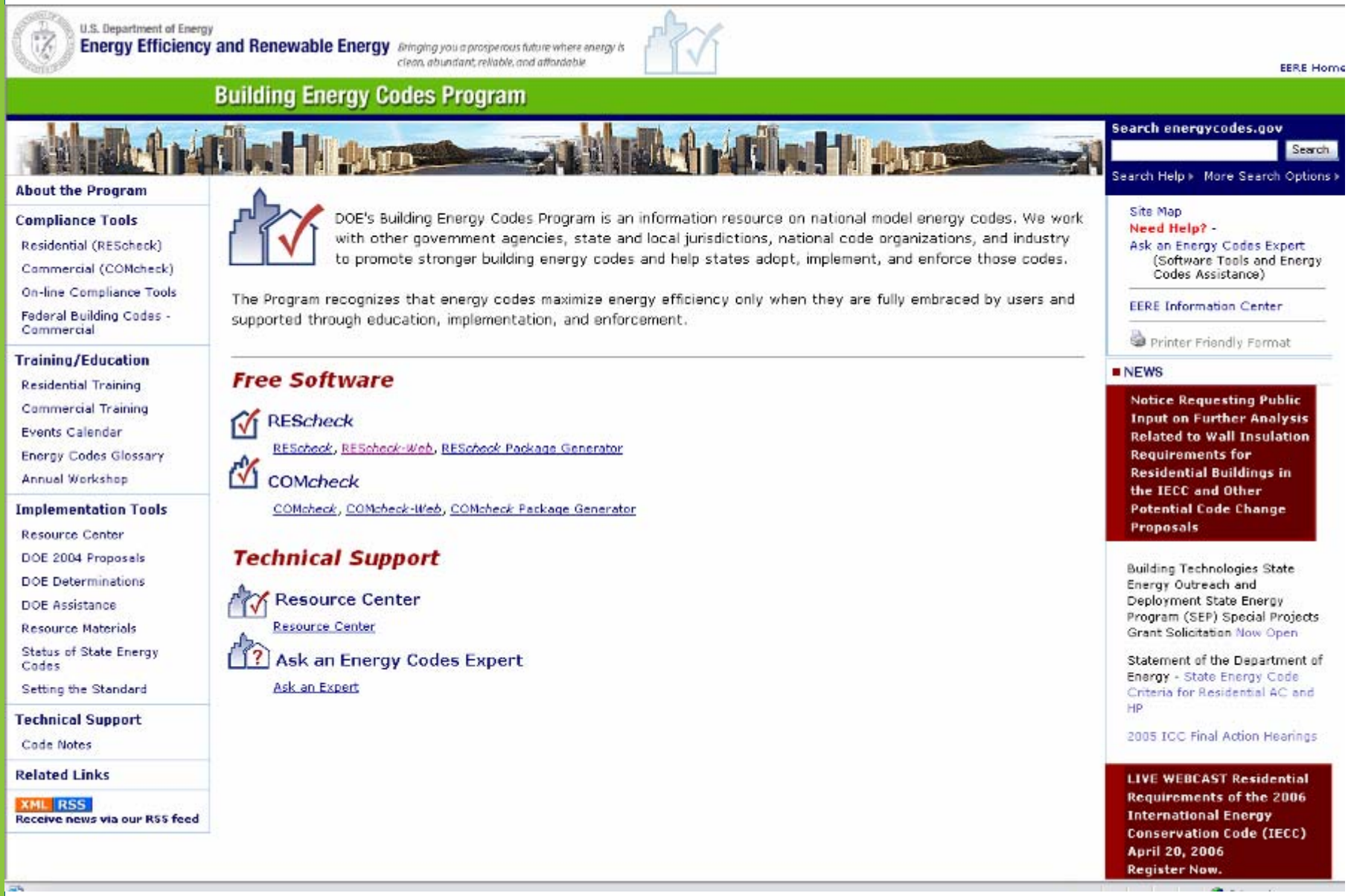
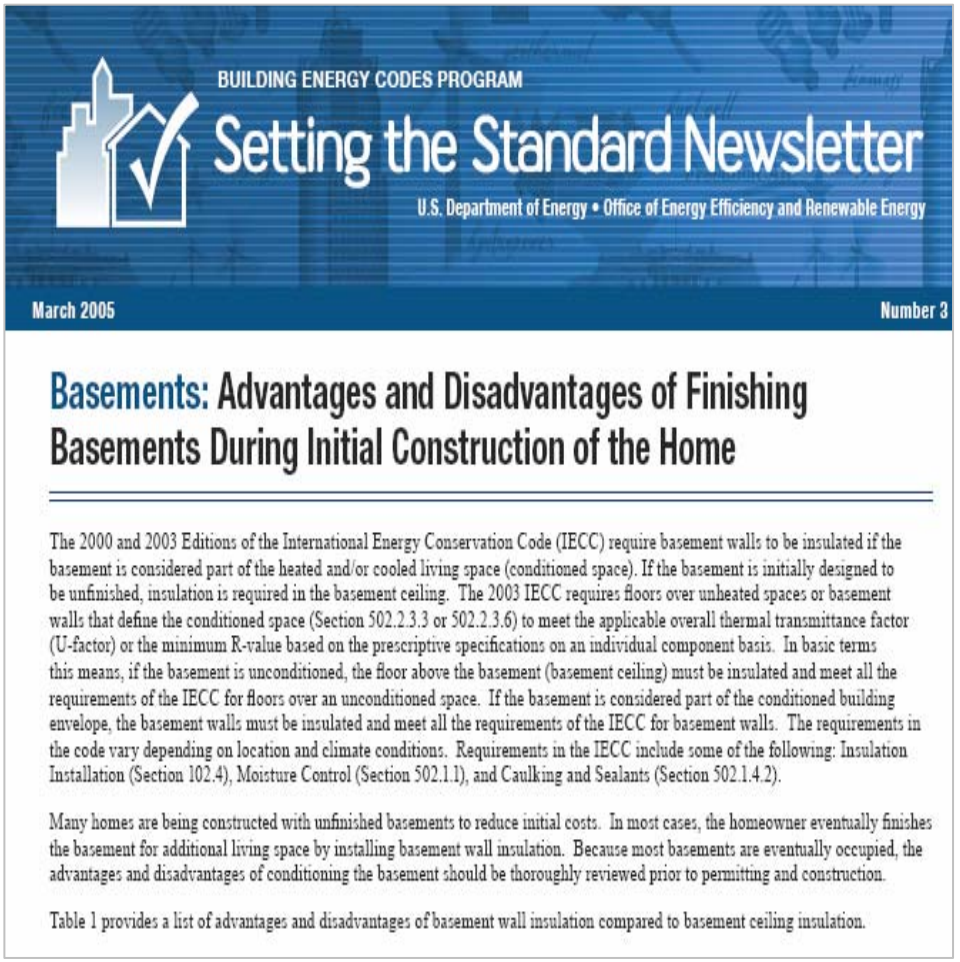


Setting the Standard Newsletter

- Register online to receive the latest up-to-date information on energy code related issues



BUILDING ENERGY CODES PROGRAM

Setting the Standard Newsletter

U.S. Department of Energy • Office of Energy Efficiency and Renewable Energy

March 2005 Number 3

Basements: Advantages and Disadvantages of Finishing Basements During Initial Construction of the Home

The 2000 and 2003 Editions of the International Energy Conservation Code (IECC) require basement walls to be insulated if the basement is considered part of the heated and/or cooled living space (conditioned space). If the basement is initially designed to be unfinished, insulation is required in the basement ceiling. The 2003 IECC requires floors over unheated spaces or basement walls that define the conditioned space (Section 502.2.3.3 or 502.2.3.6) to meet the applicable overall thermal transmittance factor (U-factor) or the minimum R-value based on the prescriptive specifications on an individual component basis. In basic terms this means, if the basement is unconditioned, the floor above the basement (basement ceiling) must be insulated and meet all the requirements of the IECC for floors over an unconditioned space. If the basement is considered part of the conditioned building envelope, the basement walls must be insulated and meet all the requirements of the IECC for basement walls. The requirements in the code vary depending on location and climate conditions. Requirements in the IECC include some of the following: Insulation Installation (Section 102.4), Moisture Control (Section 502.1.1), and Caulking and Sealants (Section 502.1.4.2).

Many homes are being constructed with unfinished basements to reduce initial costs. In most cases, the homeowner eventually finishes the basement for additional living space by installing basement wall insulation. Because most basements are eventually occupied, the advantages and disadvantages of conditioning the basement should be thoroughly reviewed prior to permitting and construction.

Table 1 provides a list of advantages and disadvantages of basement wall insulation compared to basement ceiling insulation.

Newsletter: http://www.energycodes.gov/news/

Questions/Comments

- Help Desk – on-line electronic form

http://www.energycodes.gov/support/helpdesk.php

Email

Techsupport@becp.pnl.gov