









Activity 3.3.4 Energy Codes

Introduction

In this activity you will investigate the requirements of the International Energy Conservation Code and revise your Keystone Library Renovation plans to comply with the code.

Equipment

-  Engineering notebook
-  Internet access
-  Pencil
-  Printer
-  3D architectural software file **Preliminary Keystone Library**
-  **Building Envelope Requirements for Climate Zone 5**

Procedure

1. Visit the Department of Energy *Building Energy Codes Program* website at <http://www.energycodes.gov>
2. Follow the link to DOE **Status of Energy Codes**.
3. Follow the link to What's Happening in Your State. Based on the map and key, what is the status of the energy codes in Indiana (where the Keystone Library building is located)? What is the energy code status in neighboring states? What is the energy code status in your state?
4. Note: Regardless of the energy code status, the City of Noblesville has decided to propose energy efficient design and construction and will therefore require that the Keystone Library be renovated to many requirements of the most recent ASHRAE 90.1-2007/2009 IECC code. The Building Envelope Requirements for Climate Zone 5 document reflects these requirements.
5. Based on the Energy Code requirements for the Keystone Library roof, revisit your roof design and sketch a detail of your roof proposal showing all layers and specifying the insulation. Obtain approval of your roof system from your teacher. Revise your roof design as needed in your 3D architectural model.
6. Based on the Energy Code requirements revisit your proposal for the new wall on the second floor. Sketch a detail of your new wall proposal (for the wall between the second floor and the green roof) and specify the insulation. Indicate the R-value on the sketch. Obtain instructor approval of your wall system. Create or revise this wall in your 3D architectural model.

7. What is needed in order to comply with the energy code (using the prescriptive approach presented in the PowerPoint) with regard to the unheated slab on grade for the Keystone Project? If the project were located in Montana, what would be the requirement for perimeter slab insulation?
8. Propose a preliminary scheme for fenestrations to be installed in the exterior walls of the Keystone Library. Keep the area of fenestration to a maximum of 40% of the overall exterior wall area. It is a good idea to keep books out of direct sunlight, so plan accordingly. Model your new fenestrations in your Keystone Library Renovation 3D architectural model.
9. Calculate the percentage of exterior wall composed of fenestration to verify that the area of fenestration is less than or equal to 40%.
10. Assume that the client would like to provide shading for the fenestrations on the south face of the building in order to protect the library books and resources from damage from the sun. Research methods to provide window shading and sketch a preliminary design that would provide shading such that the resulting projection factor does not restrict the use of windows based on the Solar Heat Gain Coefficient.
11. Design a vestibule entrance for the main entrance of the library. In order to improve the aesthetics of the entrance, add the vestibule to the exterior of the existing footprint such that it will be new construction. Include walls and a roof. Incorporate your design into your Keystone Library Renovation 3D architectural model. Be sure to consider how much space is needed to accommodate door swings and several people entering and exiting at the same time. Obtain instructor approval
12. Calculate the heat loss through the new second floor wall in the Keystone Library Renovation. Assume an interior temperature of 68 degrees F and an exterior temperature of 32 degrees F.

Conclusion

1. What is the purpose of energy codes?

2. How does adding a vestibule improve energy efficiency?

3. What recommendations would you make to improve the energy efficiency of the existing structure during the renovation process for the Keystone Library?