



# Right-Suite® Universal Right-Energy® Title 24 Compliance Supplement

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Approval for Compliance.....	3
Overview.....	4
Obtaining and Installing Right-Energy® Title 24.....	4
Related Publications.....	5
CBECC-Res.....	5
Software Structure.....	6
File Locations.....	7
Title 24 Data in Right-Suite Universal.....	7
Special Features and Modeling Assumptions.....	8
Field Verification.....	8
Fixed and Restricted Inputs.....	8
Mandatory Requirements.....	8
Documentation and Registered CF1R.....	9
Checklist for Compliance Submittal.....	9
Terminology.....	9
Procedures In Brief.....	12
Enter project data.....	12
Run.....	14
Investigating errors.....	15
Next steps.....	16
Step-by-Step Example.....	17
Customer Information.....	19
Job.....	19

Weather Location ..... 19

Building ..... 20

Equipment ..... 39

Compliance ..... 44

Detailed Input Description ..... 51

    Project Information Screen ..... 51

    Zone Information Screen ..... 51

    Infiltration ..... 51

    Right-Draw® ..... 51

    Equipment Screens ..... 54

    Additional Considerations ..... 57

    Right-Energy Title 24 Screens ..... 58

Project ..... 60

Analysis ..... 61

Building ..... 62

Indoor Air Quality (IAQ) ..... 63

Cool Vent ..... 64

Appendix A. Energy Commission Approval ..... 65

Appendix B. Sample Compliance Documentation ..... 66

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## Approval for Compliance

Right-Energy Title 24 (RET24) is a module within Wrightsoft's Right-Suite Universal (RSU) software program that supports demonstration of compliance with California's low-rise residential 2013 Building Energy Efficiency Standards ("standards"). The standards implement the residential energy efficiency portions of Title 24 of the California Code of Regulations and the 2013 revision becomes effective for new construction on July 1, 2014. The low-rise residential standards apply to single family dwellings (R-3 occupancy group) and to multi-family buildings (R-1 or R-2) with 3 stories or less. Hotels, motels, and multi-family buildings with 4 or more stories are outside the scope of the low-rise standards.

RET24 was approved by the California Energy Commission on June 18, 2014 (see Appendix A for the most recent resolution from the Energy Commission). Initial approval is limited to single-family, new construction projects. Wrightsoft plans to add support for additional project types, such as multi-family and existing/addition/alteration, and will obtain further approvals as needed.

Note also that Right-Energy Title 24 is approved only for *residential* compliance. RSU includes non-residential loads and duct design methods. However, the Energy Commission specifies distinct procedures for building types other than those listed above and these are not supported in Right Energy Title 24.

## Overview

The California Building Energy Efficiency standards allow compliance using either a prescriptive or performance method. The prescriptive method is found in the Residential Compliance Manual (see Related Publications). Performance method compliance provides additional flexibility. This method uses building modeling software to demonstrate compliance by comparing the calculated energy use of the project building (called the Proposed Design) to that of a building with the prescriptive requirements applied (the Standard Design). The Residential Alternative Calculation Methods (ACM) Reference Manual (see Related Publications) explains how the Proposed and Standard Designs are determined. If you have questions about how the software models a building feature, refer to the ACM Reference Manual.

All applications that demonstrate performance method compliance use a common core analysis system called Compliance Manager. Compliance Manager implements rules that derive the Standard Design, performs energy simulations and other calculations, and generates standard reports. Compliance Manager is developed and promulgated by the Energy Commission.

This manual is a guide to the use of Right-Energy Title 24. The manual assumes working knowledge of RSU operation. See In addition, knowledge of the standards is also a pre-requisite. The standards are extensive and complex. RET24 will help you efficiently prepare compliance documents, but as the submittal author, you are responsible for their content.

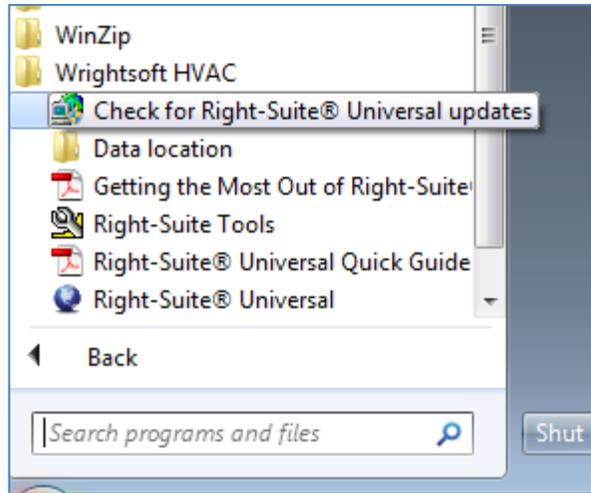
### Obtaining and Installing Right-Energy® Title 24

RET24 is a standard feature of Right-Suite Universal and is always installed with RSU. No special feature licensing is required. However, RET24 requires an internet connection to operate while RSU does not. See [www.wrightsoft.com](http://www.wrightsoft.com) for information on ordering and downloading the program.

If you are a new user of RSU, you should take some time to learn operation of the program before diving into Title 24 compliance. See the *RSU Quick Guide* Right-Draw®, Load Calculations, etc. chapters and *Getting the Most Out of Right-Suite® Universal* Chapters 1 – 9. These are available under the Help menu choice in RSU. Also useful is the extensive set of training videos available via [www.wrightsoft.com/university](http://www.wrightsoft.com/university).

Note that RSU is distributed under several product names. For example, a version for Carrier dealers is published using the ComfortBuilder name. The function of Right-Energy Title 24 is *identical* in these custom versions, so all information in this Compliance Supplement is applicable to all RSU customizations and the Energy Commission certification approval applies to all.

You can verify that your installed copy of RSU is current and obtain updates if needed by using the “Check for Right-Suite Universal updates” choice in the Wrightsoft HVAC folder of All Programs (folder and application names will differ in customized versions), as shown here --



## Related Publications

The Energy Commission makes available several publications that document in detail the standards and compliance procedures. These, along with a wealth of additional information, are can be downloaded at no cost via [www.energy.ca.gov/title24](http://www.energy.ca.gov/title24).

- *2013 Building Energy Efficiency Standards* (CEC-400-2012-004-CMF, May 2012) contains the official standards adopted by the Energy Commission.
- *Residential Compliance Manual* (CEC-400-2013-001-CMF, June 2013) is the interpretive manual for complying with the standards (also contains sample compliance forms).
- *Reference Appendices for the 2013 Building Energy Efficiency Standards* (CEC 400-2012-005-REV2) is the source document for climate zones, HERS protocols for measures requiring verification by a HERS rater, as well as eligibility and installation criteria for energy efficiency measures.
- *Residential Alternative Calculation Methods (ACM) Reference Manual* (CEC-400-2013-003-CMF-REV) contains the rules that the software follows to establish the standard and proposed designs for a proposed building.

Documents can also be purchased from the Energy Commission publications office --

California Energy Commission  
Publications Office  
1516 9<sup>th</sup> Street  
Sacramento, CA 95814

Publications Unit is 916-654-5200

## CBECC-Res

*CBECC-Res* is public domain software for compliance with 2013 Residential Energy Efficiency Standards. *CBECC-Res* uses the same Compliance Manager internals as Right-Energy Title 24 and provides a simple (non-

graphic) user interface. It can be useful to view the complete details of the compliance inputs generated by Right-Energy Title 24. To obtain this software, see:

<http://www.bwilcox.com/BEES/BEES.html>

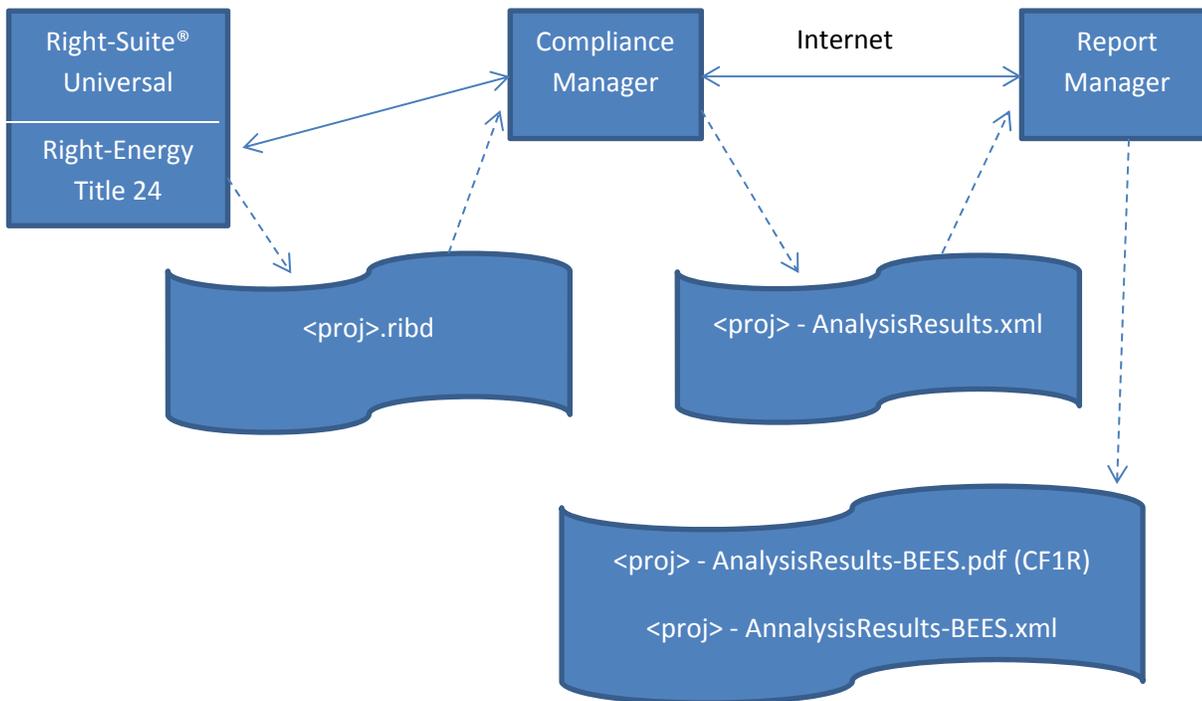
or

California Energy Commission  
Building Standards Office  
1516 9<sup>th</sup> Street, MS 37  
Sacramento, CA 95814  
Attn: Dee Anne Ross  
916-654-6560  
[deeanne.ross@energy.ca.gov](mailto:deeanne.ross@energy.ca.gov)

### Software Structure

The diagram below conceptually illustrates the information flow used by Right-Energy Title 24 to perform compliance analysis.

- When compliance calculations are initiated, Right-Energy Title 24 writes project data to a file having the same name as the RSU project file but with the extension “.ribd”. This is a text file – it can be opened and inspected in any text editor such as Notepad. The RIBD format is also used by CBECC-Res, so that application can be used to examine the project information generated by Right Energy Title 24.
- After the RIBD file is written, Right-Energy Title 24 invokes Compliance Manager. The energy model calculations are performed and results written to the file.
- Compliance Manager uses a web-based Report Manager to produce a formatted CF1R report. This step requires an internet connection from your machine. The CF1R is the key document produced by the compliance process; it is an Acrobat (PDF) file named <proj> - AnalysisResults-BEES.pdf. An example CF1R is found in Appendix B.
- The Report Manager also produces an electronically-readable project summary in a file named <proj> - AnalysisResults-BEES.xml.



### File Locations

Compliance Manager places files that it generates in a folder called <proj>-CM that is found in the same folder as the source RSU project, <proj>.rup.

For example, for a project named SimpleProject.rup located in MyFolder, the files (after running compliance) would be:

MyFolder

- SimpleProject.rup
- SimpleProject-CM
  - SimpleProject – AnalysisResults.xml
  - SimpleProject – AnalysisResults-BEES.pdf
  - SimpleProject – AnalysisResults-BEES.xml
  - (other files)

### Title 24 Data in Right-Suite Universal

Right-Suite Universal (RSU) has traditionally been aimed at design tasks – loads calculations and duct layout, for example. In contrast, California Title 24 compliance procedures support energy efficiency and embody many carefully crafted rules about analysis assumptions. There is not always a match between RSU data and Title 24 modeling requirements. From the RSU point of view, there are three classes of data --

- **Equivalent data** are items that RSU and Compliance Manager represent equivalently. Examples include surface areas and HVAC equipment types. Equivalent data is simply transmitted to Compliance Manager as needed.
- **Mappable data** are items that have similar representations in RSU and Compliance Manager, but are not equivalent. For example, in RSU, constructions can have any number of layers and can include user-defined materials. Compliance Manager has a limited number of layers and uses a specified set of materials. In cases like this, RSU must translate information into form required by Compliance Manager. If the translation cannot be done accurately, RSU issues error messages.
- **Title-24-only data** are items that are needed for compliance but have no other uses in RSU. A simple example is the project's California climate zone. For this situation, new screens or input fields have been added to RSU.

The compliance implications of specific RSU inputs are discussed in the Input Details section of this Supplement. It must be again emphasized California Title 24 Compliance procedures are not simple. Care must be used to make sure your RSU project accurately reflects the residence. The CF1R report produced by the analysis is the sole information used by building officials for inspection and enforcement. What appears on RSU screens or reports is useful for checking your work but ultimately has no compliance significance unless it is properly represented on the CF1R.

### Special Features and Modeling Assumptions

The *2013 Residential ACM Reference Manual* identifies the features that are to be shown as a Special Feature and Modeling Assumption on the Certificate of Compliance (CF1R).

### Field Verification

Appendix C of the *2013 Residential ACM Reference Manual* identifies the specific measures that require HERS verification or diagnostic testing. The CF1R identifies if a building includes any measures requiring field testing or verification by a HERS rater as part of the compliance results on the first page. Additionally, as part of the component details, any specific measures requiring testing or verification are identified.

### Fixed and Restricted Inputs

Some Compliance Manager inputs are 'fixed' or 'restricted' and cannot be changed by the user. Right-Energy Title 24 does not transmit values for these inputs, instead it relies on built-in values provided by Compliance Manager. To learn about the standard modeling assumptions, consult either Section 150.1, Package A of the *Building Energy Efficiency Standards*, the *2013 Residential ACM Reference Manual*, or experiment with CBECC-Res.

### Mandatory Requirements

Note that there are a number of mandatory requirements specified in Sections 110.0 through 110.10 and 150.0 of the standards. These requirements apply even when compliance is demonstrated using performance calculations. There are cases where Compliance Manager will model projects that include features that do not satisfy all mandatory requirements. Beware! It is your responsibility to ensure your design meets all of the requirements of the Building Energy Efficiency Standards, including a Pass from Compliance Manager.

## Documentation and Registered CF1R

Compliance Manager creates the CF1R with a watermark indicating that the CF1R is not registered. When compliance features require HERS verification, the compliance documents must be registered with a HERS provider before applying for a building permit (see Residential Compliance Manual, Section 2.1.1). Since some of the compliance features are usually mandatory, in practice, compliance documents must almost always be registered. The primary document is the Certificate of Compliance (CF1R) (file <proj> - AnalysisResults-BEES.pdf described above). Additionally, as construction progresses, follow-up documentation (certificates of installation (CF2R) and certificates of verification (CF3R)) are required to confirm that the required measures are installed.

The file needed to upload a project to a HERS provider is <proj> - AnalysisResults-BEES.xml described above.

The Energy Commission no longer produces a Mandatory Measures (MF-1R) form. Mandatory measures documentation is found on the installation certificates (CF2R). You can see a list of forms in Appendix A of the 2013 Residential Manual and you can access/print forms at the Energy Commission's web site:

<http://www.energy.ca.gov/title24/2013standards/>.

## Checklist for Compliance Submittal

The forms and documentation needed for compliance submittal include an electronic version of the CF1R, registered with a HERS provider. Supporting documentation that could also be required is the roofing material rating from the Cool Roof Rating Council, solar water heating documentation to support a modeled solar fraction, AHRI certified efficiency of cooling, heating and/or water heating equipment, NFRC certified U-factor and Solar Heat Gain Coefficient for windows and skylights.

## Terminology

**Compliance Manager.** The compliance manager is the simulation and compliance rule implementation software specified by the Energy Commission. It models the features of the building as specified in the standards, Section 150.1(c) and Table 150.1-A (Package A) to establish the energy budget for the building.

**Report Manager.** The report manager is a separate program used to generate the Certificate of Compliance (CF1R). This is a web based application that enables registering the CF1R, which is required any time there are HERS measures in a building. For more on CF1R registration, see *Residential Compliance Manual*, Section 2.1.1.

**Proposed Design.** The user-defined proposed building modeled in RSU is called the proposed design. The energy use of the proposed design is compared to the standard design to determine if the building complies with the standards.

**Standard Design.** Compliance Manager creates a version of the proposed building that has the features of Section 150.1(c) and Table 150.1-A (Package A) in the specified climate zone to establish the allowed energy budget or standard design. The standard design is compared to the proposed design, and if it complies a Certificate of Compliance (CF1R) can be produced.

For newly constructed buildings, the standard design building is in the same location and has the same floor area, volume, and configuration as the proposed design, except that wall and window areas are distributed equally between the four main compass points, North, East, South and West. For additions and alterations, the standard design has the same wall and window areas and orientations as the proposed building.

The basis of the standard design is prescriptive Package A (from Section 150.1(c) of the standards, Table 150.1-A). Package A requirements (not repeated here) vary by climate zone. Reference Appendices for the 2013 Building Energy Efficiency Standards (Reference Appendices), Joint Appendix JA2, Table 2-1, contains the 16 California climate zones and their representative city. The climate zone can be found by city, county and zip code in JA2.1.1.

Detailed information about how the standard design is established can be found in the ACM Reference Manual.

**Mandatory Requirements.** Mandatory requirements are found in Sections 100.0 through 110.10 and 150.0 of the standards. Any requirement that is mandatory (some are modeled, some are not) shouldn't be removed from the proposed building. For example, a building in climate zone 10 may be built without a whole house fan as long as it complies without that feature, because the whole house fan is a feature of Package A in Section 150.1. While the standard design building has all of the features of Package A, measures that are more efficient or less efficient can be modeled in the proposed design as long as it meets the mandatory minimum requirements and meets the energy budget.

A partial list of the changes affecting the building envelope is a minimum of R-30 ceiling/roof insulation, R-19 raised floor insulation, and a maximum of 0.58 U-factor for window (see Section 150.0(q) for exceptions). Space conditioning system mandatory requirements include ducts with R-6 insulation that are sealed and have tested duct leakage, air-handler fan efficacy of 0.58 W/CFM or less, and cooling airflow of greater than 350 CFM/ton. These measures require a Home Energy Rating System (HERS) rater.

**Climate Zone.** California has 16 climate zones. The climate zone can be found in the Reference Appendices, Joint Appendix JA2.1.1, by looking up the city, county, or zip code. The climate zone determines the measures that are part of the building's standard design (see Section 150.1, Table 150.1-A in the standards).

- 1 Arcata
- 2 Santa Rosa
- 3 Oakland
- 4 San Jose
- 5 Santa Maria
- 6 Torrance
- 7 San Diego
- 8 Fullerton
- 9 Burbank
- 10 Riverside
- 11 Red Bluff

- 12 Sacramento
- 13 Fresno
- 14 Palmdale
- 15 Palm Springs
- 16 Blue Canyon

**HERS Rater Verification.** Some mandatory requirements and other optional compliance features require a Home Energy Rating Systems (HERS) rater to perform diagnostic testing or verify the installation. HERS raters are trained and certified by one of the HERS Providers. For a list of currently approved providers see <http://www.energy.ca.gov/HERS/providers.html>. HERS raters are trained and certified by the provider to perform verification and testing requirements as specified in the Reference Appendices, Residential Appendices RA1 – RA4.

## Procedures In Brief

This section is a brief guide on how to perform Title 24 compliance analysis in Right-Suite Universal (RSU) using the Right-Energy® Title 24. The goal is to walk through the process without getting into the details. Two other sections follow that provide information from additional viewpoints –

- Step-by-step Example provides shows how to enter and perform compliance analysis on a simple project.
- Detailed Input Description fully documents all inputs related to Title 24 compliance.

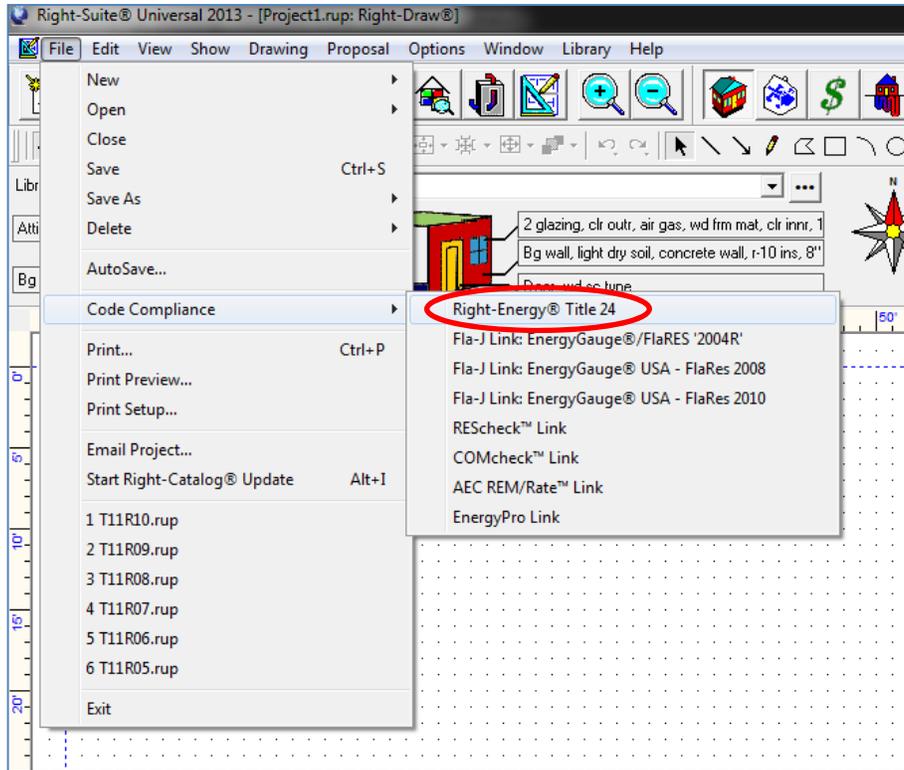
### Enter project data

Start a new project in RSU (or open an existing one). Using Right-Draw and other input screens, enter the description of the residence to be analyzed. Information required includes --

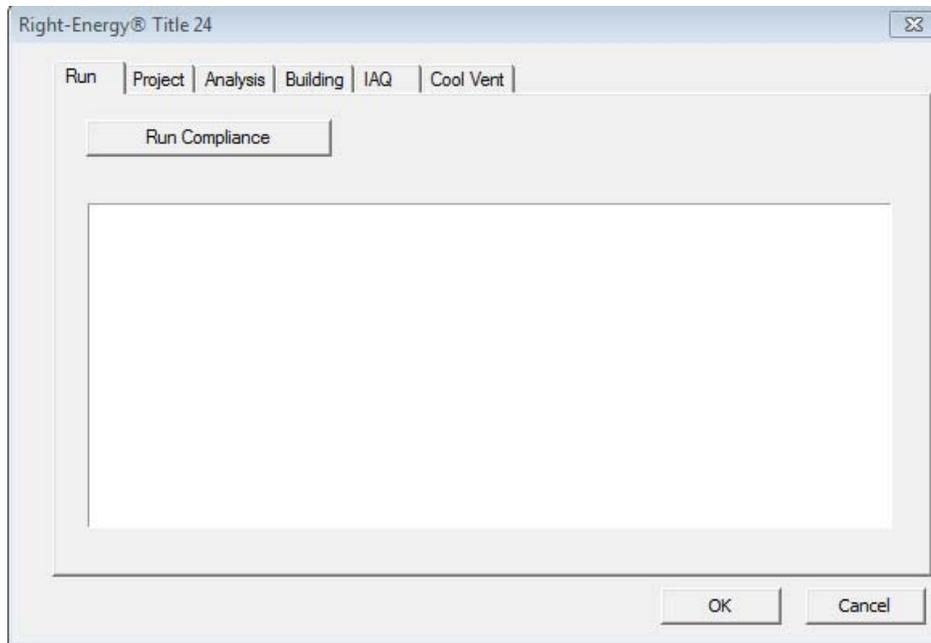
1. Building address, climate zone, front orientation, and availability of natural gas,
2. Conditioned floor area and average ceiling height,
3. Attic/roof details including roofing material,
4. Ceilings below attic and vaulted ceiling R-values,
5. Wall areas, orientation, and construction details,
6. Door areas and orientation,
7. Slab or raised floor area and construction details,
8. Window and skylight areas, orientation, U-factor, Solar Heat Gain Coefficient,
9. Building overhang and side fin shading,
10. Mechanical heating and cooling equipment type and efficiency,
11. Distribution system location and construction details,
12. Method for providing mechanical ventilation, and
13. Domestic water heating system details, including type of water heating equipment, fuel type, efficiency, distribution system details.

As discussed under Title 24 Data in Right-Suite Universal, much of the required information has equivalent or mappable representation in RSU, so you need enter only standard data that would be typically used for loads calculations. The main example of this type of information is surface areas and constructions – the required Compliance Manager data is derived directly from the Right-Draw drawing and properties.

There a number of screens that capture information specific to Title 24 analysis. These are accessed via the Code Compliance choice on the File menu --



This choice brings you to the following --

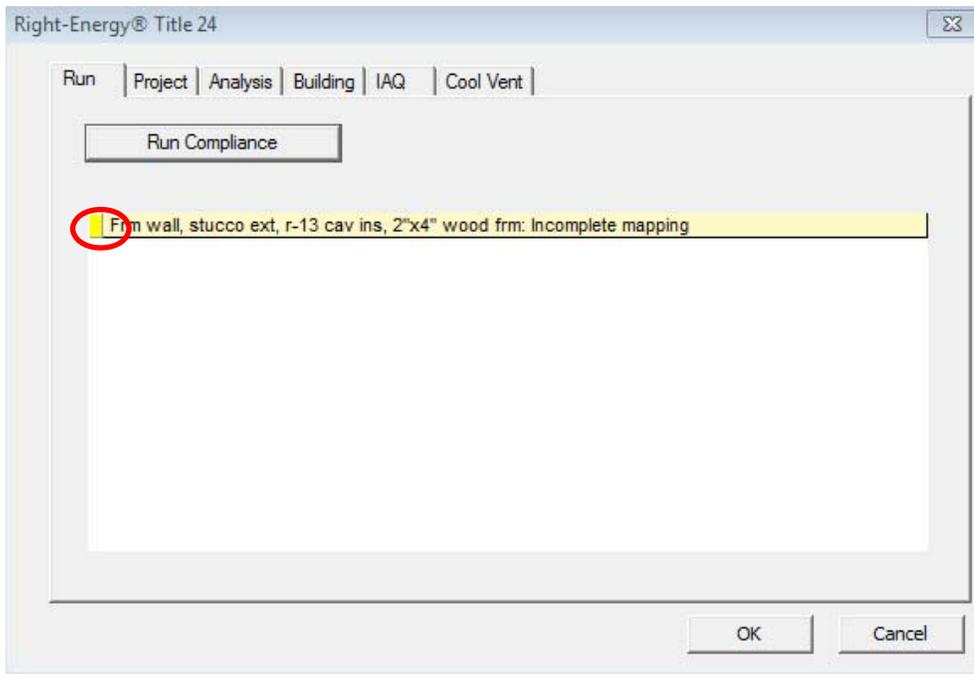


The various tabs allow input of Title 24 specific information not found on other RSU screens. See Step-by-Step Example and Detailed Input Description for specifics.

## Run

Once input has been prepared, save your work (via File | Save) and then press Run Compliance on the Run tab of the Right-Energy® Title 24 screen (shown above).

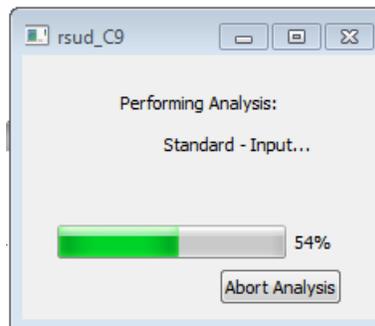
At this point, Right-Energy Title 24 gathers information from the RSU project and performs any required mapping to conform to Compliance Manager requirements. Any error or warnings are shown in a window on the Run tab --



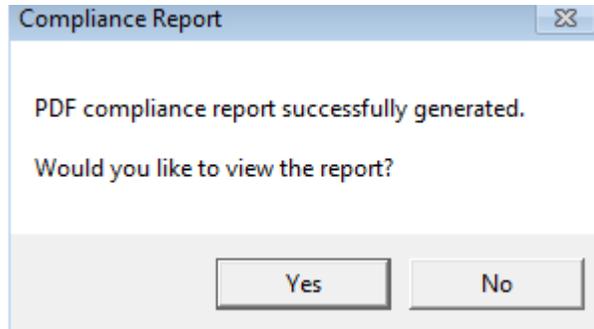
Warning messages are shown with a yellow tag, as circled above. Warnings do not prevent the run from proceeding, but should be investigated (see below).

Error messages have a red tag. The run will not proceed if there are errors.

When the analysis gets underway, a small message box is displayed to keep you informed of run progress --



When the run is complete, you are given the opportunity to view the CF1R report (not shown here, see Appendix B for an example CF1R).



Finally, the overall energy model results are displayed. PASS or FAIL is shown near the lower right corner of this screen.

End Use	Standard Design Site (kWh)	Standard Design Site (therms)	Standard Design (kTDV/ft²-yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft²-yr)	Compliance Margin (kTDV/ft²-yr)
Space Heating	207	240.9	22.73	197	229.3	21.57	1.16
Space Cooling	414		14.13	328		10.86	3.27
IAQ Ventilation	112		1.13	112		1.13	0.00
Other HVAC			0.00			0.00	0.00
Water Heating		181.4	13.86		181.4	13.86	0.00
PV Credit						0.00	0.00
Compliance Total			51.85			47.42	4.43
Inside Lighting	1,045		11.16	1,045		11.16	Result: <b>PASS</b>
Appl. & Cooking	958	52.5	13.80	958	52.5	13.80	
Plug Loads	2,206		22.73	2,206		22.73	
Exterior	117		1.16	117		1.16	
<b>TOTAL</b>	<b>5,058</b>	<b>474.8</b>	<b>100.70</b>	<b>4,962</b>	<b>463.2</b>	<b>96.27</b>	

### Investigating errors

Some errors are self-explanatory and can be immediately corrected via changes to the RSU project.

One significant cause of messages is unsupported features. Right-Suite Universal supports some building features that are not covered by Compliance Manager. A notable example is basements. Any below-grade surfaces are rejected.

CBECC-Res can be a “tool of last resort.” If you have warnings or errors that you cannot resolve, you can load the RIBD file for your project into CBECC-Res, make corrections or additions, and do the compliance analysis. Of course, this is a “one way street” – any changes you make in CBECC-Res are not captured in your RSU project.

### Next steps

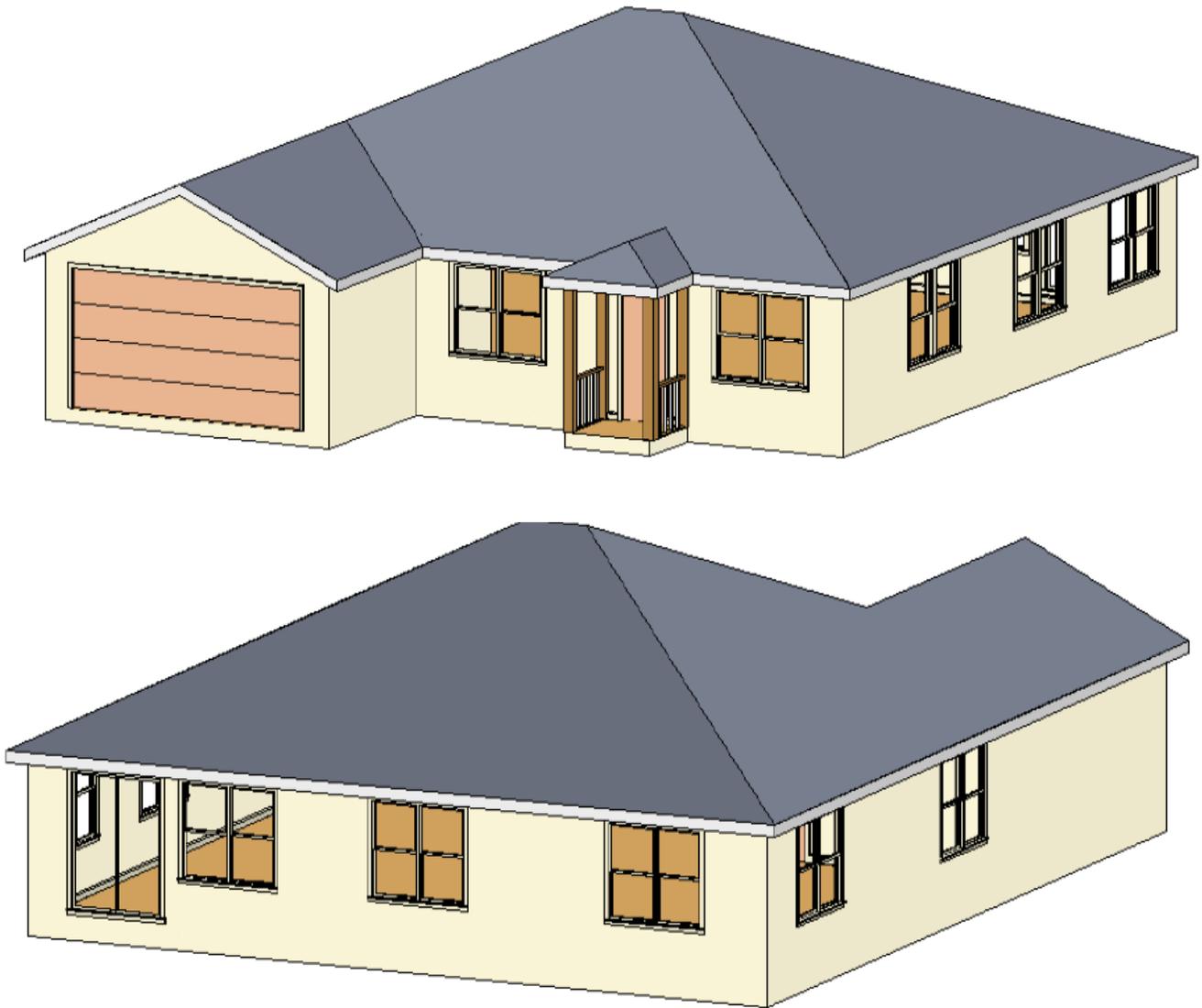
Once you have completed a run and achieved PASS, you should review the CF1R carefully to verify it accurately represents your project. You should make corrections and re-run as needed.

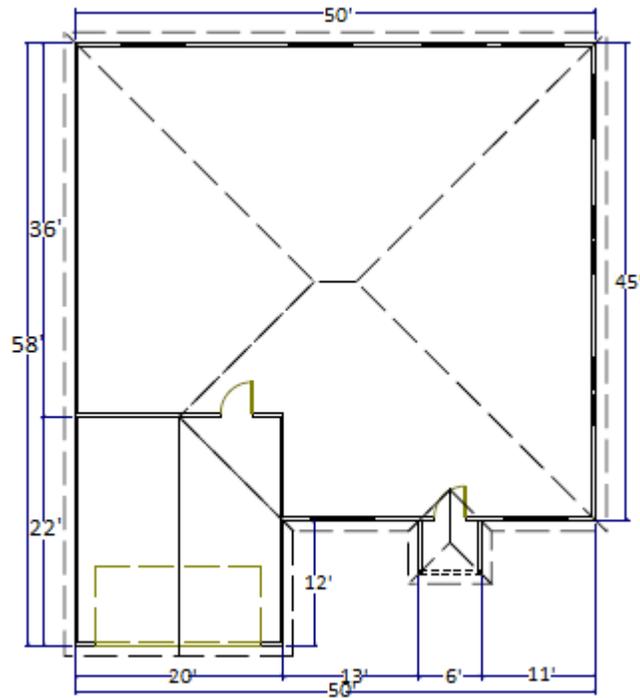
Finally, when you are ready to submit the project for permit approval, you generally need to register the CF1R with a HERS provider as discussed above. [To be expanded when procedures are clarified.]

## Step-by-Step Example

This example will take you through the steps necessary to prepare a project for Title 24 Compliance in RSU.

The house pictured below has a living area, 9-ft ceilings with an attic above, and a slab-on-grade floor. There is also an unconditioned garage with an attic above. It is located in Sacramento.





Component	Description
Ceiling height	9 ft
Conditioned floor area	2100 ft <sup>2</sup>
Conditioned volume	18,900 ft <sup>3</sup>
Gross areas	
Slab	2100 ft <sup>2</sup>
Slab perimeter, outside	162 ft
Ceiling	2100 ft <sup>2</sup> , vented attic
Front wall (South)	270 ft <sup>2</sup>
Front garage wall	180 ft <sup>2</sup> , shaded
Left wall (West)	324 ft <sup>2</sup>
Left garage wall	90 ft <sup>2</sup> , shaded
Back wall (North)	450 ft <sup>2</sup>
Right wall (East)	414 ft <sup>2</sup>
Front door	20 ft <sup>2</sup>
Garage door	
Overhangs	1 ft
Constructions	
Exterior wall	Wood frame, ½" gypsum board interior, R15 cavity insulation, 2 x 4 16" O.C., R4 synthetic stucco exterior
Ceiling below attic	Wood frame, ½" gypsum board ceiling, R38 cavity insulation, 2 x 4 24" O.C., asphalt shingle roof

## Customer Information

- Start RSU or start a new project from the default template.
- Select **Show | Project Information** from the main menu.
- Enter '1516 Ninth Street' for the Customer Address
- Enter 'Sacramento' for the Customer City
- Enter 'CA' for the Customer State
- Enter '95811' for the Customer Zip code

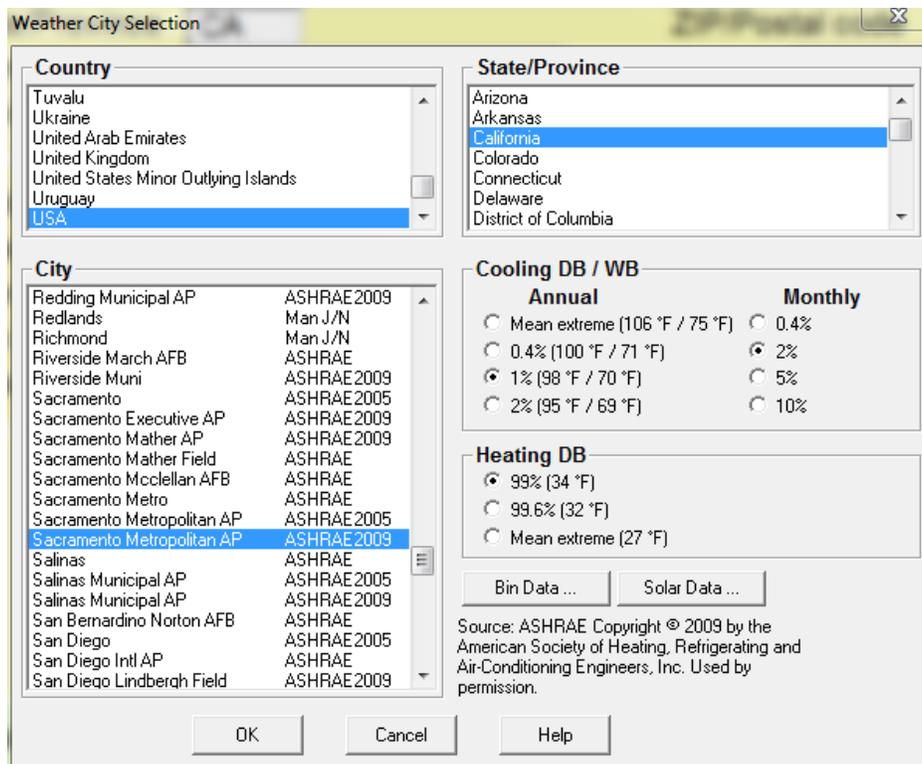
## Job

- Select the Orientation as the 'Front Door' faces 'South'
- Enter 3 for the number of bedrooms

## Weather Location

The weather location isn't required for Title 24 Compliance. This is handled when you enter the Climate Zone. However, it is required if you are also doing a load calculation.

- Scroll down to the 'Weather location' in the 'Location' section.
- Click on the  button to the right of the 'Weather location' field.
- Select 'Sacramento Metropolitan AP, California as shown below



**Weather City Selection**

**Country**

- Tuvalu
- Ukraine
- United Arab Emirates
- United Kingdom
- United States Minor Outlying Islands
- Uruguay
- USA**

**State/Province**

- Arizona
- Arkansas
- California**
- Colorado
- Connecticut
- Delaware
- District of Columbia

**City**

Redding Municipal AP	ASHRAE2009
Redlands	Man J/N
Richmond	Man J/N
Riverside March AFB	ASHRAE
Riverside Muni	ASHRAE2009
Sacramento	ASHRAE2005
Sacramento Executive AP	ASHRAE2009
Sacramento Mather AP	ASHRAE2009
Sacramento Mather Field	ASHRAE
Sacramento McClellan AFB	ASHRAE
Sacramento Metro	ASHRAE
Sacramento Metropolitan AP	ASHRAE2005
<b>Sacramento Metropolitan AP</b>	<b>ASHRAE2009</b>
Salinas	ASHRAE
Salinas Municipal AP	ASHRAE2005
Salinas Municipal AP	ASHRAE2009
San Bernardino Norton AFB	ASHRAE
San Diego	ASHRAE2005
San Diego Intl AP	ASHRAE
San Diego Lindbergh Field	ASHRAE2009

**Cooling DB / WB**

**Annual**      **Monthly**

Mean extreme (106 °F / 75 °F)       0.4%  
 0.4% (100 °F / 71 °F)       2%  
 1% (98 °F / 70 °F)       5%  
 2% (95 °F / 69 °F)       10%

**Heating DB**

99% (34 °F)  
 99.6% (32 °F)  
 Mean extreme (27 °F)

Bin Data ...      Solar Data ...

Source: ASHRAE Copyright © 2009 by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Used by permission.

OK      Cancel      Help

- Click the 'OK' button to return to the Project Information Screen.
- Scroll down to the 'Conditions' section and verify the Heating Dry bulb temperature and Cooling Annual (Jul) DB temperature

**Conditions**

**Heating**  
 Dry bulb [ 34 ] °F  
 Wind speed 15.0 mph

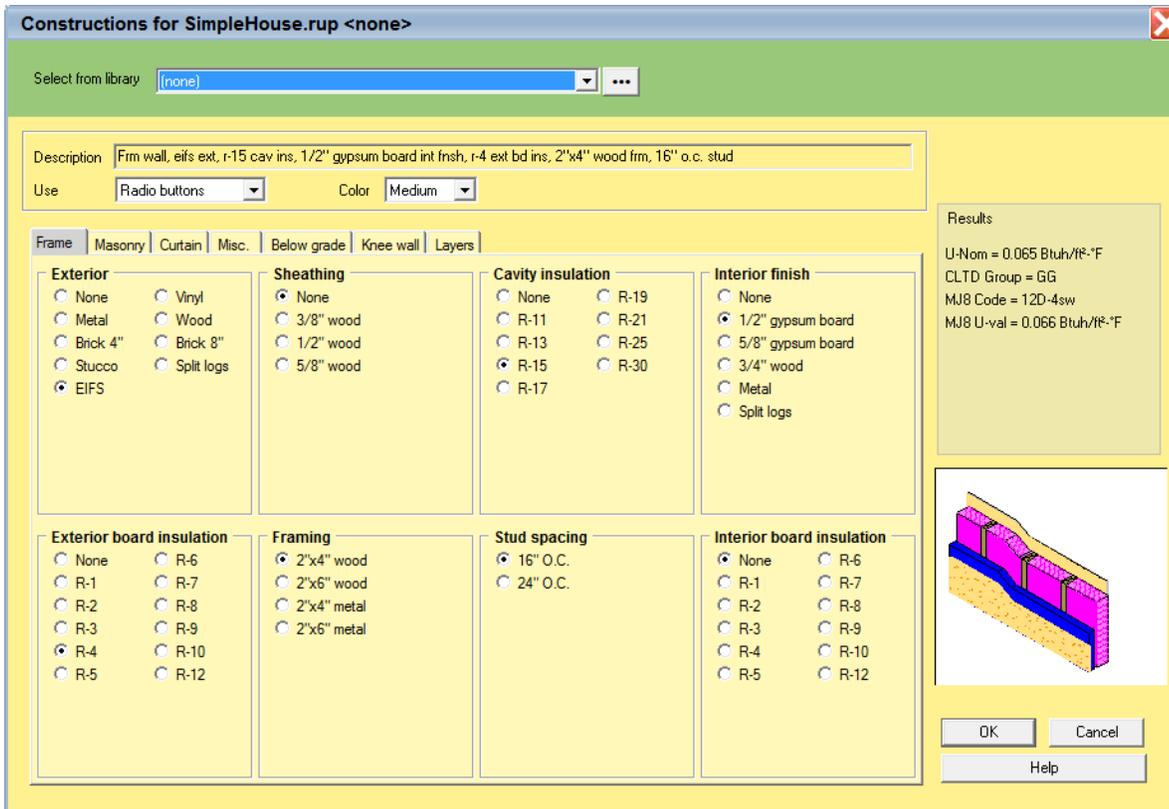
**Cooling** Annual  
 Wind speed 7.5 mph

Month	DB ( °F )	Daily range ( °F )	WB ( °F )	RH (%)	Daylight saving	Irrad ( Btu/ft <sup>2</sup> )	Avg DB ( °F )	Mains ( °F )
Annual (Jul)	97.9	32.1	69.7	24	<input checked="" type="checkbox"/>	1481	61.5	60.0

- Select **File | Save As | Project ...** to save the project before we go any further. Enter whatever project name you like – SimpleHouse.rup, for example.

## Building

- Select **File | Show | Right-Draw®** to display the Right-Draw screen.
- We will define the constructions first. Click on the wall type in the Default Construction bar at the top of the screen below the toolbars.
- Select the 'Frame' tab. Select EIFS for the Exterior, None for Sheathing, R-15 for Cavity insulation, ½" gypsum board for Interior finish, R-4 for Exterior board insulation, 2" x 4" wood for Framing, 16" O.C. for Stud spacing, and None for Interior board insulation. Click the 'OK' button to accept this construction and return to the Right-Draw screen.



- Click on the ceiling type in the Default Construction bar at the top of the screen below the toolbars.

The ceiling cannot be described using just the radio buttons. We will use the 'Custom Layers' option.

- Select 'Custom layers' from the drop-down list at the top of the screen.

Constructions for SimpleHouse.rup <none>

Select from library (none)

Description: Attic ceiling, asphalt shingles roof mat, r-20 roof ins, 1/2" gypsum board int fnsh

Use: Radio buttons Color: Medium

Flat Roof/Ceiling | Sloped Roof/Ceiling | **Ceiling under Attic** | Ceiling Partition | Layers

Roof material	Roof insulation	Attic type	Ceiling insulation
<input checked="" type="radio"/> Asphalt shingles	<input type="radio"/> None	<input type="radio"/> Unvented	<input checked="" type="radio"/> None
<input type="radio"/> Wood shingles	<input type="radio"/> R-2	<input type="radio"/> Unvented w/ radiant bar	<input type="radio"/> R-7
<input type="radio"/> Wood shakes	<input type="radio"/> R-3	<input checked="" type="radio"/> Vented	<input type="radio"/> R-28
<input type="radio"/> Tile, slate, concrete	<input type="radio"/> R-4	<input type="radio"/> Vented w/ radiant bar	<input type="radio"/> R-30
<input type="radio"/> Metal	<input type="radio"/> R-5	<input type="radio"/> Fan vented	<input type="radio"/> R-38
<input type="radio"/> Tar and gravel	<input type="radio"/> R-6	<input type="radio"/> Fan vented w/ radiant bar	<input type="radio"/> R-44
<input type="radio"/> Membrane	<input type="radio"/> R-7	<input type="radio"/> Encapsulated	<input type="radio"/> R-50
	<input type="radio"/> R-8		<input type="radio"/> R-56
	<input type="radio"/> R-10		
	<input type="radio"/> R-12		
	<input type="radio"/> R-15		
	<input type="radio"/> R-17		
	<input type="radio"/> R-18		
	<input checked="" type="radio"/> R-20		
	<input type="radio"/> R-22		
	<input type="radio"/> R-25		
	<input type="radio"/> R-28		
	<input type="radio"/> R-31		
	<input type="radio"/> R-35		

Ceiling finish

- None
- 1/2" gypsum board
- 5/8" gypsum board
- 3/4" wood
- Metal
- Suspended, plaster board
- Suspended, fiber board
- Suspended, acoustical
- Suspended, foam board

Suspended ceiling insulation

- None
- R-2
- R-4
- R-6
- R-7
- R-11
- R-19
- R-30

Plenum

- Dead air
- Return air

Results

U-Nom = 0.405 Btuh/ft<sup>2</sup>-F  
 CLTD Group = 55  
 MJ8 Code = 16B-0ad  
 MJ8 U-val = 0.408 Btuh/ft<sup>2</sup>-F



OK Cancel

Help

- Select 'Medium' from the Color drop-down list.
- Click on the 'Add' button above the list of layers.
- Select 'RoofTile 10 PSF' from the list of construction materials.
- Click the 'Select' button to return to the Layers screen.
- Select the 'RoofAsph' material in the list and click the 'Del' button above the list.
- Click the 'Add' button again and select the 'AirGap' material.
- Double-click on the 'AtticV' material and select the 'AtticVRB' material (VRB means vented with a radiant barrier).
- The joists in the ceiling are 2 x 4, 24" O.C. Change the frame fraction (FrameF) on the 'Framed' line to 0.07 to reflect this. Change the thickness (Thick) to 3.50"
- Click the 'OK' button to accept this construction and return to the Right-Draw screen.

Constructions for SimpleHouse.rup <none>

Select from library:

Description: Attic ceiling, asphalt shingles roof mat, r-20 roof ins, 1/2" gypsum board int fnsh

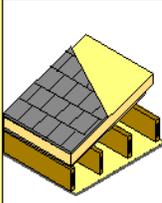
Use:  Color:

Layers

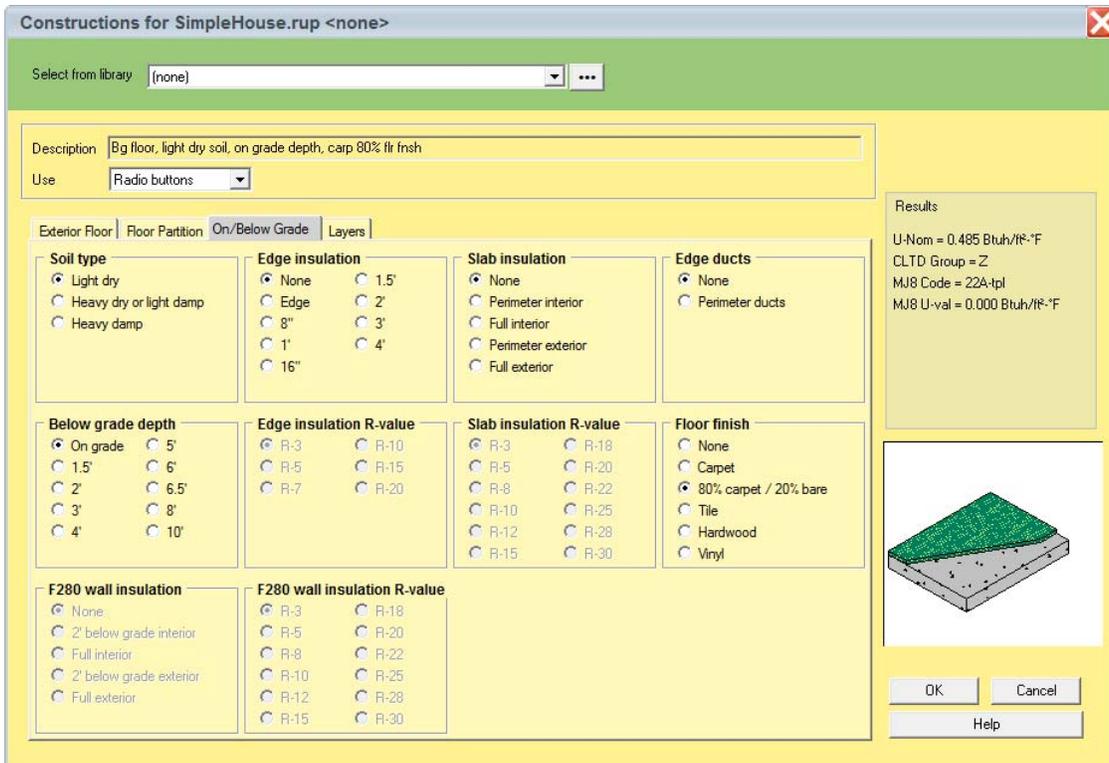
L#	Material	FrameF	Thick (in)	Cond (Btu/ft·°F)	Dens (lb/ft³)	SpHt (ft²·°F/Btu)	R (ft²·°F/Btu)	Weight (lb/ft²)	HC (Btu/ft²·°F)
	Outside surface						0.17		
1	RoofAsph		0.40	0.070	70.0	0.30	0.48	2.33	0.70
2	AirGap		1.00	0.104	0.0	0.00	0.80	0.00	0.00
3	R20		1.00	0.004	0.0	0.00	20.00	0.00	0.00
4	WoodPly		1.00	0.080	34.0	0.36	1.04	2.83	1.02
5	AtticVRB		12.00	1.000	0.0	0.00	1.00	0.00	0.00
6	Framed	0.07	3.50	0.271	2.1	0.39	1.08	0.61	0.24
	WoodFrm (7%)		3.50	0.067	30.0	0.39	4.35	8.75	3.41
	Empty (93%)		3.50	0.286	0.0	0.00	1.02	0.00	0.00
7	GypBd		0.50	0.092	49.9	0.26	0.45	2.08	0.54
	Inside surface						0.68		
	Totals		4.00	0.218	8.1	0.29	2.38	2.69	0.78

Results

U-Nom = 0.416 Btu/h/ft²·°F  
 CLTD Group = 45  
 MJ8 Code = Attic ceiling, asphalt  
 MJ8 U-val = 0.416 Btu/h/ft²·°F



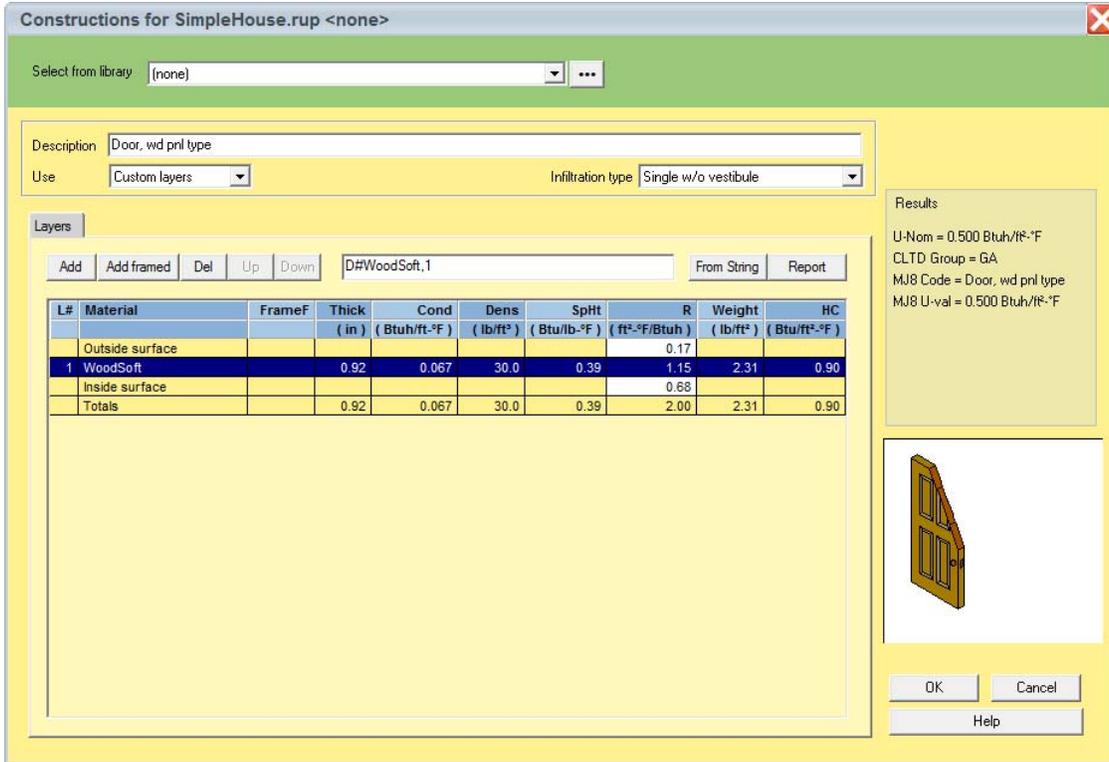
- Click on the floor type in the Default Construction bar at the top of the screen below the toolbars.
- Select the 'On/Below Grade' tab. Select 'Light dry' for the Soil type, 'None' for the Edge insulation, 'None' for the Slab insulation, 'None' for Edge ducts, 'On grade' for Below grade depth, and '80% carpet / 20% bare' for Floor finish. Click the 'OK' button to accept this construction and return to the Right-Draw screen.



- Click on the door type in the Default Construction bar at the top of the screen below the toolbars.

The door needs to be specified using the 'Custom Layers'.

- Select 'Custom layers' from the drop-down list on the top of the screen.
- Change the thickness of the 'WoodSoft' material to 0.92". Change the R-value to 1.15.
- Click the 'OK' button to accept this construction and return to the Right-Draw screen.



- Click on the glazing type in the Default Construction bar at the top of the screen below the toolbars.
- Select 'Custom values' from the drop-down list at the top of the screen.
- Select 'Clear' for the Glazing type, check the NFRC rated box, enter 0.320 for the U-value, enter 0.25 for the SHGC, enter 1 for the Number of glazings, un-check the Has storm window, and set the Frame type to 'None'.
- Click the 'OK' button to accept this construction and return to the Right-Draw screen.

**Constructions for SimpleHouse.rup <none>**

Select from library: (none)

Description: 2 glazing, clr low-e outr, air gas, insulated vinyl frm mat, clr innr, 1/4" gap, 1/4" thk

Use: Custom values

Custom

Glazing type: Clear

Number of glazings (not including storm window): 1

NFRC rated  Has storm window

Without storm window: U-value: 0.320, SHGC: 0.25

With storm window: U-value: 0.320, SHGC: 0.25

Frame type: None

Results:

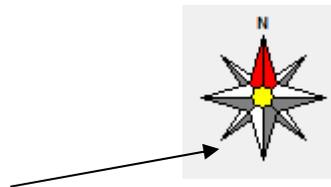
SHGC w/o storm = 0.25  
 U-val w/o storm = 0.320  
 MJ8 Code = 2 glazing, clr low-e  
 MJ8 SHGC w/o storm = 0.25  
 MJ8 U-val w/o storm = 0.320

Picture Not Available

OK Cancel Help

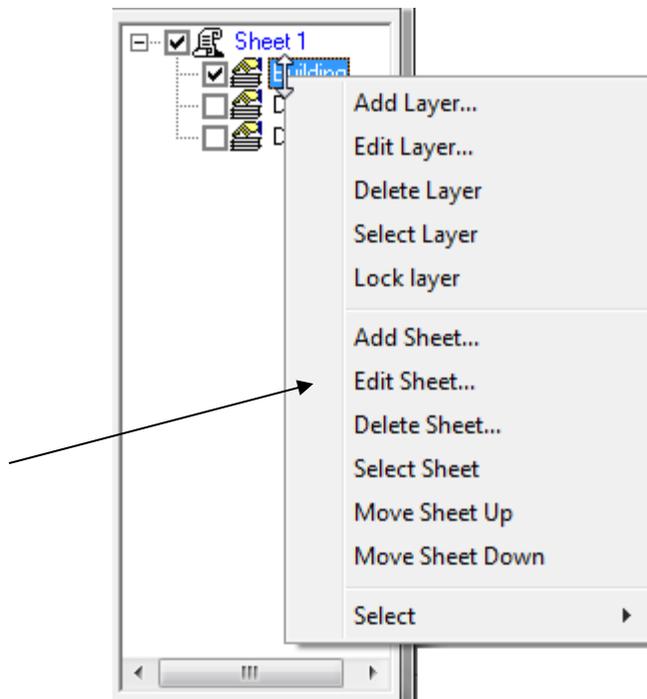
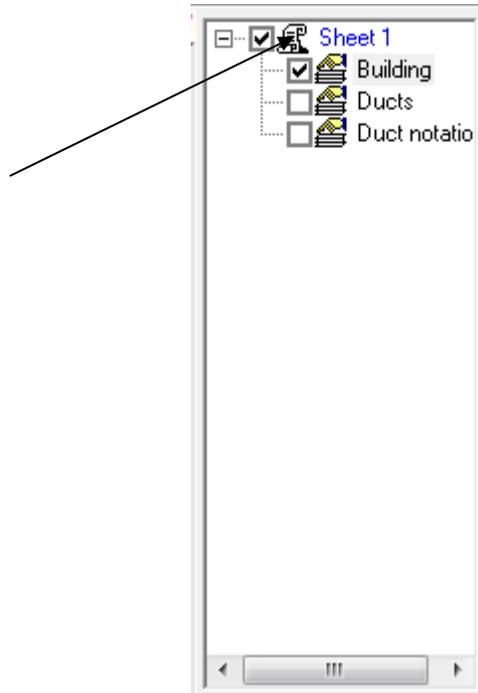
We're now ready to start drawing the building.

- We'll set the orientation of the building first. Double-click on the bottom point of the compass rosette.

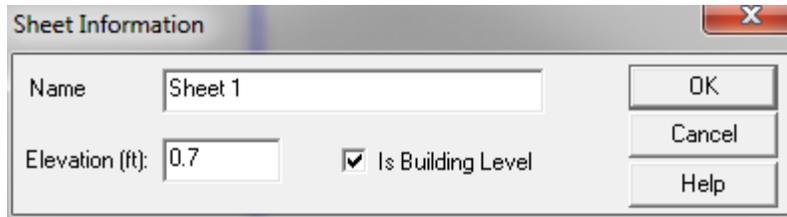


Before we start adding rooms, we need to set the bottom of the floor. This is the height above grade of the floor in these rooms.

- Click the right mouse button on 'Sheet 1' in the list of Sheets and Layers on the right.
- Select 'Edit Sheet ...' from the menu that appears.



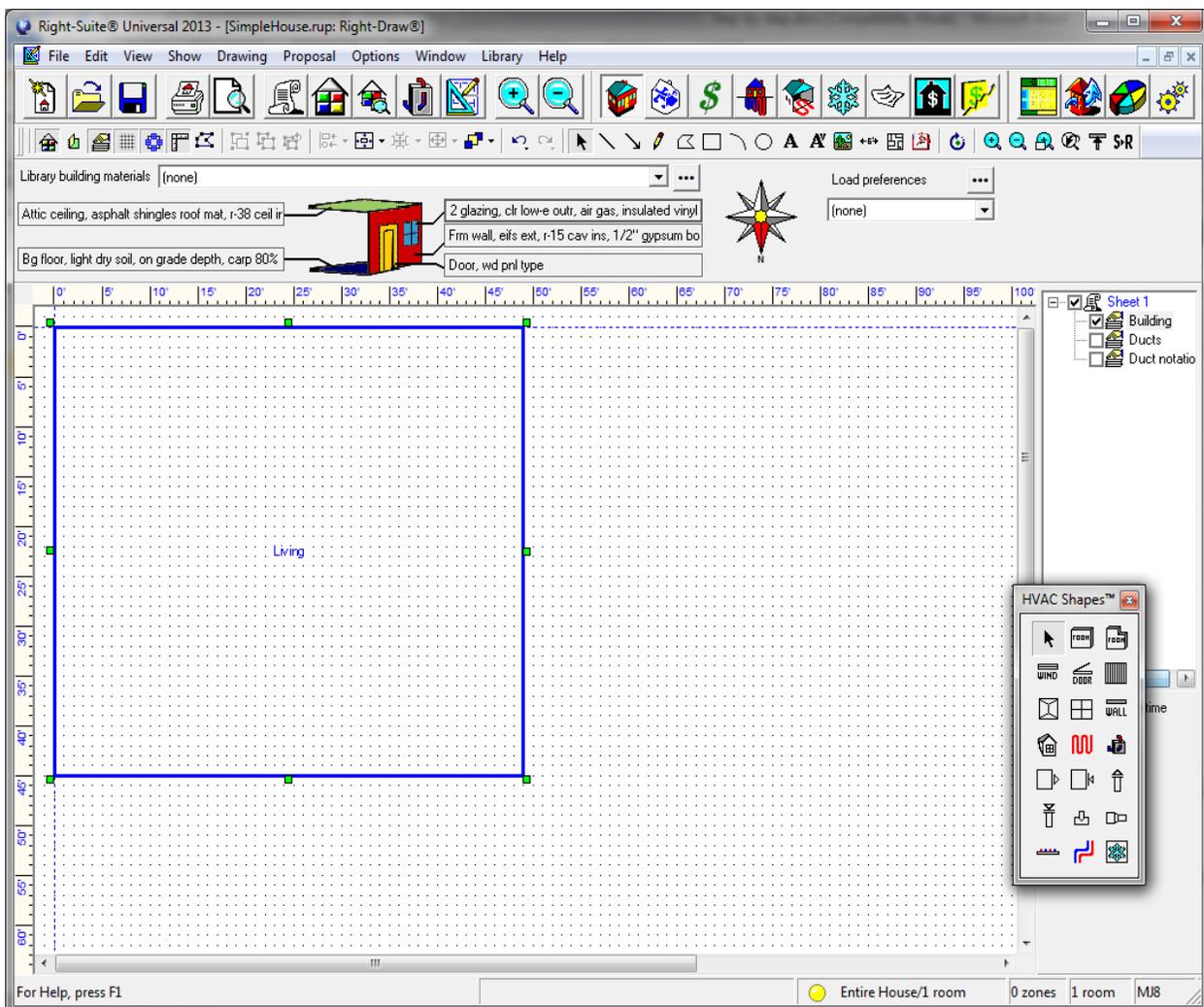
- Enter 0.7 ft for the Elevation.



- Click the 'OK' button to return to the drawing.

Now, we can start adding rooms.

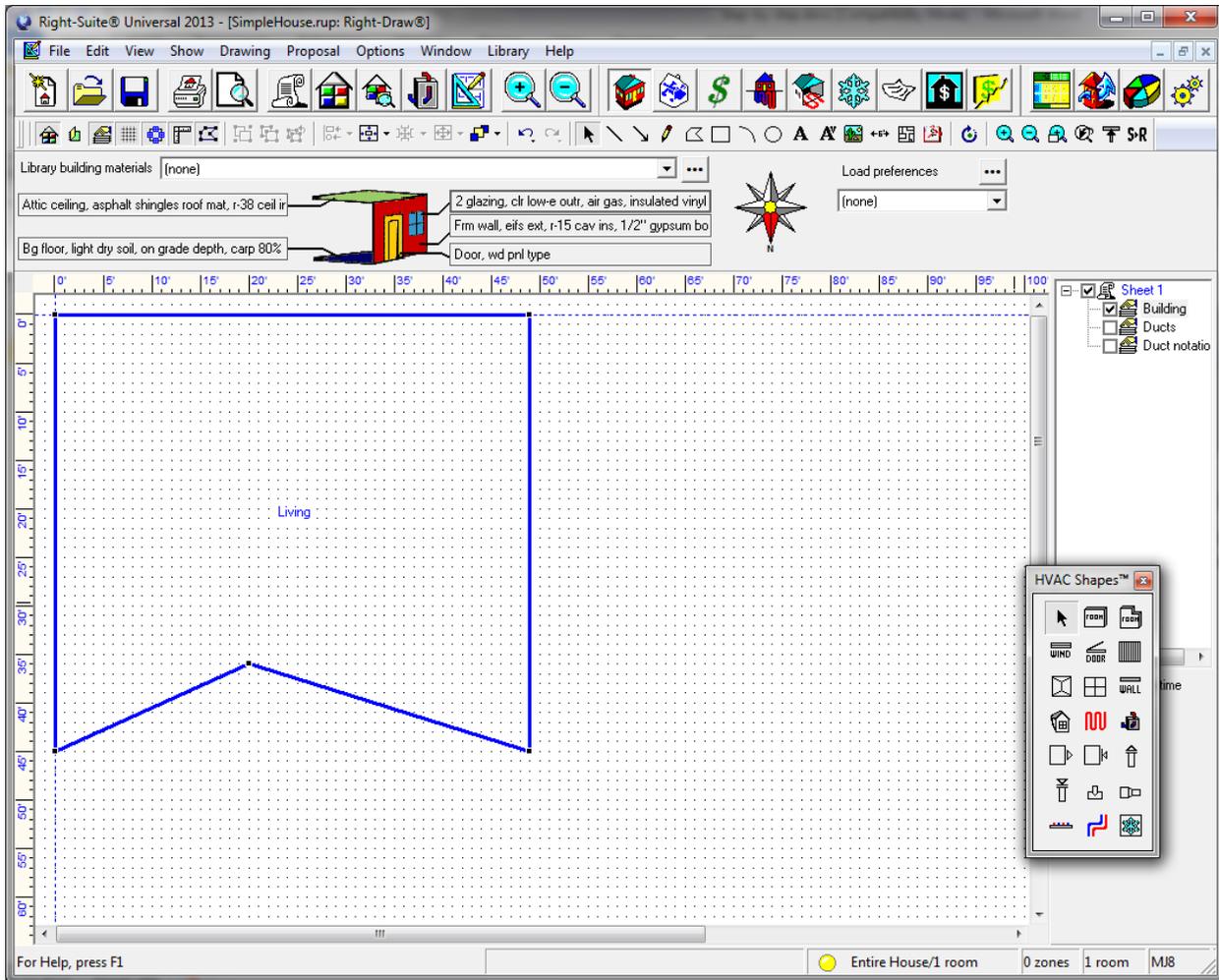
- Click on the Room tool in the HVAC Shapes™ toolbar. Draw a 50' wide by 45' high room. Name the room 'Living'.



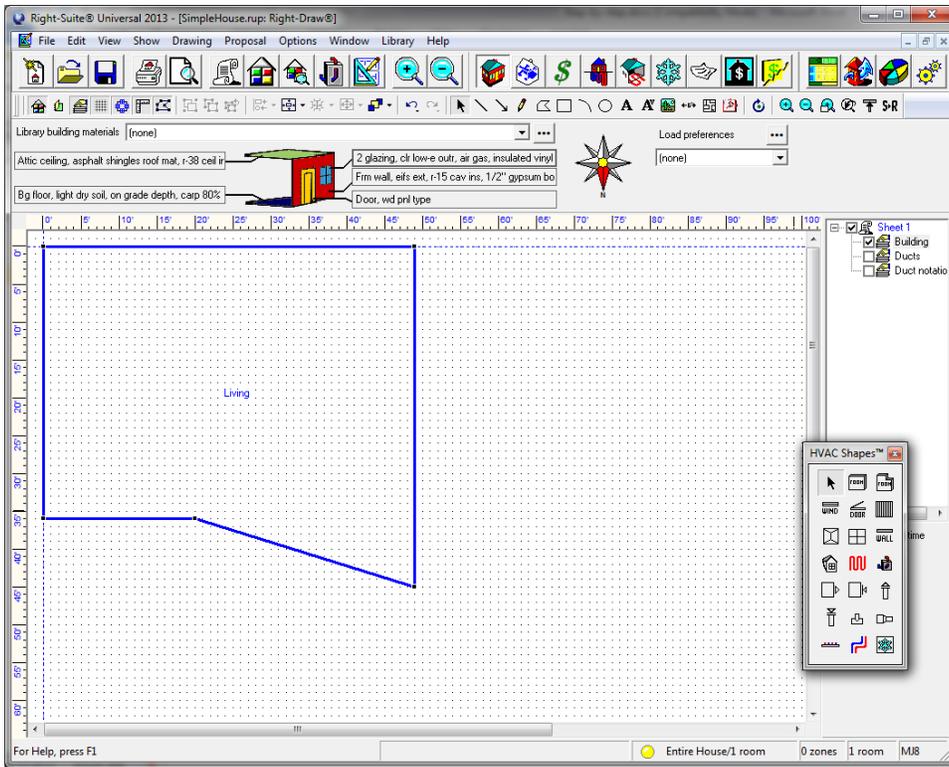
Now we have to make a 'notch' in the lower left corner for the garage.

- With the Living room selected, click on the  button in the Draw Toolbar.

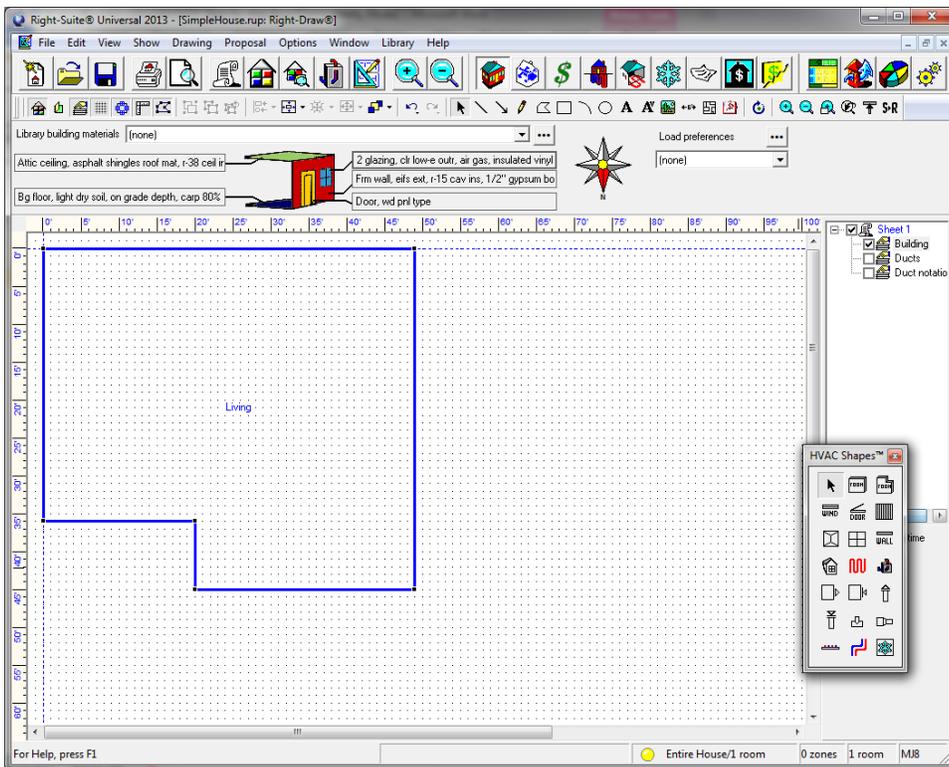
- Click anywhere on the bottom (South) wall and hold the mouse button down. Drag the mouse to the 10' horizontal and 36' vertical mark (use the rulers on the top and left of the drawing area). Let go of the mouse button.



- Click on the lower left corner and drag it to be even with the corner you just made.

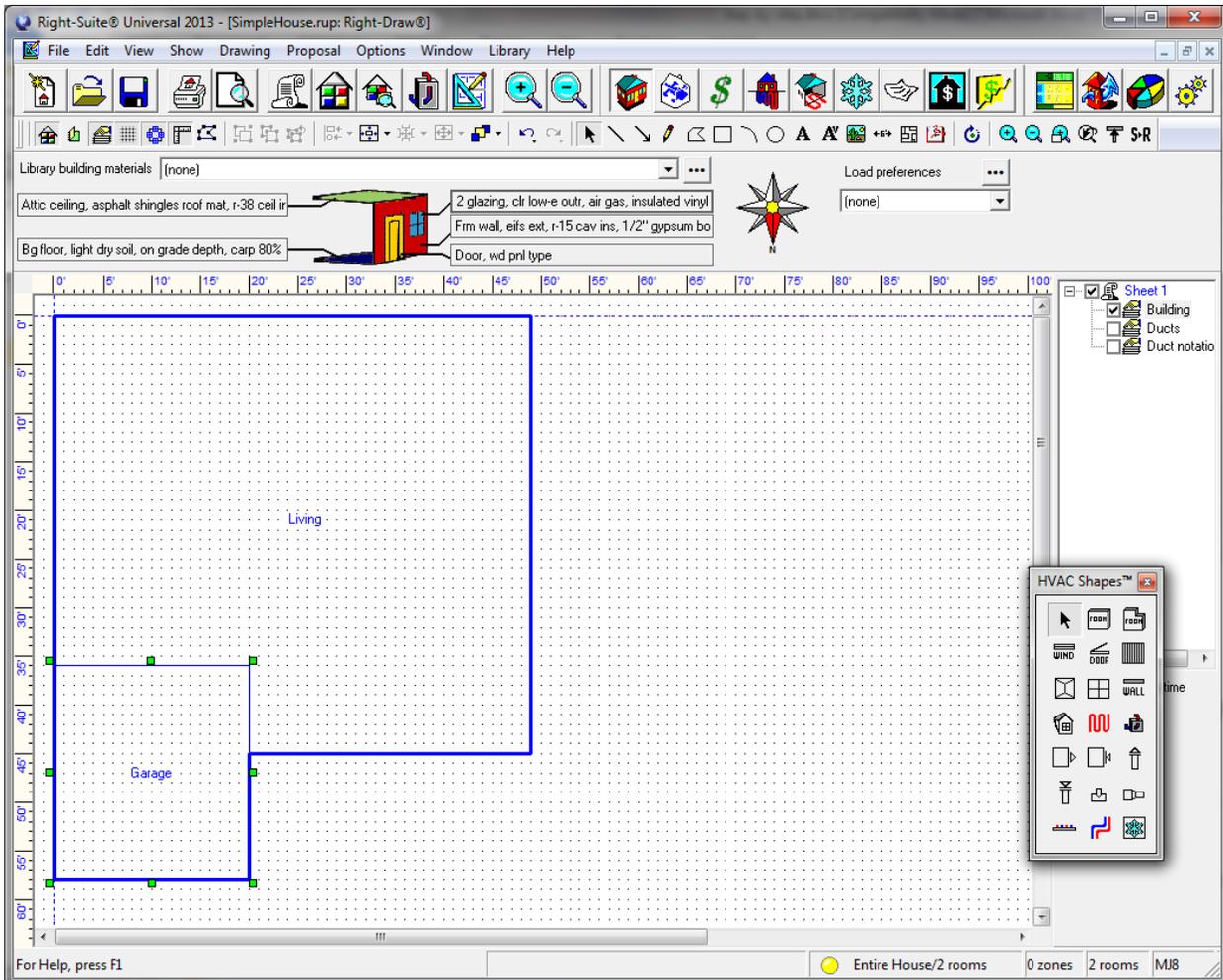


- Click anywhere on the diagonal wall and hold the mouse button down. Drag the mouse to be even with the bottom of the right (West) wall and perpendicular to the North wall of the garage.



And now, time to draw the garage.

- Click on the Room tool on the HVAC Shapes toolbar and draw a 20' wide by 22' high room. Fit it into the notch that we just made.



We need to set some of the garage's properties.

- Click the right mouse button with the pointer over the garage. This will display the Property Sheet for the Garage.
- Set 'Include in calculations?' to 'Yes', 'Room heating condition' and 'Room cooling condition' to '[None]', and set the 'Room type' to 'Garage'.

Room	Wall	Ceiling	Floor
Room name	Garage		
Include in calculations?	Yes		
Zone name	Entire House		
Room heating condition	[None]		
Room cooling condition	[None]		
Room type	Garage		
Room height (ft)	9.0		
Internal loads (Btuh)	Occupants=0 / Appliances=0		
Duct heat loss factor (%)	0.0		
Duct sensible gain factor (%)	0.0		
Duct latent gain (Btuh)	0		
Automatic branch splitting	Yes		
Heating ventilation air flow (cfm)	0.0		
Cooling ventilation air flow (cfm)	0.0		
Room components gain (Btuh)	0		
Room component gain per area	0.00		
Room components loss (Btuh)	0		
Room component loss per area	0.00		

Note that setting 'Include in calculations?' to 'Yes' will include the volume of the garage in the infiltrations calculations. This may or may not be what you want for the load calculations. However, it is necessary for the compliance calculations. You may have to set it to 'No' for load calculations and 'Yes' for compliance.

We also have to set the properties of the internal wall that was created between the Living room and the Garage.

- Click on the Living room. The Property Sheet will change to refer to the Living room.
- Click on the Wall 2 type field. This is the construction of the interior wall.
- Select 'Custom layers' from the list at the top of the screen.
- Double-click on the 'Stucco' material and select 'GypBd' from the list of materials. Change the thickness to 0.50.
- Click on the 'R4' material and click on the 'Del' button.

**Constructions for SimpleHouse.rup <none>**

Select from library: (none)

Description: Frm wall, eifs ext, r-15 cav ins, 1/2" gypsum board int frsh, r-4 ext bd ins, 2"x4" wood frm, 16" o.c. stud

Use: Custom layers Color: Medium

Layers: W#Stucco,0.375~X;4~X;WoodFrm,3.5,0.25,15;GypBd,0. From String Report

L#	Material	FrameF	Thick (in)	Cond (Btuh/ft²-F)	Dens (lb/ft³)	SpHt (Btu/lb-F)	R (ft²-F/Btuh)	Weight (lb/ft²)	HC (Btu/ft²-F)
	Outside surface						0.17		
1	GypBd		0.50	0.092	49.9	0.26	0.45	2.08	0.54
2	Framed	0.25	3.50	0.031	7.5	0.39	9.31	2.19	0.85
	WoodFrm (25%)		3.50	0.067	30.0	0.39	4.35	8.75	3.41
	R15 (75%)		3.50	0.019	0.0	0.00	15.00	0.00	0.00
3	GypBd		0.50	0.092	49.9	0.26	0.45	2.08	0.54
	Inside surface						0.68		
	Totals		4.50	0.037	16.9	0.30	11.07	6.35	1.93

Results:  
 U-Nom = 0.088 Btuh/ft²-F  
 CLTD Group = GC  
 MJ8 Code = Frm wall, eifs ext, r-15  
 MJ8 U-val = 0.088 Btuh/ft²-F

OK Cancel Help

- Click the 'OK' button to return to the drawing screen.
- Click the 'OK' button on the Partition Adjacent Conditions screen that is displayed to accept the defaults.
- Click on the Garage on the drawing. The Property Sheet will display properties for the Garage.
- Click on the Wall tab and click on the Wall 1, type field.
- Select 'Stucco' for the Exterior and 'None' for the Cavity insulation.

Constructions for SimpleHouse.rup <none>

Select from library: (none)

Description: Frm wall, stucco ext, 1/2" gypsum board int fnsh, 2"x4" wood frm, 16" o.c. stud

Use: Radio buttons Color: Medium

Frame Masonry Curtain Misc. Below grade Knee wall Layers

**Exterior**

None  Vinyl  
 Metal  Wood  
 Brick 4"  Brick 8"  
 Stucco  Split logs  
 EIFS

**Sheathing**

None  
 3/8" wood  
 1/2" wood  
 5/8" wood

**Cavity insulation**

None  R-19  
 R-11  R-21  
 R-13  R-25  
 R-15  R-30  
 R-17

**Interior finish**

None  
 1/2" gypsum board  
 5/8" gypsum board  
 3/4" wood  
 Metal  
 Split logs

**Exterior board insulation**

None  R-6  
 R-1  R-7  
 R-2  R-8  
 R-3  R-9  
 R-4  R-10  
 R-5  R-12

**Framing**

2"x4" wood  
 2"x6" wood  
 2"x4" metal  
 2"x6" metal

**Stud spacing**

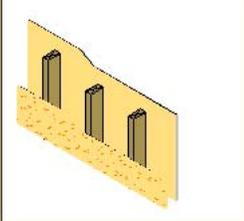
16" O.C.  
 24" O.C.

**Interior board insulation**

None  R-6  
 R-1  R-7  
 R-2  R-8  
 R-3  R-9  
 R-4  R-10  
 R-5  R-12

Results

U-Nom = 0.362 Btuh/ft<sup>2</sup>-F  
 CLTD Group = GA  
 MJ8 Code = 12A-0sw  
 MJ8 U-val = 0.240 Btuh/ft<sup>2</sup>-F



OK Cancel Help

- Click the 'OK' button to return to the drawing screen.
- Click on the 'Ceiling' tab and click on the Ceiling type field.
- Select 'R-20' for the Roof insulation.
- Select 'Custom layers' from the drop-down list at the top of the screen.
- Select 'Medium' for the Color at the top of the screen.
- Select the 'R20' material and click on the 'Add' button above the list. Select 'AirGap' from the list of materials.
- Double-click on the 'Attic' material and select 'AtticVRB' from the list of materials.
- Change the frame fraction (FrameF) on the 'Framed' line to 0.07. Change the thickness to 3.50.

Constructions for SimpleHouse.rup <none>

Select from library: (none)

Description: Attic ceiling, asphalt shingles roof mat, r-20 roof ins, 1/2" gypsum board int frsh

Use: Custom layers Color: Dark

Layers: C#RoofAsph;20;WoodPly,1;AtticV:WoodFrm,7.5,0.1,Empt From String Report

L#	Material	FrameF	Thick (in)	Cond (Btu/ft <sup>2</sup> ·°F)	Dens (lb/ft <sup>3</sup> )	SpHt (Btu/lb·°F)	R (ft <sup>2</sup> ·°F/Btu)	Weight (lb/ft <sup>2</sup> )	HC (Btu/ft <sup>2</sup> ·°F)
	Outside surface						0.17		
1	RoofAsph		0.40	0.070	70.0	0.30	0.48	2.33	0.70
2	AirGap		1.00	0.104	0.0	0.00	0.80	0.00	0.00
3	R20		1.00	0.004	0.0	0.00	20.00	0.00	0.00
4	WoodPly		1.00	0.080	34.0	0.36	1.04	2.83	1.02
5	AtticVRB		12.00	1.000	0.0	0.00	1.00	0.00	0.00
6	Framed	0.07	3.50	0.271	2.1	0.39	1.08	0.61	0.24
	WoodFrm ( 7%)		3.50	0.067	30.0	0.39	4.35	8.75	3.41
	Empty (93%)		3.50	0.286	0.0	0.00	1.02	0.00	0.00
7	GypBd		0.50	0.092	49.9	0.26	0.45	2.08	0.54
	Inside surface						0.68		
	Totals		4.00	0.218	8.1	0.29	2.38	2.69	0.78

Results:  
 U-Nom = 0.416 Btu/h/ft<sup>2</sup>·°F  
 CLTD Group = 45  
 MJ8 Code = Attic ceiling, asphalt  
 MJ8 U-val = 0.416 Btu/h/ft<sup>2</sup>·°F

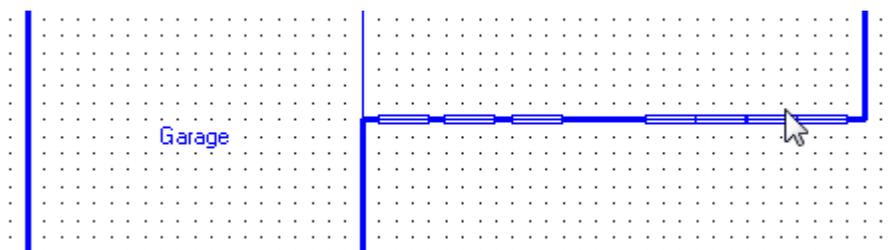
OK Cancel Help

- Click the 'OK' button to return to the drawing screen.
- Click on the 'X' in the upper right corner of the Property Sheet to close it.

We have all of the rooms entered. Now, it's time to add the windows and doors.

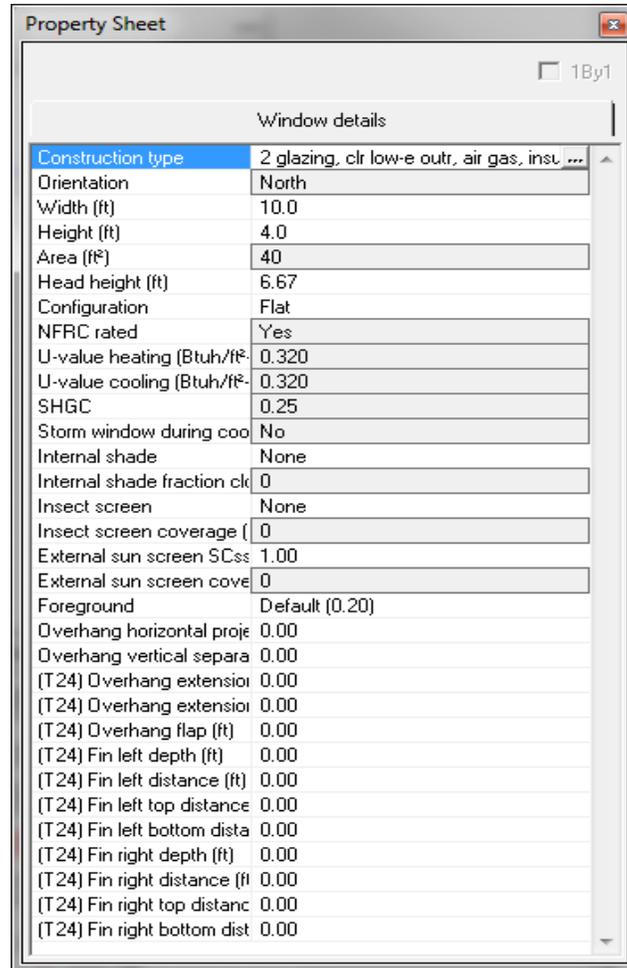
The windows on the South wall are 105 ft<sup>2</sup> total – 7 windows 3'w x 5'h. We'll put 3 to the left of the door and 4 to the right.

- Draw the windows on the South wall using the Window tool on the HVAC Shapes tool bar. Just draw them 10' wide for now. We will adjust the width later on in the Property Sheet.

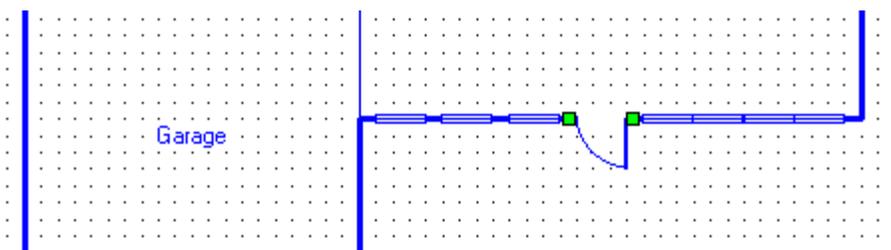


- Click the right mouse button on one of the windows to display its Property Sheet.
- Set the Width to 3.0, the height to 5.0, NFRC rated to 'Yes', Insect screen to 'Outdoor'.

- There are many more overhang and fin settings for Title 24 than are required for load calculations. For this example, set 'Overhang horizontal projection' to 1.00 ft, 'Overhang vertical separation' to 1.33 ft, '(T24) Overhang extension left' to 3.00 ft, '(T24) Overhang extension right' to 3.00 ft, and '(T24) Overhang flap' to 0.40 ft.



- Repeat these settings for the other windows.
- Draw the door (3' wide by 6'8" (6.67') high) between the 2 groups of windows.



- Click the right mouse button on the door to display its Property Sheet.

- Change the Door type to 'Opening BottomRight'. Change the Height to 6'8". Note that the calculator will pop up when you type the '. When you type the rest of the dimension in and click the 'OK' button, the result will be converted to feet and placed in the height field.

Enter the rest of the windows and doors according to the following table:

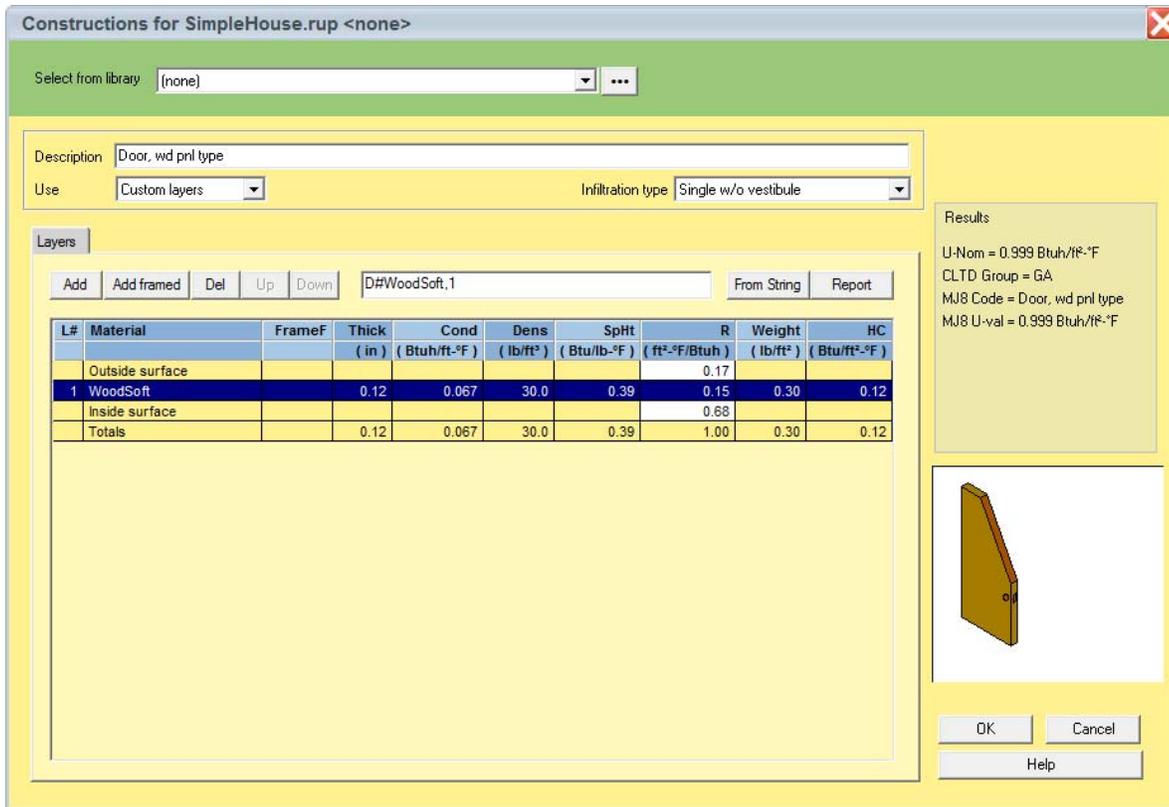
North	East	South	West
Garage Door 128 ft <sup>2</sup> - 16'w x 8'h		Garage Door 20 ft <sup>2</sup> - 3'w x 6'8"h	
	Living 3 Windows 15 ft <sup>2</sup> - 3'w x 5' h 1 Window 7.5 ft <sup>2</sup> - 1.5'w x 5'h	Living 14 Windows 15 ft <sup>2</sup> - 3'w x 5'h	Living 3 Windows 15 ft <sup>2</sup> - 3'w x 5' h 1 Window 7.5 ft <sup>2</sup> - 1.5'w x 5'h

The values in the Property Sheet for all of the windows are the same as the North windows.

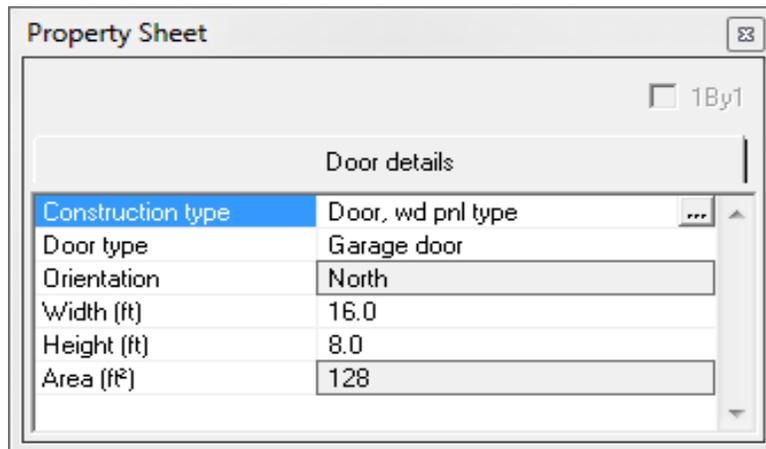
The values for the South door between the Living room and the Garage are the same as the North door in the Living room.

The North Garage door is quite different from the other doors.

- Click the right mouse button on the North Garage door to display its Property Sheet.
- Click on 'Construction type' at the type to display the Door Construction screen.
- Select 'Custom layers' from the drop-down list at the top of the screen.
- Change the thickness of the 'WoodSoft' material to 0.12.



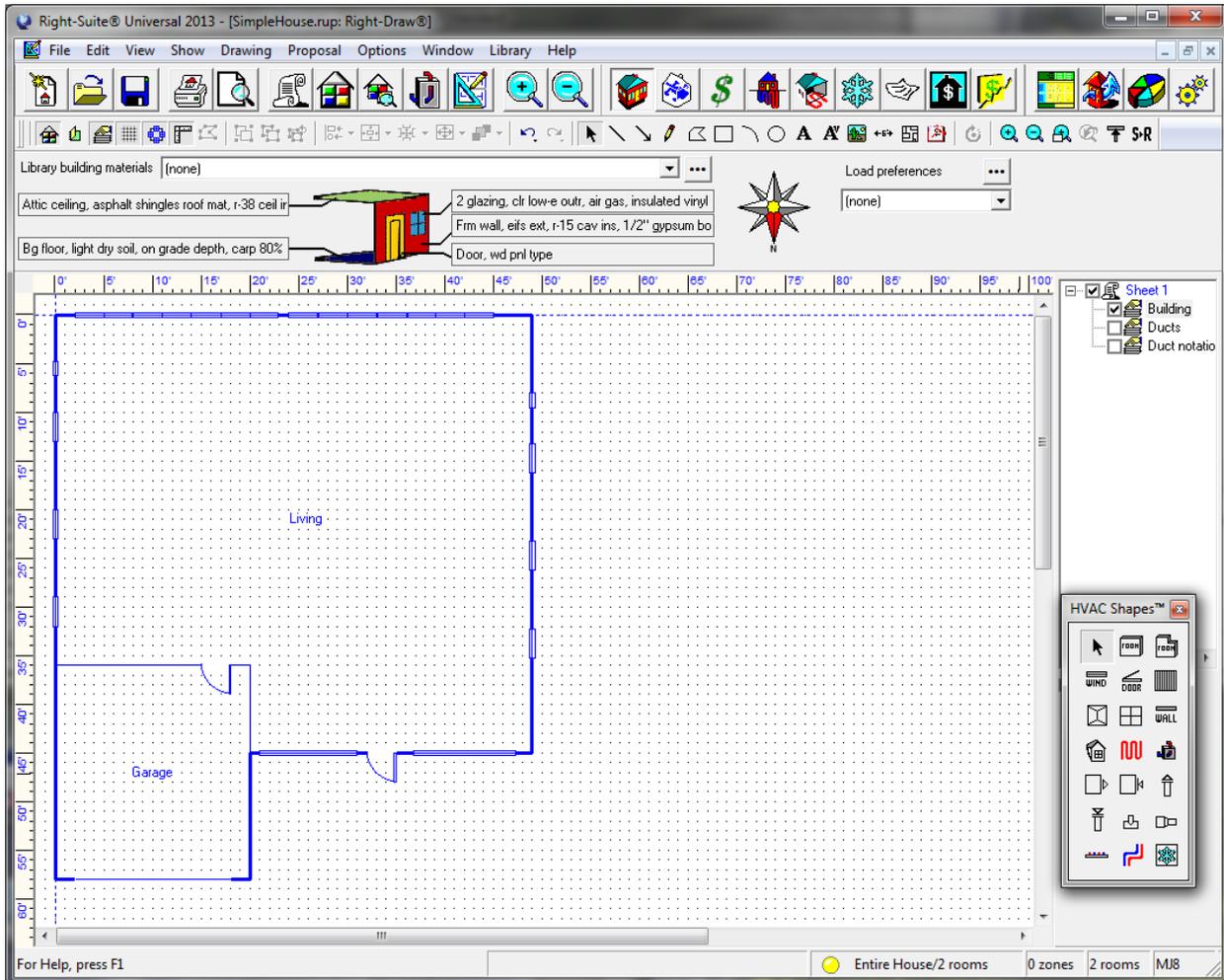
- Click on the 'OK' button to return to the Property Sheet.
- Select 'Garage door' for the Door type.
- In the Property Sheet, set the Height to 8.0'.



While we're adjusting the Garage, the slab floor is slightly different.

- Click on the Garage in the drawing. The Property Sheet will change to the Property Sheet for the Garage room.
- Click on the 'Floor' tab and then click on the 'Construction type' field.
- Select 'None' for the 'Floor finish'.

- Click on the 'OK' button to accept the change and return to the Property Sheet.
- Click on the 'X' in the upper right corner of the Property Sheet to return to the drawing.



## Equipment

RSU can now calculate the load and we can select equipment.

- Select **Show | Equipment** from the top menu.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation

**Heating**

Type

None

Electric baseboard

Electric strip

Furnace

Boiler

**Fuel**

Electricity

Natural gas

Oil

Propane

Wood

Backup electricity

**Water heating**

Type  Solar Count

None

Conventional

Instantaneous

Air source HP

WS/GS HP dedicated

WS/GS HP desuperheater

**Fuel**

Electricity

Natural gas

Oil

Propane

Backup electricity

**Cooling**

None

Split AC

Split air source HP

Pkg AC

Pkg air source HP

Water source HP

Ground source HP

**T24**

WH Distribution

AC Charge

Select Equip Generic Equip OK Cancel Apply Help

In this screen, you select the type of cooling, heating, and water heating equipment that you will describe in greater detail in the other tabs. For this example, we will use a split air conditioner, a natural gas fired furnace, and a natural gas fired water heating system. If you have a water heating system with multiple identical units, you can indicate how many units there are at the top of the Water heating section. You can indicate the Title 24 Water Heating Distribution type by selecting from the drop-down list.

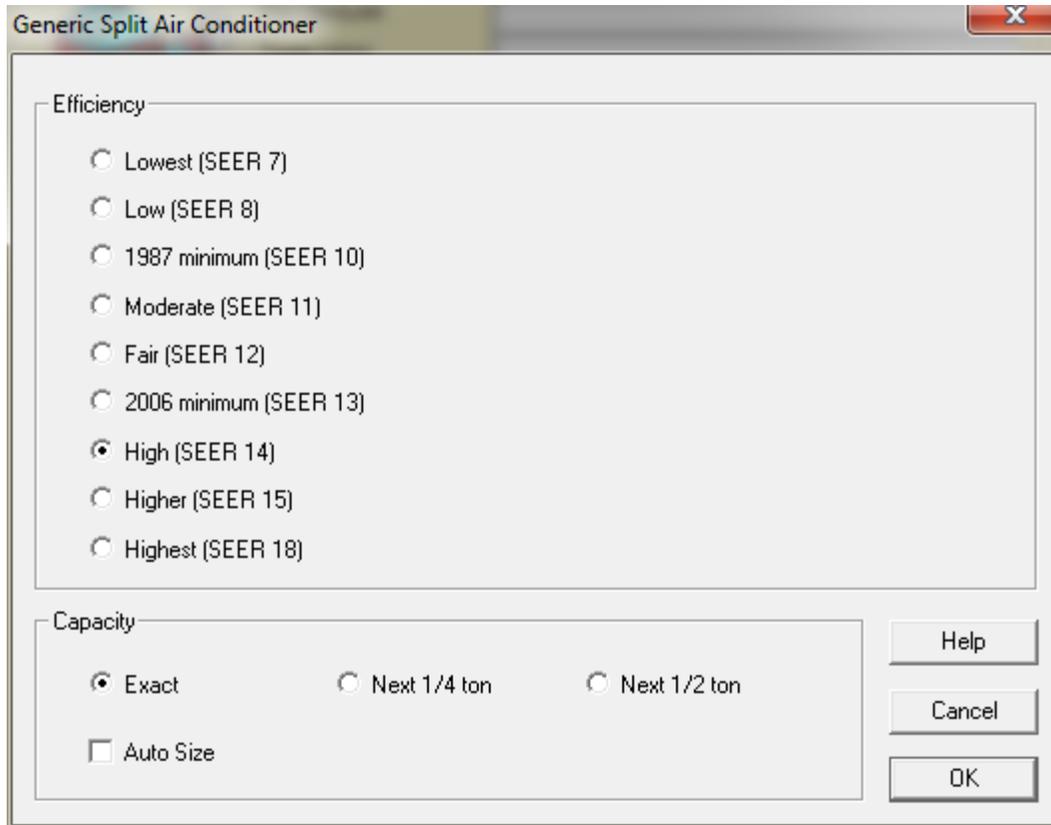
- Select 'Verified' from the drop-down list for the 'AC Charge'.

Now, we can proceed to the other tabs.

- Click on the 'Split AC' tab.

Normally, you can select whatever equipment you are going to use in your project. You would click on the 'Select Equip' button to do this. However, for this example, we are going to use generic equipment.

- Click on the 'Generic Equip' button.
- Select 'High (SEER 14) for the Efficiency
- Select 'Exact' for the Capacity.



- Click the 'OK' button to return to the Equipment Screen.

RSU has calculated the CFM at 400 CFM per ton. However, we would like to use 350 CFM per ton. The 95°F total capacity is 23,437 Btuh. This is 1.953 tons (23,437 / 12,000).  $1.953 \times 350 = 683.55$  CFM (684).

- Change the Fan cfm from 781 to 684.
- Change the Fan W to 396.
- Change the 95°F EER to 11.70.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation

 Type  
 Manufacturer:   
 Trade name:   
 Condenser model / PN:   
 Coil model / PN:   
 AHRI ref. number:

Target Capacities (Btuh)  
 Cooling sensible:   
 Cooling latent:

Air Distribution  
 Estimated AVF (cfm):  Design AVF (cfm):  Static pressure (in H2O):   
 Heating=Cooling

Detailed Performance

2 stage

	Stage 1			Stage 2		
	Total	Sensible	EER	Total	Sensible	EER
67°F (Btuh)						
82°F (Btuh)	25042	17529	14.78	0	0	0.00
95°F (Btuh)	23436	16405	11.70	0	0	0.00
	cfm	W		cfm	W	
Fan	684	396		0	0	
Continuous fan	312	86	<input type="checkbox"/> Continuous fan			

Ratings  
 EER:   
 SEER:   
 SHR:   
 Sound (bels):

Select Equip | Generic Equip | OK | Cancel | Apply | Help

- Click on the 'Gas Furnace' tab.
- We will use generic equipment for the heating equipment, too. Click on the 'Generic Equip' button.
- Select 'Pilot w/ vent damper (AFUE 78)' for the Efficiency.
- Select 'Exact' for the Capacity.

Generic Gas Furnace

Efficiency

- Standing pilot (AFUE 64)
- Pilot w/ vent damper (AFUE 78)
- Power vent (AFUE 81)
- Power vent condensing (AFUE 92)
- Highest (AFUE 96)

Capacity

- Exact
- Next 1000
- Next 5000
- Auto Size

Help

Cancel

OK

- Click the 'OK' button to return to the Equipment Screen.
- Click on the 'Gas WH' tab.
- There is no generic water heating equipment, so we will just enter the data into this screen. Enter 50 gal. for the Tank size, 40.0 MBtuh for the Input, 0.600 for the Energy factor, 76% for the Recovery efficiency.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation



Type  
 Manufacturer   
 Trade name   
 Model   
 AHRI ref no.

Occupants

Age	Number
0-5	<input type="text" value="0"/>
6-13	<input type="text" value="2"/>
14-59	<input type="text" value="2"/>
60-	<input type="text" value="0"/>

Home during day   
 Dishwasher   
 Clothes washer   
 Additional use (gpd)

Ratings

Tank size (gal)	<input type="text" value="50"/>	Energy factor	<input type="text" value="0.600"/>
Input (MBtuh)	<input type="text" value="40.0"/>	1st hour (gal)	<input type="text" value="60"/>
		Recovery efficiency (%)	<input type="text" value="76"/>
	EWT (°F)	Capacity (MBtuh)	COP
Dedicated WS/GS heat pump	<input type="text"/>	<input type="text"/>	<input type="text"/>

Load

Setpoint (°F)	<input type="text" value="120"/>	Daily use (gpd)	<input type="text" value="62"/>
---------------	----------------------------------	-----------------	---------------------------------

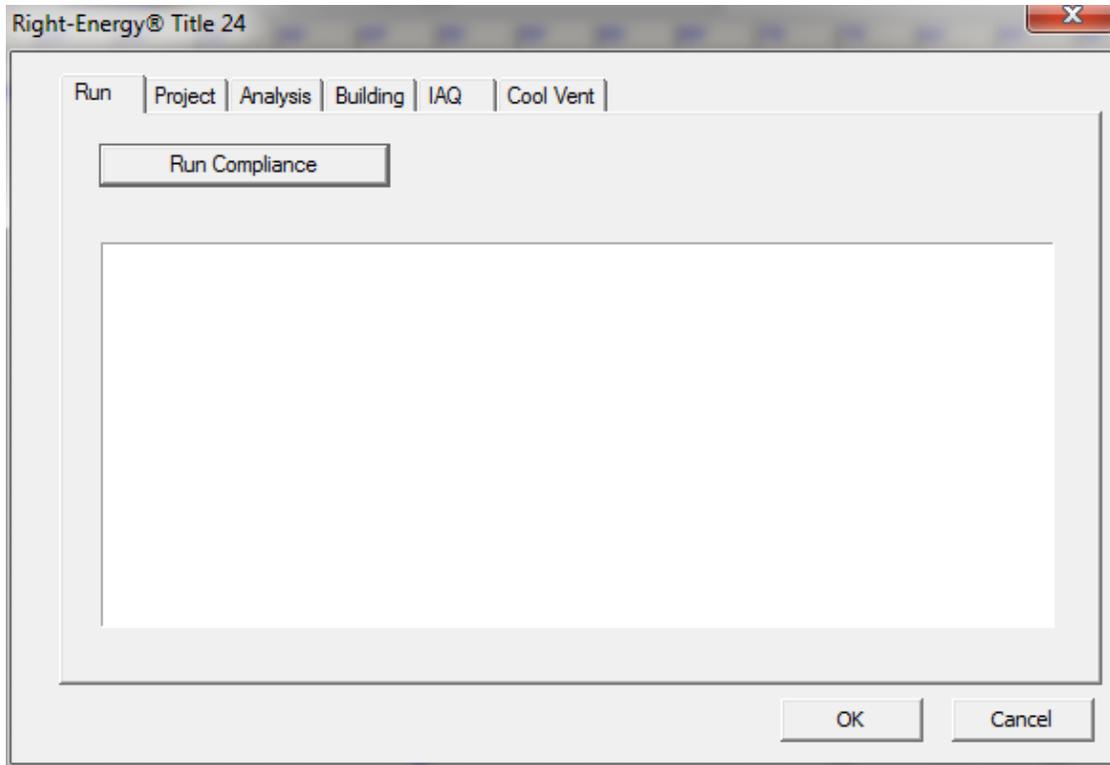
Select Equip | Generic Equip | OK | Cancel | Apply | Help

- Click the 'OK' button to return to the drawing.

## Compliance

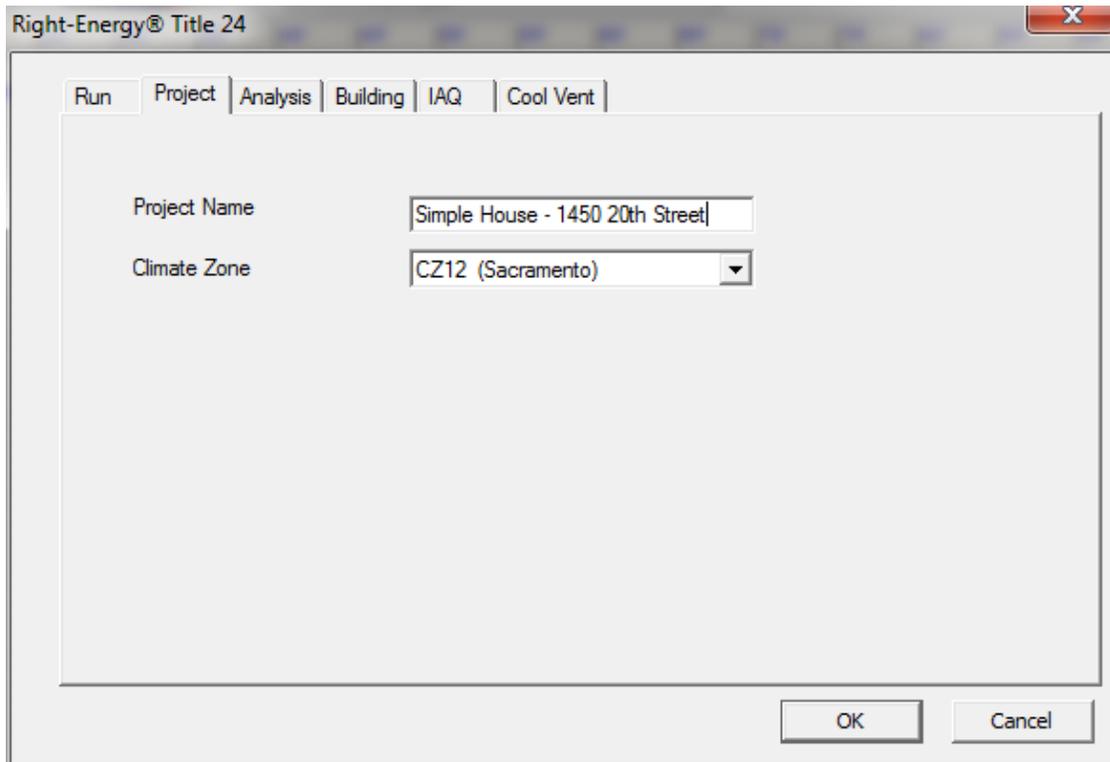
We are now ready to perform the compliance calculations.

- Select **File | Code Compliance | Right-Energy® Title 24** from the menu at the top.

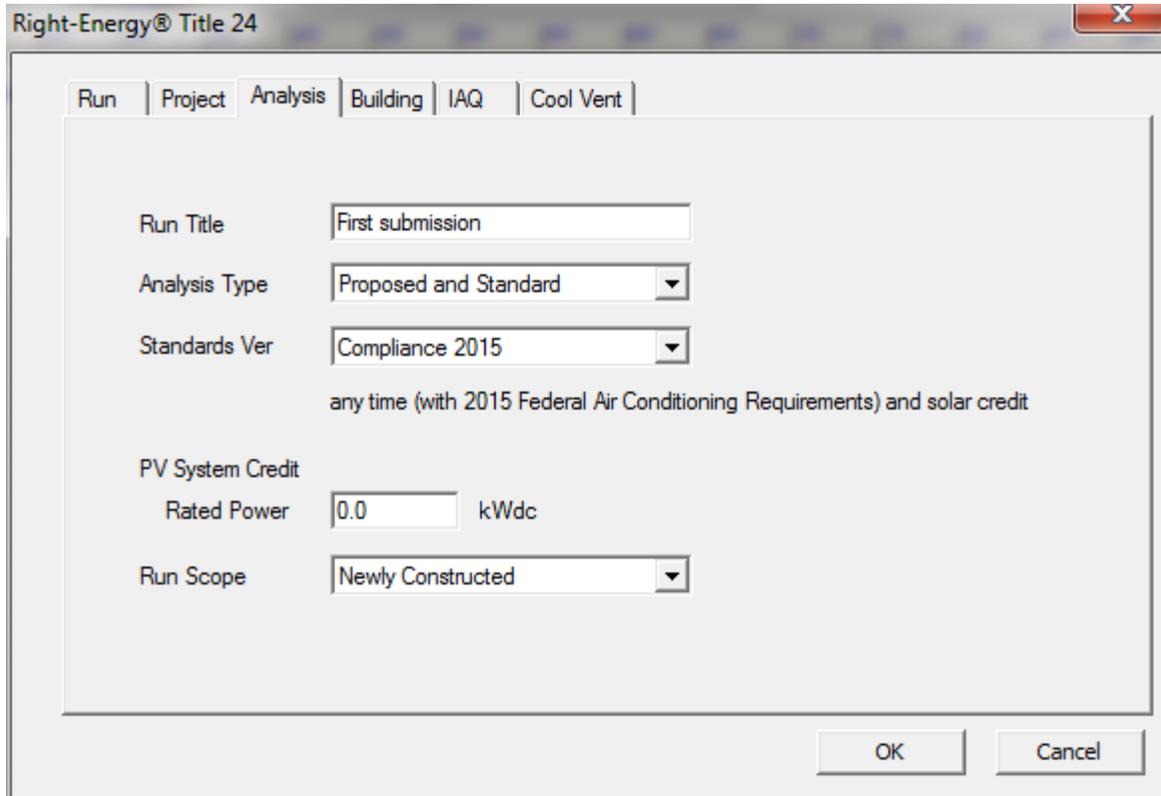


We will enter information into the other tabs and return to this tab to run the compliance.

- Click on the 'Project' tab.



- Enter a name for the project. This will appear on the reports that you will submit.
- Select the Climate Zone from the drop-down list. Our example is in Sacramento, so select CZ12 (Sacramento).
- Click on the 'Analysis' tab.



The screenshot shows the 'Right-Energy® Title 24' software window with the 'Analysis' tab selected. The interface includes the following fields and options:

- Run Title:** Text input field containing 'First submission'.
- Analysis Type:** Drop-down menu set to 'Proposed and Standard'.
- Standards Ver:** Drop-down menu set to 'Compliance 2015'. Below this field, the text 'any time (with 2015 Federal Air Conditioning Requirements) and solar credit' is displayed.
- PV System Credit:** Section containing:
  - Rated Power:** Text input field containing '0.0' followed by the unit 'kWdc'.
- Run Scope:** Drop-down menu set to 'Newly Constructed'.

At the bottom right of the window are 'OK' and 'Cancel' buttons.

- Enter a 'Run Title'. The Run Title is for your own notes or project information. The information will not appear on the CF1R. It can be used to identify information such as a compliance variable being considered (e.g., "w/ tankless water heater").
- Select the remaining information from the drop-down lists.
- Click on the 'Building' tab.

Right-Energy® Title 24

Run | Project | Analysis | **Building** | IAQ | Cool Vent

Building Description: 1 floor with garage

Air Leakage: 5.0 ACH @ 50Pa

Insul. Construction Quality: Standard

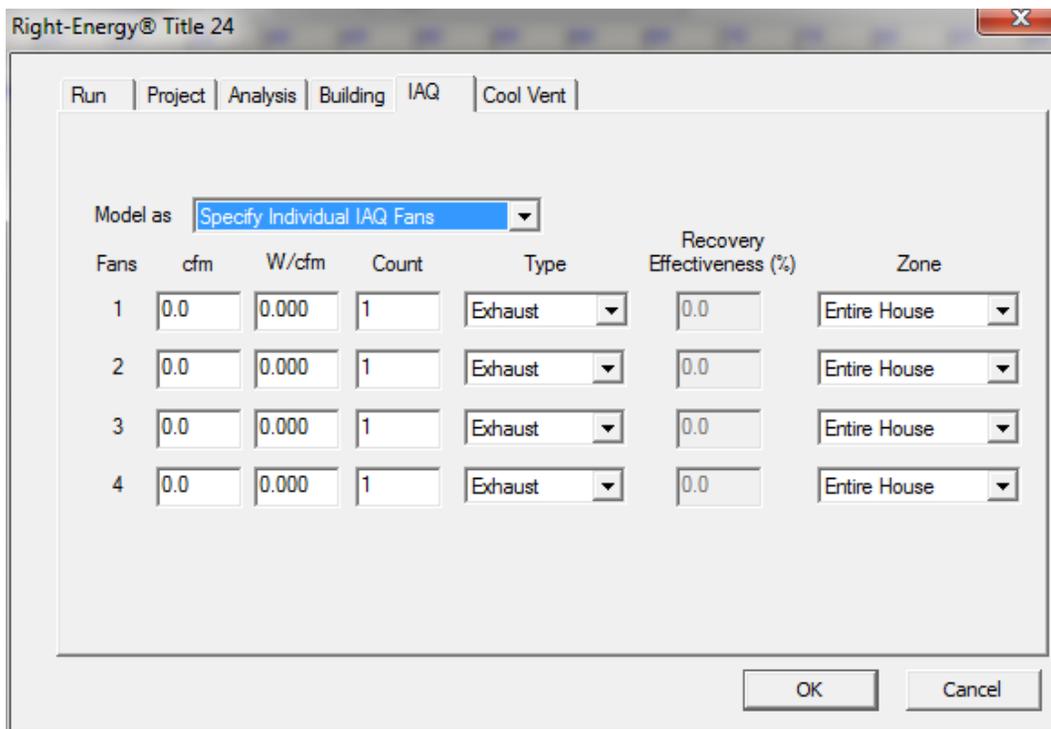
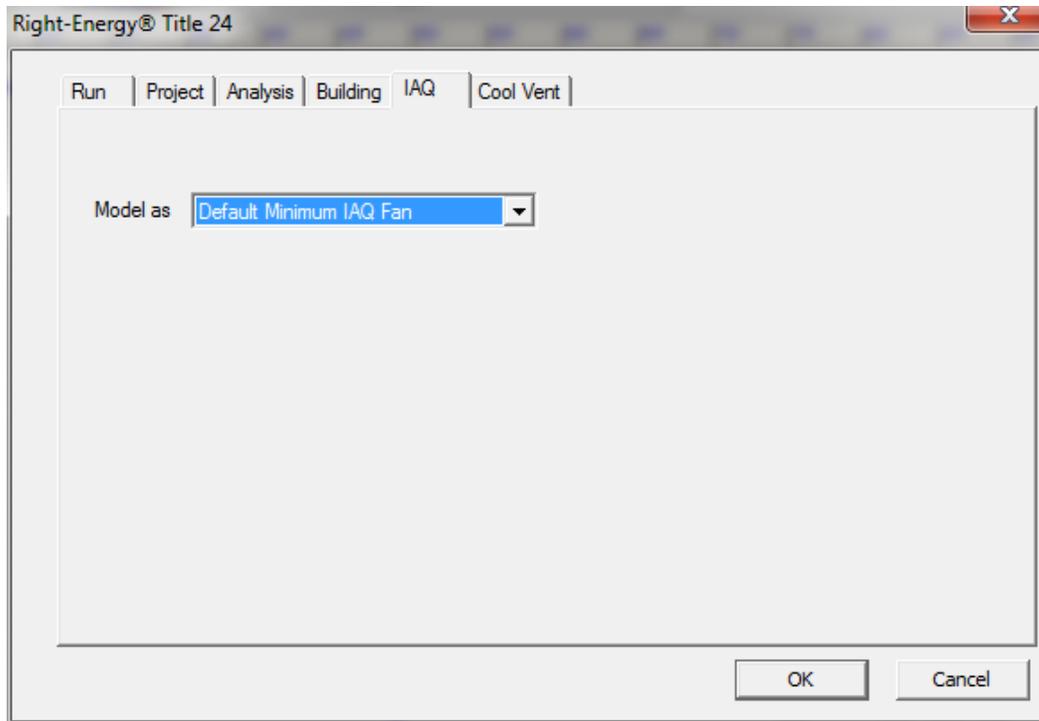
Perform Multiple Orientation Analysis

Front Orientation: 0 deg

Natural Gas is available at the site

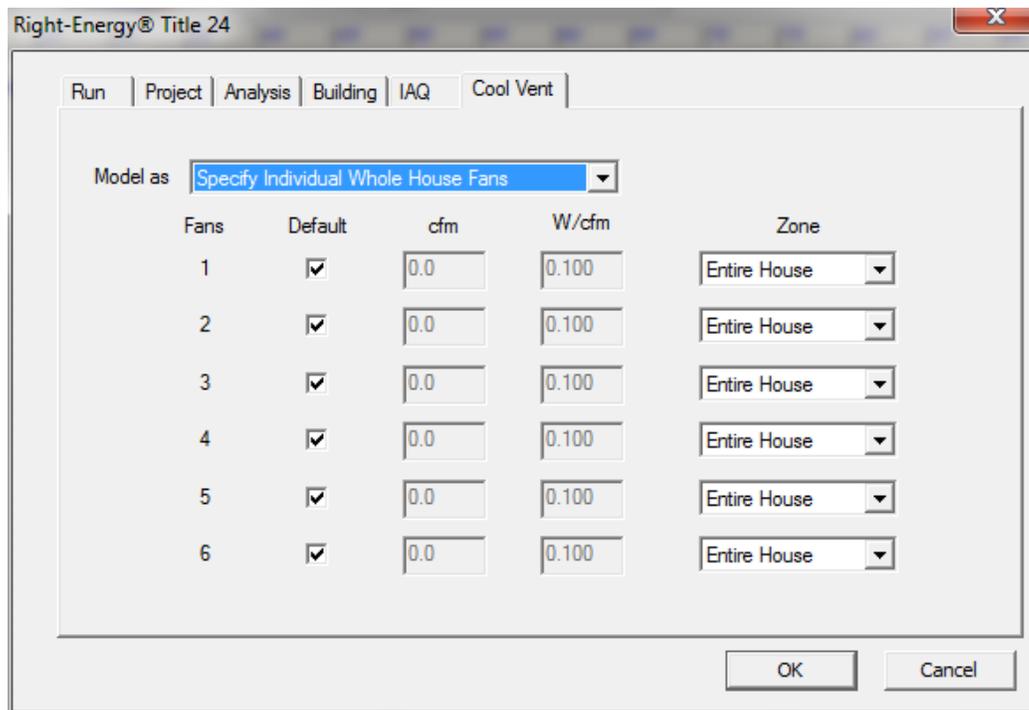
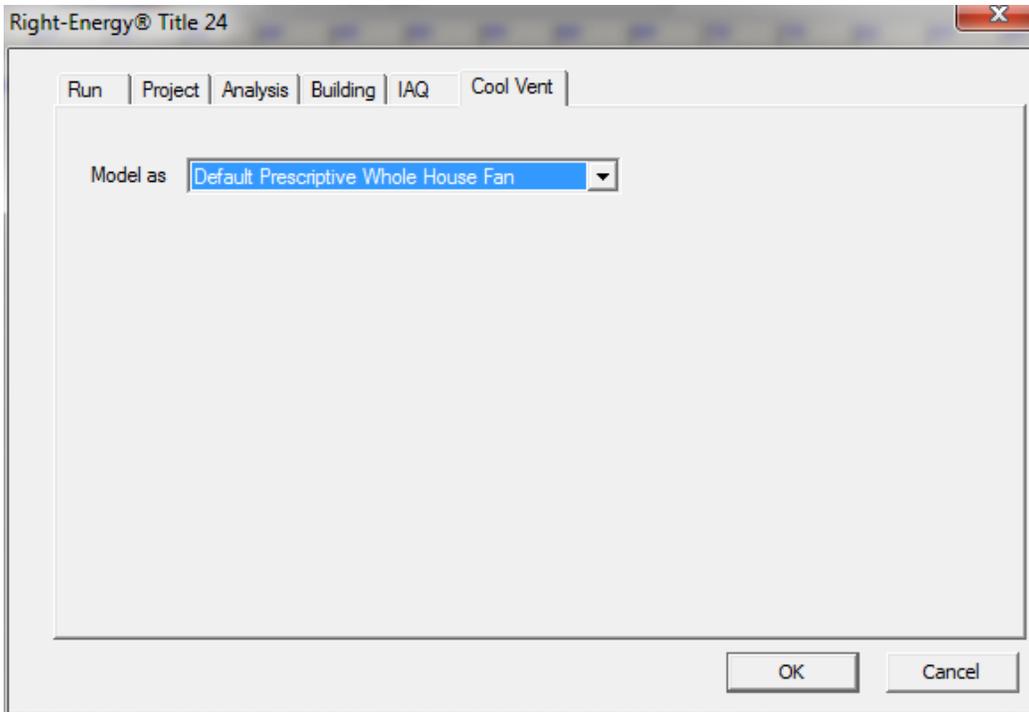
OK Cancel

- Enter the 'Building Description'. The building description will appear as the second line of general project information on the CF1R. It is different than the project name.
- Enter the remaining information. Note that for the Front Orientation, 0 deg = North, 90 deg = East, 180 deg = South, and 270 deg = West. 'Natural Gas is available at the site' should be checked if gas is **available**. That is, it might be available but not used in the project.
- Click on the 'IAQ' (Indoor Air Quality) tab.



Note that the screen changes depending on your choice.

- Select 'Specify Individual IAQ Fans' from the drop down list.
- In Fan 1, enter 51.0 cfm, 0.250 W/cfm, 1 for Count, and 'Exhaust' for Type.
- Click on the 'Cool Vent' tab.



Note that the screen changes depending on your choice.

- Select 'Specify Individual Whole House Fans' from the drop-down list.
- For Fan 1, un-check the Default checkbox, enter 4200.0 for cfm, and 0.100 for W/cfm.

We're all done with the tabs. We can now run the compliance calculations.

- Click on the 'Run' tab.
- Click the 'Run Compliance' button.

A progress screen will be displayed as the calculations are performed. When it is finished, another screen will ask if you want to view the report. Click the 'Yes' button. The compliance results will be displayed as well as a PDF of the CF1R form. Minimize the CF1R to view the results.

SimpleHouse

Energy Use Details | Summary

End Use	Standard Design Site (kWh)	Standard Design Site (therms)	Standard Design (kTDV/ft²-yr)	Proposed Design Site (kWh)	Proposed Design Site (therms)	Proposed Design (kTDV/ft²-yr)	Compliance Margin (kTDV/ft²-yr)
Space Heating	207	240.9	22.73	197	229.3	21.57	1.16
Space Cooling	414		14.13	328		10.86	3.27
IAQ Ventilation	112		1.13	112		1.13	0.00
Other HVAC			0.00			0.00	0.00
Water Heating		181.4	13.86		181.4	13.86	0.00
PV Credit						0.00	0.00
<b>Compliance Total</b>			<b>51.85</b>			<b>47.42</b>	<b>4.43</b>
Inside Lighting	1,045		11.16	1,045		11.16	Result: <b>PASS</b>
Appl. & Cooking	958	52.5	13.80	958	52.5	13.80	
Plug Loads	2,206		22.73	2,206		22.73	
Exterior	117		1.16	117		1.16	
<b>TOTAL</b>	<b>5,058</b>	<b>474.8</b>	<b>100.70</b>	<b>4,961</b>	<b>463.2</b>	<b>96.27</b>	

Done

SimpleHouse

Energy Use Details | Summary

	Compliance Total (kTDV/ft²-yr)	Compliance Margin (kTDV/ft²-yr)
Standard Design	51.85	
Proposed Design	47.42	4.43

Result: **COMPLIES**

Done

## Detailed Input Description

This section provides specific details about Right-Suite Universal (RSU) inputs that are used by Right-Energy Title 24.

If you are a new RSU user, you should refer to other documentation to become familiar with general input capabilities. In particular, note the use of overrides (activated using the F8 key) that allow altering default input values.

### Project Information Screen

This screen should be filled out just like it would for the load calculations. Pay careful attention to the following:

- Note that the California Climate zone is not linked to project data. You have to separately select climate zone on the Right-Energy Title 24 Project tab (see below).
- In the 'Site' section, you can check the checkbox at the top to copy the information that is in the 'Customer' section.
- In the 'Job' section, the Orientation information is used for documentation only and does not modify or effect modeled surface orientations.
- Number of bedrooms is important for Title 24. The default value is derived from Right-Draw room type property. You should override the default if it is not correct.
- The Weather location is not needed for Title 24 compliance. However, it is good practice to select appropriate weather data for the building location. With accurate weather data, you can use all the other features of RSU, such as load calculations, duct design, and equipment operating cost comparison (assuming you have any required module licenses).

### Zone Information Screen

The zone information screen includes information about ventilation. This information is used *only* for loads calculations. Compliance-related ventilation data is entered on the Right-Energy Title 24 IAQ tab. Note that in many cases, information about the same equipment will be entered in two places.

### Infiltration

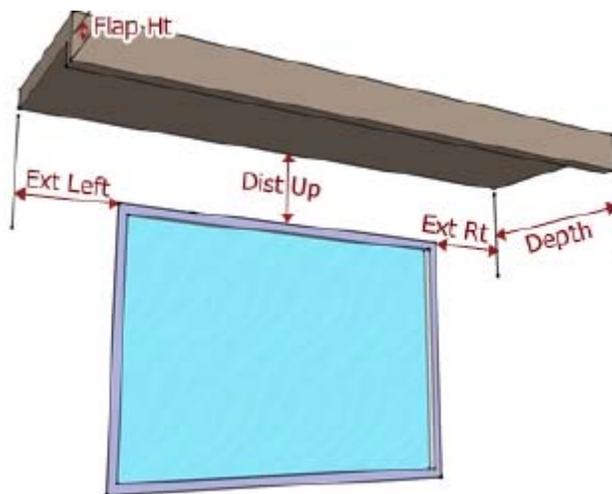
Infiltration data for compliance is entered on the Right-Energy Title 24 Building tab. Infiltration values entered on "traditional" RSU screens are used for loads calculations only and have no effect on compliance modeling.

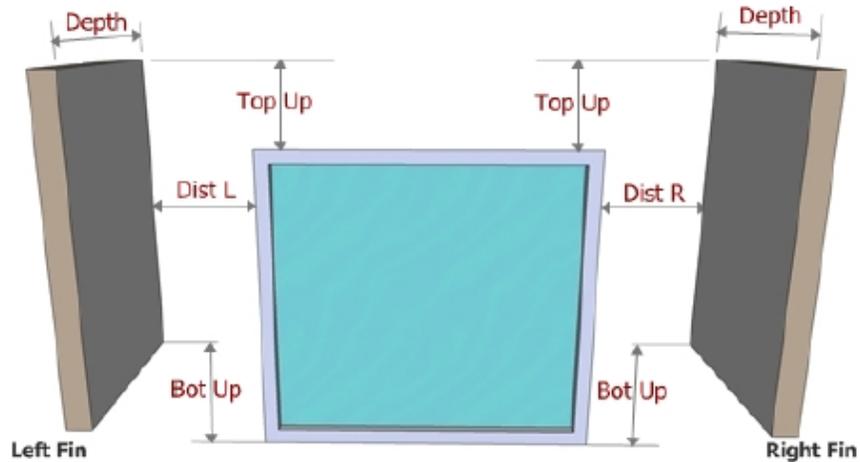
### Right-Draw®

Drawing procedures are identical to those used for loads calculations. Compliance Manager models the house at the zone level (not room level), so if you are not doing room-by-room load calculations (e.g. for duct design), you do not need to draw each room (i.e., draw the building as if you are doing a block load). Right-Energy Title 24 combines all rooms within each zone, so compliance analysis will work correctly with or without room level input.

Pay careful attention to the following:

- When adding sheets, be sure that the 'Elevation' is accurate. RSU doesn't require the elevations to be real, just in ascending order to determine which sheet is above which. For compliance, however, the actual elevation is needed. This means that even the lowest level may not be at 0 elevation. If the floor is 3" above grade, you need to indicate that.
- **Room property sheet:** Set the Room type. Bedrooms and garages are particularly important for compliance. If you do not draw each room, be sure to override Number of bedrooms on Project Information.
- **Wall property sheet:** Wall constructions (accessible via the [...] buttons on e.g. Wall 1, type) provide many standard constructions plus some recently added for consistency with Compliance Manager. EIFS (exterior insulating finish system) is a new choice – to use it you must select EIFS (under Exterior) and the appropriate Exterior board insulation (to represent the foam layer of the system).
- **Ceiling property sheet:** For ceilings under an attic, wood shakes; tile, slate, concrete; and metal roof materials will include an air gap under the roof. Other roof materials do not include an air gap. Therefore, if you have another roof material selected, and there is an air gap, you will need to switch to 'Custom layers' and add an air gap manually.
- **Floor property sheet:** For 'On/Below Grade' floors, there is an option for '80% carpet / 20% bare' in the Floor finish group. This is the Compliance Manager default for slab floor construction.
- **Window property sheet:** The construction and dimensions of the window are used in compliance. The width, height, and head height are needed for compliance, as well as the presence of an insect screen. There are more overhang options needed than there are for RSU load calculations:





Enter these values in the Property Sheet for the window (see below).

Property Sheet	
Window details	
Construction type	4A5-2ov
Orientation	North
Width (ft)	10.0
Height (ft)	5.0
Area (ft <sup>2</sup> )	50
Head height (ft)	6.67
Configuration	Flat
NFRC rated	Yes
U-value heating (Btuh/ft <sup>2</sup> -°F)	0.470
U-value cooling (Btuh/ft <sup>2</sup> -°F)	0.470
SHGC	0.31
Storm window during cooling	No
Internal shade	None
Internal shade fraction closed	0
Insect screen	Outdoor
Insect screen coverage (%)	50
External sun screen SCss	1.00
External sun screen coverage	0
Foreground	Default (0.20)
Overhang horizontal projection	1.00
Overhang vertical separation (ft)	1.33
(T24) Overhang extension left (ft)	3.00
(T24) Overhang extension right (ft)	3.00
(T24) Overhang flap (ft)	0.4
(T24) Fin left depth (ft)	0.00
(T24) Fin left distance (ft)	0.00
(T24) Fin left top distance to top (ft)	0.00
(T24) Fin left bottom distance to bottom (ft)	0.00
(T24) Fin right depth (ft)	0.00
(T24) Fin right distance (ft)	0.00
(T24) Fin right top distance to top (ft)	0.00
(T24) Fin right bottom distance to bottom (ft)	0.00

## Equipment Screens

You need to select heating, cooling, and DHW equipment for compliance. Select **Show | Equipment** from the main RSU menu to display the Equipment Screen.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation

Name: Split AC + Furn

High velocity duct system

Heating Type

- None
- Electric baseboard
- Electric strip
- Furnace
- Boiler

Water heating Type

Solar Count: 1

- None
- Conventional
- Instantaneous
- Air source HP
- WS/GS HP dedicated
- WS/GS HP desuperheater

Cooling

- None
- Split AC
- Split air source HP
- Pkg AC
- Pkg air source HP
- Water source HP
- Ground source HP

Fuel

- Electricity
- Natural gas
- Oil
- Propane
- Wood
- Backup electricity

Fuel

- Electricity
- Natural gas
- Oil
- Propane
- Backup electricity

T24

WH Distribution: Standard

AC Charge: Verified

Select Equip | Generic Equip | OK | Cancel | Apply | Help

In this screen, enter the cooling, heating, and water heating equipment types. You will select the specific units in other screens. In Title 24, you can have multiple water heating units in each zone. Indicate how many units there are in the upper right corner of this screen. Select the water heating distribution (WH Distribution) from the drop-down list at the bottom of this screen. Also, select the air conditioner charge (AC Charge) from the drop-down list.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation

Type: Generic

Manufacturer:

Trade name:

Condenser model / PN: SEER 14.0

Coil model / PN:

AHRI ref. number:

Target Capacities (Btuh)

Cooling sensible: 12147

Cooling latent: 0

Air Distribution

Estimated AVF (cfm): 684

Design AVF (cfm):

Static pressure (in H2O):

Heating=Cooling

Detailed Performance

2 stage

	Stage 1			Stage 2		
	Total	Sensible	EER	Total	Sensible	EER
67°F (Btuh)						
82°F (Btuh)	25042	17529	14.78	0	0	0.00
95°F (Btuh)	23436	16405	11.70	0	0	0.00

Fan

	cfm	W	cfm	W
Fan	684	396	0	0
Continuous fan	312	86		

Continuous fan

Ratings

EER:

SEER:

SHR:

Sound (bels):

Select Equip | Generic Equip | OK | Cancel | Apply | Help

The Split AC tab contains detailed information about the air conditioner. To select the specific unit, click the 'Select Equip' button. To select generic equipment, click the 'Generic Equip' button. The fan cfm and Watts must be carefully chosen. Title 24 has specific cfm/ton and W/cfm requirements.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation



Type  
 Manufacturer   
 Trade name   
 Model   
 AHRI ref no.

Occupants

Age	Number
0-5	<input type="text" value="0"/>
6-13	<input type="text" value="2"/>
14-59	<input type="text" value="2"/>
60-	<input type="text" value="0"/>

Home during day   
 Dishwasher   
 Clothes washer   
 Additional use (gpd)

Ratings

Tank size (gal)	<input type="text" value="50"/>	Energy factor	<input type="text" value="0.600"/>
Input (MBtuh)	<input type="text" value="40.0"/>	1st hour (gal)	<input type="text" value="60"/>
		Recovery efficiency (%)	<input type="text" value="76"/>
	EWT (°F)	Capacity (MBtuh)	COP
Dedicated WS/GS heat pump	<input type="text"/>	<input type="text"/>	<input type="text"/>

Load

Setpoint (°F)	<input type="text" value="120"/>	Daily use (gpd)	<input type="text" value="62"/>
---------------	----------------------------------	-----------------	---------------------------------

Select Equip | Generic Equip | OK | Cancel | Apply | Help

The Gas WH tab has information about the specific water heating unit. Click the 'Select Equip' button to select the unit.

Equipment for Entire House: Base System (Split AC + Furn)

System Type | Data | Features | Split AC | Gas furnace | Gas WH | Perf | Simulation

Simulation only!

Distribution

Leakage/conduction

Type: Ducts located in unconditioned attic

Has bypass duct  Automatic Insulation R-value (ft<sup>2</sup>\*F/Btuh): 6.0

Low leakage AH Duct leakage: Sealed and tested 6.00 %

Verified design

Location: Supply: Attic Return: Attic

Surface area (ft<sup>2</sup>): Supply: 321.8 Return: 98.9

Insulation R-value (ft<sup>2</sup>\*F/Btuh): Supply: 6.0 Return: 6.0

Buried ducts

Deeply buried ducts

Distribution system efficiency

Heating: 0.00 Cooling: 0.00

Auxiliaries

Crankcase heater power (W): 0

Cut-off temperature (°F): 0

Select Equip. Generic Equip. OK Cancel Apply Help

The 'Simulation' tab has information about the distribution (ducts) in your project. These generally correspond to CBECC-Res inputs. Further changes and/or improved documentation are expected when the next build of Compliance Manager becomes available (week of June 9).

### Additional Considerations

**Attics** – Attics are not explicitly described in RSU. However, they need to be defined for compliance. RSU will generate an attic when there is a 'Ceiling under Attic' in the building. Wood shakes; tile, slate, concrete; and metal roof materials will include an air gap under the roof. Other roof materials do not include an air gap. Therefore, if you have another roof material selected, and there is an air gap, you will need to switch to 'Custom layers' and add an air gap.

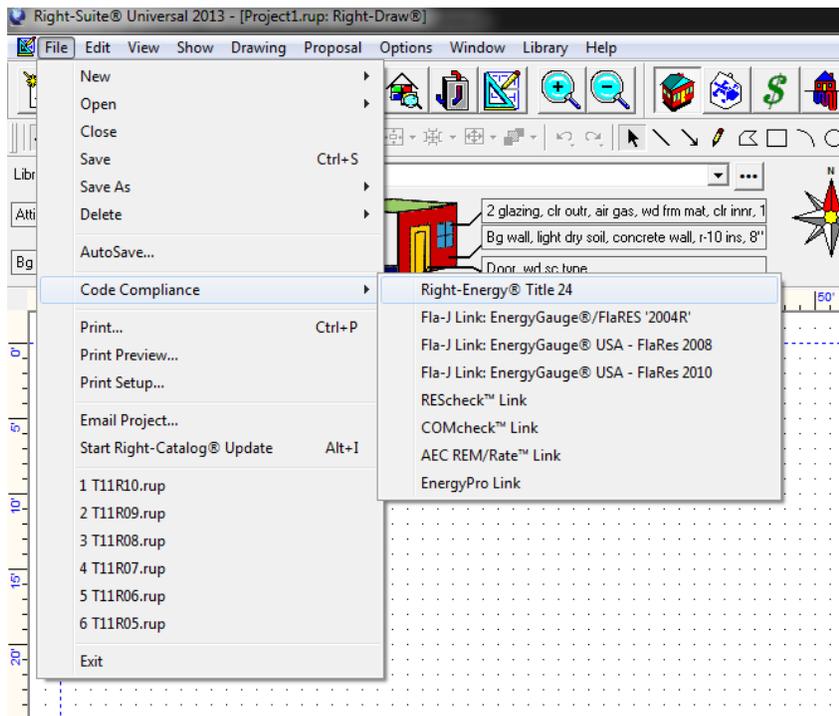
**Garages** – Garages are usually not conditioned and, therefore, not considered for load calculations. However, compliance requires that they be defined. When you enter an attached garage, be sure to set the following in the Room Property Sheet for the garage:

1. Set 'Include in calculations?' to 'Yes'.
2. Set the 'Room heating condition' and 'Room cooling condition' to '[None]'.
3. Set the 'Room type' to 'Garage'.

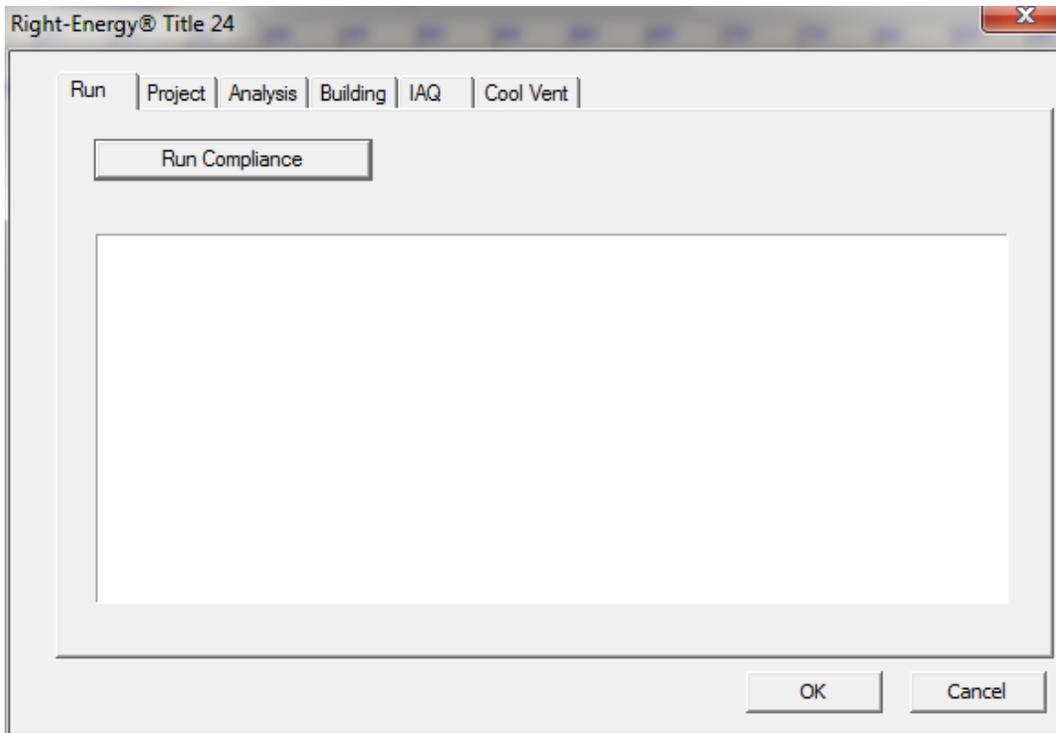
**Crawl Spaces** – Crawl spaces are not explicitly described in RSU. However, they need to be defined for compliance. RSU will generate a crawl space when there is an Exterior Floor with the Exterior Conditions set to one of the crawl space options.

## Right-Energy Title 24 Screens

A number of screens capture input that is used *only* for Title 24 compliance. In some cases, default information is provided from elsewhere in RSU, but no data entered here has any effect on other RSU calculations.

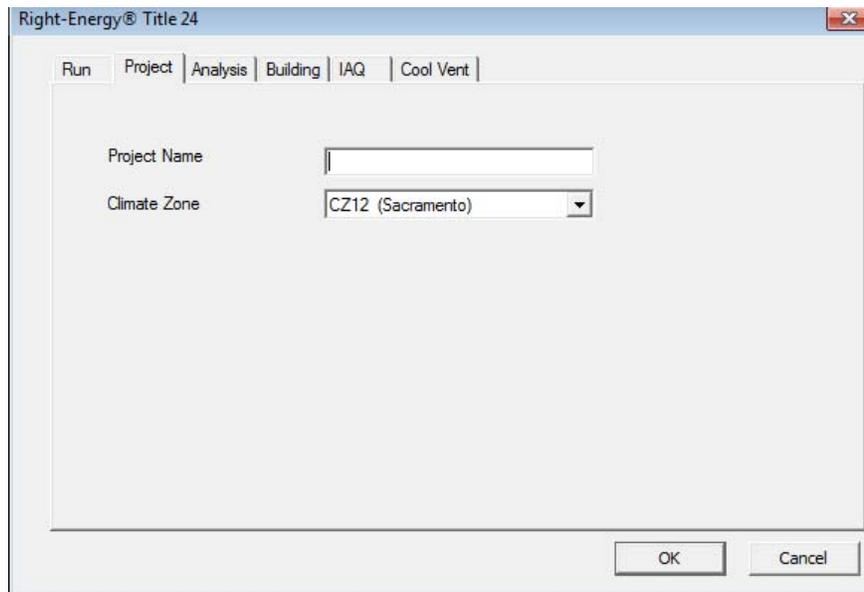


This will display the following screen that provides a number of tabbed property page screens. These screens are similar to corresponding ones in CBECC-Res.



As explained under Procedure in Brief, the Run tab allows initiation of the compliance calculations and displays error messages.

## Project



The screenshot shows a software window titled "Right-Energy® Title 24" with a standard Windows-style title bar. Below the title bar is a tabbed interface with five tabs: "Run", "Project", "Analysis", "Building", and "Cool Vent". The "Project" tab is currently selected. The main area of the window contains two input fields: "Project Name" with an empty text box, and "Climate Zone" with a dropdown menu showing "CZ12 (Sacramento)". At the bottom right of the window are "OK" and "Cancel" buttons.

This screen contains project-wide information.

1. Enter the Project Name. This will appear at top of each page of the CF1R. It also appears on the first page in the 'General Information' section.
2. Select the Climate Zone from the drop-down list. Use the zip code or jurisdiction and *Reference Appendicies*, JA2.1.1 to determine the correct climate zone.

## Analysis

Right-Energy® Title 24

Run | Project | Analysis | Building | IAQ | Cool Vent

Run Title: Example

Analysis Type: Proposed and Standard

Standards Ver: Compliance 2015  
any time (with 2015 Federal Air Conditioning Requirements) and solar credit

PV System Credit

Rated Power: 0.0 kWdc

Run Scope: Newly Constructed

OK Cancel

This screen contains information specific to the compliance analysis that you want to perform.

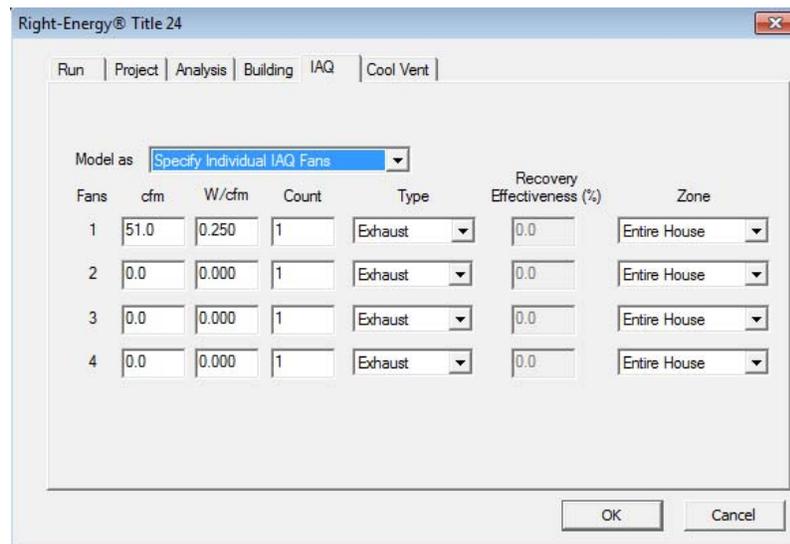
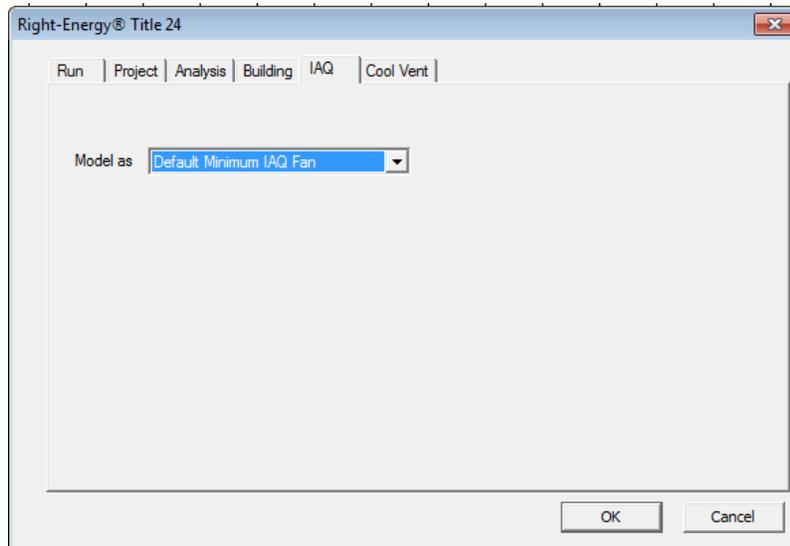
- Run Title appears at the top of each page of the CF1R – under the Project Name – as ‘Calculation Description’.
- Run Scope. The only choice is Newly Constructed. When Right-Energy Title 24 is enhanced to support multi-family and/or additions, more choices will be provided.

## Building

This screen contains information about the building being analyzed.

- Building Description appears on the first page of the CF1R in the 'General Information' section as 'Calculation Description'.
- Air Leakage specifies the assumed leakage rate for the building (air changes at 50 pascals). Infiltration input elsewhere in RSU is *not* used for compliance modeling. The default value of 5 is used if no blower door test is to be performed. If the house will have HERS verified infiltration testing, enter an achievable leakage value.
- Insulation Construction Quality. Standard indicates insulation installation will not be field-verified and all insulation is modeled with R values reduced by 20%. Improved (also known as Quality Insulation Installation or QII) uses the full R values for all insulation and must be HERS verified.
- Front Orientation effectively rotates the building by the amount entered. If multiple orientation analysis is selected, Compliance Manager models the building in four cardinal orientations; if the worst case passes, then the design may be constructed in any orientation (this is applicable for subdivision projects where a given design may be constructed in various orientations).
- Natural Gas is available at the site. Check the box if natural gas is available at the building site. The field does not indicate what fuel type is being used in the building for heating, cooling, or water heating. Whether natural gas is available determines the fuel type used as the basis for time dependent value (TDV) in the standard design (see Reference Appendices, Joint Appendix JA3).

## Indoor Air Quality (IAQ)



This screen contains Indoor Air Quality ventilation options.

1. Select either 'Default Minimum IAQ Fan' or 'Specify Individual IAQ Fans'. The screen will change depending on your selection.
2. If you select 'Specify Individual IAQ Fans', enter the details of each of the IAQ fans.

## Cool Vent

Energy Code Compliance

Energy Code: California 2013 Residential Title-24

Run | Project | Analysis | Building | IAQ | Cool Vent

Model as: Default Prescriptive Whole House Fan

OK Cancel

Right-Energy® Title 24

Run | Project | Analysis | Building | IAQ | Cool Vent

Model as: Specify Individual Whole House Fans

Fans	Default	cfm	W/cfm	Zone
1	<input type="checkbox"/>	4200.0	0.100	Entire House
2	<input checked="" type="checkbox"/>	0.0	0.100	Entire House
3	<input checked="" type="checkbox"/>	0.0	0.100	Entire House
4	<input checked="" type="checkbox"/>	0.0	0.100	Entire House
5	<input checked="" type="checkbox"/>	0.0	0.100	Entire House
6	<input checked="" type="checkbox"/>	0.0	0.100	Entire House

OK Cancel

This screen contains information about the cooling ventilation in the building.

1. Select '- none -', 'Default Prescriptive Whole House Fan', or 'Specify Individual Whole House Fans' from the drop-down list. The screen will be different if you select 'Specify Individual Whole House Fans'.
2. If you select 'Specify Individual Whole House Fans', enter the details of each of the cooling ventilation fans.

## Appendix A. Energy Commission Approval

(To be added)

## Appendix B. Sample Compliance Documentation

GENERAL INFORMATION			
01	Project Name	Simple House - 1450 20th Street	
02	Calculation Description	1 floor with garage	
03	Project Location	1450 20th Street	
04	A City	Sacramento	
06	Zip code	05	Standards Version
		07	Compliance Manager Version
08	Climate Zone	09	Software Version
10	Building Type	11	Front Orientation (deg/Cardinal)
12	Project Scope	13	Number of Dwelling Units
14	Total Cond. Floor Area (FT <sup>2</sup> )	15	Number of Zones
16	Slab Area (FT <sup>2</sup> )	17	Number of Stories
18	Addition Cond. Floor Area	19	Natural Gas Available
20	Addition Slab Area (FT <sup>2</sup> )	21	Glazing Percentage (%)

COMPLIANCE RESULTS			
01	Building Complies with Computer Performance		
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.		
03	This building incorporates one or more Special Features shown below		
ENERGY USE SUMMARY			
04	05	06	07
Energy Use (kTDV/ft)	Standard Design	Proposed Design	Compliance Margin
Space Heating	22.73	21.57	1.16
Space Cooling	14.13	10.86	3.27
IAQ Ventilation	1.13	1.13	0.00
Water Heating	13.86	13.86	0.00
Photovoltaic Offset	----	0.00	0.00
TOTAL	51.85	47.42	4.43
			Percent Improvement
			5.1%
			23.1%
			0.0%
			0.0%
			----
			8.5%

Detailed help on using the CF-1R Certificate of Compliance is available via the Internet by either scanning the QR code or browsing to <http://www.title24energycode.org/t24help/cf1r.aspx>



**REQUIRED SPECIAL FEATURES**

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

- Window overhangs and/or fins

**BUILDING - FEATURES INFORMATION**

01	02	03	04	05	06	07
Project Name	Conditioned Floor Area (sft)	Number of Dwelling Units	Number of Bedrooms	Number of Zones	Number of Ventilation Cooling Systems	Number of Water Heating Systems
Simple House - 1450 20th Street	2100	1	3	1	1	1

**ZONE INFORMATION**

01	02	03	04	05	06	07
Zone Name	Zone Type	HVAC System Name	Zone Floor Area (ft <sup>2</sup> )	Avg. Ceiling Height	Water Heating System 1	Water Heating System 2
Entire House (heat/cool)	Conditioned	RSU HVAC Sys 1	2100	9	DHW System 1	

**OPAQUE SURFACES**

01	02	03	04	05	06	07	08
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft <sup>2</sup> )	Window Area (ft <sup>2</sup> )	Tilt(deg)
WALL-02	Entire House (heat/cool)	EXTWALL	0	- specify -	270	105	90
WALL-04	Entire House (heat/cool)	EXTWALL	90	- specify -	324	52.5	90
WALL-05	Entire House (heat/cool)	EXTWALL	180	- specify -	450	210	90
WALL-07	Entire House (heat/cool)	EXTWALL	270	- specify -	414	52.5	90
WALL-08	Entire House (heat/cool)>>Garage (uncond)	INTWALL			270		
CEIL-02	Entire House (heat/cool)	CLGBLWATC			2100		
WALL-01	Garage (uncond)	Garage Ext Wall	0	- specify -	180	0	90
WALL-03	Garage (uncond)	Garage Ext Wall	90	- specify -	198	0	90
WALL-06	Garage (uncond)	Garage Ext Wall	270	- specify -	108	0	90
CEIL-01	Garage (uncond)	CLGBLWATC-A			440		

**CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD**

CF1R-PRF-NCB-01

Project Name: Simple House - 1450 20th Street

Calculation Date/Time: 17:36, Wed, Jun 04, 2014

Page 3 of 8

Calculation Description: First submission

Input File Name: SimpleHouse.ribd

<b>ATTIC</b>		<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>
<b>Name</b>	<b>Construction</b>	<b>Roof Rise</b>	<b>Roof Reflectance</b>	<b>Roof Emittance</b>	<b>Radiant Barrier</b>	<b>Cool Roof</b>		
RSU Attic	ATTICRF-AtcRf	5	0.2	0.85	Yes	No		

<b>WINDOWS</b>		<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>
<b>Name</b>	<b>Type</b>	<b>Surface (Orientation-Azimuth)</b>	<b>Height (ft)</b>	<b>Width(ft)</b>	<b>Multiplier</b>	<b>Area (ft<sup>2</sup>)</b>	<b>U-factor</b>	<b>SHG C</b>	<b>Exterior Shading</b>		
GLAZ-01	Window	WALL-02 (- specify --0)	5.0	3.0	7	105.0	0.32	0.25			
GLAZ-02	Window	WALL-04 (- specify --90)	5.0	1.5	1	7.5	0.32	0.25			
GLAZ-03	Window	WALL-04 (- specify --90)	5.0	3.0	3	45.0	0.32	0.25			
GLAZ-04	Window	WALL-05 (- specify --180)	5.0	3.0	14	210.0	0.32	0.25			
GLAZ-05	Window	WALL-07 (- specify --270)	5.0	1.5	1	7.5	0.32	0.25			
GLAZ-06	Window	WALL-07 (- specify --270)	5.0	3.0	3	45.0	0.32	0.25			

<b>DOORS</b>		<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>
<b>Name</b>	<b>Side of Building</b>	<b>Area (ft<sup>2</sup>)</b>	<b>U-factor</b>		
DOOR-02	WALL-02	20.1	0.50		
DOOR-03	WALL-08	20.0	0.50		
DOOR-01	WALL-01	128.0	1.00		

<b>OVERHANGS AND FINS</b>		<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>
<b>Window</b>	<b>Depth</b>	<b>Overhang</b>						<b>Left Fin</b>						<b>Right Fin</b>	
		<b>Dist Up</b>	<b>Left Extent</b>	<b>Right Extent</b>	<b>Flap Ht.</b>	<b>Depth</b>	<b>Top Up</b>	<b>DistL</b>	<b>Bot Up</b>	<b>Depth</b>	<b>Top Up</b>	<b>Dist R</b>	<b>Bot Up</b>	<b>Bot Up</b>	
GLAZ-01	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0
GLAZ-02	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0
GLAZ-03	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0
GLAZ-04	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0
GLAZ-05	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0
GLAZ-06	1	1.33	3	3	0.4	0	0	0	0	0	0	0	0	0	0

Registration Number:

Registration Date/Time:

Report Version - CF1R-05292014-605

HERS Provider:

CA Building Energy Efficiency Standards - 2013 Residential Compliance Report Generated at: 6/4/2014:2:38:05 PM

**CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD**

CF1R-PRF-NCB-01

Project Name: Simple House - 1450 20th Street

Calculation Date/Time: 17:36, Wed, Jun 04, 2014

Page 4 of 8

Calculation Description: First submission

Input File Name: SimpleHouse.ribd

OPAQUE SURFACE CONSTRUCTIONS						
01	02	03	04	05	06	
Construction Name	Surface Type	Construction Type	Framing	Total Cavity R-value	Assembly Layers	
EXTWALL	Exterior Walls	Wood Framed Wall	2x4 @ 16 in. O.C.	R 15	<ul style="list-style-type: none"> <li>Inside Finish: Gypsum Board</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Cavity: R 15</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Exterior Finish: R4 Synthetic Stucco</li> </ul>	
INTWALL	Interior Walls	Wood Framed Wall	2x4 @ 16 in. O.C.	R 15	<ul style="list-style-type: none"> <li>Inside Finish: Gypsum Board</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Cavity: R 15</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Other Side Finish: Gypsum Board</li> </ul>	
CLGBLWATC	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O.C.	R 38	<ul style="list-style-type: none"> <li>Attic Floor: - no attic floor -</li> <li>Cavity: R 38</li> <li>Sheathing/Insulation - no sheathing/insul. -</li> <li>Inside Finish: Gypsum Board</li> </ul>	
CLGBLWATC-A	Ceilings (below attic)	Wood Framed Ceiling	2x4 @ 24 in. O.C.		<ul style="list-style-type: none"> <li>Attic Floor: - no attic floor -</li> <li>Cavity: - no insulation -</li> <li>Sheathing/Insulation - no sheathing/insul. -</li> <li>Inside Finish: Gypsum Board</li> </ul>	
ATTICRF-AtcRf	Attic Roofs	Built-up Roof	2x4 Top Chord of Roof Truss @ 24 in. O.C.		<ul style="list-style-type: none"> <li>Roofing: 10 PSF (RoofTile)</li> <li>Above Deck Insulation - no insulation -</li> <li>Roof Deck: Wood Siding/sheathing/decking</li> <li>Cavity: - no insulation -</li> <li>Inside Finish: - select inside finish -</li> </ul>	
Garage Ext Wall	Exterior Walls	Wood Framed Wall	2x4 @ 16 in. O.C.	- no insulation (vertical) -	<ul style="list-style-type: none"> <li>Inside Finish: Gypsum Board</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Cavity: - no insulation (vertical) -</li> <li>Sheathing/Insulation: - no sheathing/insul. -</li> <li>Exterior Finish: 3 Coat Stucco</li> </ul>	

SLAB FLOORS						
01	02	03	04	05	06	07
Name	Zone	Area (ft <sup>2</sup> )	Perimeter (ft)	Edge Insul. R-value& Depth	Carpeted Fraction	Heated
FLOOR-01	Entire House (heat/cool)	2100	162	None	0.8	No
FLOOR-02	Garage (uncond)	440	54	None	0	No

Registration Number:

Registration Date/Time:

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CA Building Energy Efficiency Standards - 2013 Residential Compliance

Report Version - CF1R-05292014-605

Report Generated at: 6/4/2014:2:38:05 PM

<b>BUILDING ENVELOPE - HERS VERIFICATION</b>			
01	02	03	04
Quality Insulation Installation(QII)	Quality Installation of Spray Foam Insulation	Building Envelope Air Leakage	CFM @ 50 Pa
NOT REQUIRED	NOT REQUIRED	NOT REQUIRED	---

<b>WATER HEATING SYSTEMS</b>			
01	02	03	04
Name	Distribution Type	Number of Heaters	Solar Fraction (%)
DHW System 1	Standard	1	n/a

<b>WATER HEATERS</b>							
01	02	03	04	05	06	07	08
Name	Heater Element Type	Tank Type	Tank Volume (gal)	Energy Factor or Efficiency	Input Rating	Tank Exterior Insulation R-value	Standby Loss (Fraction)
Water Heater 1	Natural Gas	Small Storage	50	0.6	40000-Btu/hr	0	0

<b>WATER HEATING - HERS VERIFICATION</b>						
01	02	03	04	05	06	07
Name	Pipe Insulation	Parallel Piping	Compact Distribution	Point-of Use	Recirculation with Manual Control	Recirculation with Sensor Control
DHW System 1-hers-dhw	n/a	n/a	n/a	n/a		n/a

<b>HVAC SYSTEMS</b>							
01	02	03	04	05	06	07	
Name	System Type	Heating System Name	Cooling System Name	Distribution System	Fan System	Floor Area Served	
RSU HVAC Sys 1	Other Heating and Cooling System	RSU HVAC Sys 1-heat	RSU HVAC Sys 1-cool	RSU HVAC Sys 1-dist	RSU HVAC Sys 1-fan	2100	

<b>HVAC - HEATING SYSTEMS</b>		
01	02	03
Name	Type	Efficiency
RSU HVAC Sys 1-heat	CntrlFurnace - Fuel-fired central furnace	78 AFUE

HVAC - COOLING SYSTEMS				
01	02	03	04	05
Name	System Type	EER	Efficiency	SEER
RSU HVAC Sys 1-cool	SplitAirCond - Split air conditioning system	11.7		14
				HERS Verification
				RSU HVAC Sys 1-cool-hers-cool

HVAC COOLING - HERS VERIFICATION				
01	02	03	04	05
Name	Verified Airflow	Airflow Target	Verified EER	Verified SEER
RSU HVAC Sys 1-cool-hers-cool	Required	350	Not Required	Not Required
				Verified Refrigerant Charge
				Required

HVAC - DISTRIBUTION SYSTEMS				
01	02	03	04	05
Name	Type	Duct Leakage	Insulation R-value	Supply Duct Location
RSU HVAC Sys 1-dist	Ducts located in unconditioned attic	Sealed and tested	6	Attic
				Return Duct
				Attic
				Bypass Duct
				None
				HERS Verification
				RSU HVAC Sys 1-dist-hers-dist

HVAC DISTRIBUTION - HERS VERIFICATION				
01	02	03	04	05
Name	Duct Leakage Verification	Duct Leakage Target (%)	Verified Duct Location	Verified Duct Design
RSU HVAC Sys 1-dist-hers-dist	Required	6.0	Not Required	Not Required
				Return
				Not Required
				Supply
				Not Required

HVAC - FAN SYSTEMS				
01	02	03	04	
Name	Type	Fan Power (Watts/CFM)	HERS Verification	
RSU HVAC Sys 1-fan	Single Speed PSC Furnace Fan	0.578947	Required	

HVAC FAN SYSTEMS - HERS VERIFICATION				
01	02	03		
Name	VerifiedFanWatt Draw	Required Fan Efficiency (Watts/CFM)		
RSU HVAC Sys 1-fan-hers-fan	Required	0.58		

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CF1R-PRF-NCB-01

Project Name: Simple House - 1450 20th Street

Calculation Date/Time: 17:36, Wed, Jun 04, 2014

Page 7 of 8

Calculation Description: First submission

Input File Name: SimpleHouse.ribd

IAQ (Indoor Air Quality) FANS				
01	02	03	04	05
Name	IAQ CFM	IAQ Fan Type	IAQ Recovery Effectiveness(%)	HERS Verification
IAQFan1	51	Exhaust	0	Required

COOLING VENTILATION				
01	02	03	04	05
Name	Cooling Vent CFM	Cooling Vent Watts/CFM	Number of Fans	HERS Verification
CoolVentFan1	4200	0.1	1	

This Certificate of Compliance is not registered

Registration Number:

Registration Date/Time:

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<b>DOCUMENTATION AUTHOR'S DECLARATION STATEMENT</b>	
1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
Address:	CEA/HERS Certification Identification (if applicable):
City/State/Zip:	Phone:
<b>RESPONSIBLE PERSON'S DECLARATION STATEMENT</b>	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> <li>I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design identified on this Certificate of Compliance.</li> <li>I certify that the energy features and performance specifications identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.</li> <li>The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.</li> </ol>	
Responsible Designer Name:	Responsible Designer Signature:
Company:	Date Signed:
Address:	License:
City/State/Zip:	Phone:

