Autodesk Sustainable Design Curriculum

Getting Started Guide

Working with Revit® Architecture Software and BIM for Sustainable Design

Autodesk®

Preface: Sustainable Design with BIM Educational Curriculum Workbook Exercises

Revit Architecture Sustainable Curriculum Sample Exercises:

This workbook contains sample exercises for the Autodesk Sustainable Design Curriculum. It is not intended to be used as a standalone tutorial or as courseware for sustainable design. Although these sample exercises correspond to the units in the Autodesk Sustainable Design Curriculum Lecture Notes, not all of the units in the Lecture Notes have a corresponding sample exercise, and some contain more than one.

Because this document supplements the information found in the Lecture Notes, the exercises do not provide step-by-step instructions on how to document all of the submittals for any given sustainable rating system, such as LEED®, BREEAM©, or GBTool™, but instead provide a wide range of examples showing how you can use the Building Information Model (BIM) to provide information for design decisions in a sustainable context.

The exercises in this workbook assume a working knowledge of Revit Architecture software.
If you are new to Revit Architecture, we suggest you work through the Revit Architecture Building Information Modeling Education Curriculum prior to attempting these exercises (available on the Autodesk Student Engineering and Design Community at www.autodesk.com/edcommunity)

Sustainability and BIM

BIM enables you to quickly study multiple design iterations so you can choose the option that best fits the needs of your architectural program and client. When working with a sustainable design, the process is no different, except that you must consider more design constraints. Currently, there are many different tools available for sustainable design and documentation. For example, the US Department of Energy (DOE) web site, http://www.eere.energy.gov/buildings/tools_directory/alpha_list.cfm, lists nearly 350 different tools that engineers and architects can use to analyze different aspects of building energy usage.

While BIM software is good at generating and reporting information about the components of a building, the purpose of most BIM software packages is not to analyze data so much as to create, coordinate, and display it. This data can then be exported as needed to software built specifically for data analysis. Generic analysis packages (spreadsheets and databases) and purpose-built analysis tools, such as those listed on the DOE website, start where the BIM software leaves off, by enabling you to perform more detailed analyses and computations on data generated from the building information model.

The exercises in this workbook are grouped into 3 categories, each of which covers a different approach to analyzing the data in the building information model.

Visual Analysis:
- What: Create a view that demonstrates something about the topic of concern to help analyze or present the information in a graphical way.
- Examples: Display the percentage of recycled content of materials as a shade of green, or graphically represent the shaded portion of the hardscape to alleviate heat island creation.

Direct Tabular Analysis:
- What: BIM software is extremely good at scheduling and reporting information in tabular format.
- Examples: Schedule the recycled percentage of all materials used in the building and present this in terms of volume of the building shell.

Export Data for analysis in a separate software tool, such as Microsoft® Excel or one of the purpose-built tools:
- What: BIM tools create the building model. Purpose-built tools enable further investigation and analysis.
- Examples: Export the building model to an energy analysis package such as IES <VE>™ or Ecotect™ to determine which exterior shading devices are most energy efficient.

While many BIM software packages can provide similar results, the exercises in this document use Revit Architecture and Revit® MEP software to provide the visual and direct tabular analysis information. The exercises on analysis use other software packages, such as IES <VE>. As with the BIM model itself, you can

obtain identical analysis results using a multitude of different software packages. For example, if you have access to Ecotect, but not to IES <VE>, then you may use that instead to perform the building energy analysis.

Using this Workbook Exercise

Workbook and Software Knowledge

The exercises in this workbook assume a working knowledge of Revit Architecture and the other software packages used. All exercises are task-oriented; that means that each contains a general description of the suggested tasks but not step-by-step instructions on how to complete them. If you are new to Revit Architecture software, we suggest you complete the Revit Architecture Building Information Modeling Education Curriculum prior to attempting these exercises (available on the Autodesk Student Engineering and Design Community at www.autodesk.com/edcommunity).

Workbook ZIP Files

Each unit with a corresponding exercise also includes a separate Zip file that may contain some or all of the following:

- This introductory document.
- A Workbook Exercise document.
- Additional resource materials referenced by the exercise document.
- A Workbook dataset that includes a starting point dataset and, if appropriate, a complete dataset, to enable you to check your work.All exercises are structured to enable you to substitute your own project data for the provided exercise dataset if you wish..

Workbook Exercise Structure

The workbook is structured in a two-column format (see image below):

- The first column lists either a task number, a "TIP," or a "NOTE."
- Task numbers refer to the steps necessary to complete an exercise. Lines with TIP or NOTE provide additional explanatory material related to the task.
- The right column contains images that help clarify the task , as well as a written description of the task below the image.

2   *Create a New Area Plan*
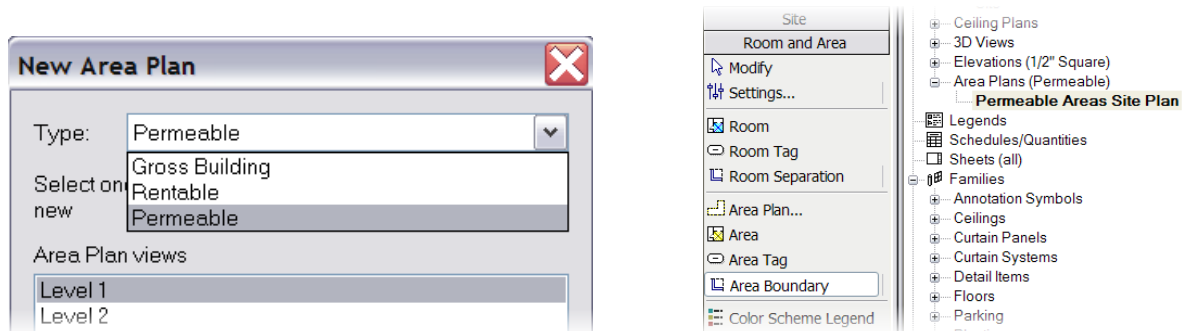
To create a new Level 1 area plan of the permeable area scheme type you just created, click View menu > New > Area Plan. Do NOT associate lines with exterior walls when prompted. Use the option bar filter to copy just the detail lines from the Level 1 floor plan . To place them in the Permeable Areas Site Plan, click Edit menu > Paste Aligned. Click View menu > Properties. Finally, select Level Below from the lists under Primary Range Bottom and View Depth Level.

We hope you enjoy learning ways you utilize BIM to aid your design of sustainable projects. Have fun!

IES <VE>

Units 5 and 6 feature a new integrated heating and cooling load analysis powered by components from a third party product called IES <Virtual Environment>. The full version of IES <VE> is not included with your purchase of AutoCAD Revit MEP Suite 2008.

If you would like to request a trial version, or purchase IES <VE>, then please follow the instructions that appear when you first select the <Virtual Environment> button in the Heating and Cooling Loads feature of Revit MEP 2008.

IES <VE> is distributed and supported by Integrated Environmental Solutions Limited.

IF you do not have IES <VE> installed:	If you DO have the full version of IES <VE> installed and licensed
Click the heating and cooling tool on the mechanical design bar in Revit MEP 2008 Click the Virtual Environment button in the new window that pops up. Follow the instructions and submit an email request.	With the full <VE> installed on the machine, the only task that needs to be completed after installation of Revit MEP 2008 is to re-direct the software to the existing installation of the <VE>.
You will be emailed a form letter with two links one for an MSI installer (about 30 megs) the other for the Keys that you can download and copy into the proper location	Users will need to contact support@iesve.com to obtain formal instructions. If the customer installs the most recent version (5.8) of the IES <VE> after installing Revit MEP 2008, then the installer will detect Revit MEP 2008 and make these changes automatically.
The license keys provided from IES provide full access to the IES <VE> for 30 days; it is a 30-Day Trial.	There is no additional licensing or installation required (see above). Once Revit MEP 2008 is re-directed to look at the existing IES <VE> install path, things will work normally.