Rapid Energy Modeling Workflows– Autodesk University 2013
Class Handout

This handout is intended to provide an introduction to basic capabilities within FormIt and Vasari for the purpose of rapidly generating an energy model and report. More advanced capabilities and detailed energy modeling are not described in this tutorial.

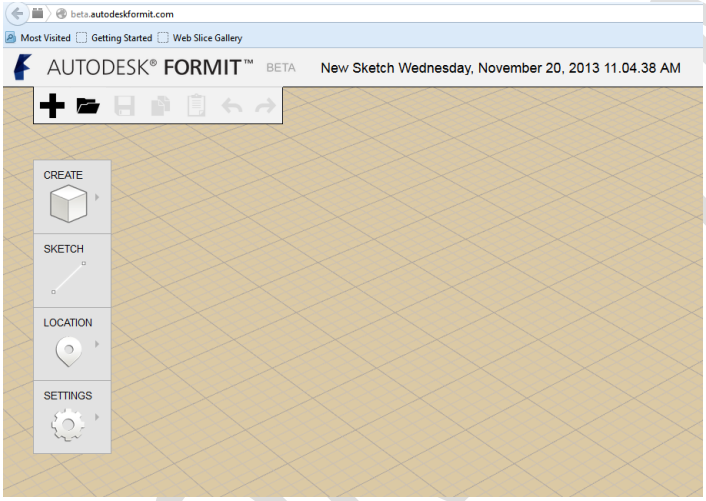
The class will cover the following Rapid Energy Modeling workflows using:

A. Formit - available for free on the iOS App Store (iPad only), Google Play Store and as a Web beta at http://beta.autodeskformit.com/
B. Vasari beta: free desktop download available at http://www.autodeskvasari.com/
C. Green Building Studio: http://gbs.autodesk.com/

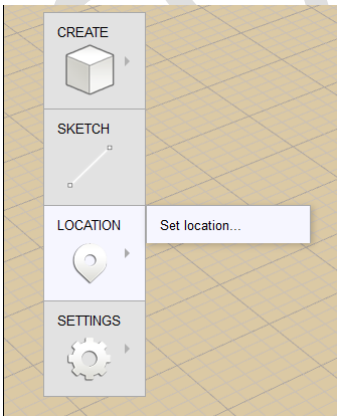
FormIt- Web Beta

Autodesk® FormIt helps you capture building design concepts digitally, anytime and anywhere ideas strike—both on your iOS or Android mobile device, and now in your web browser.

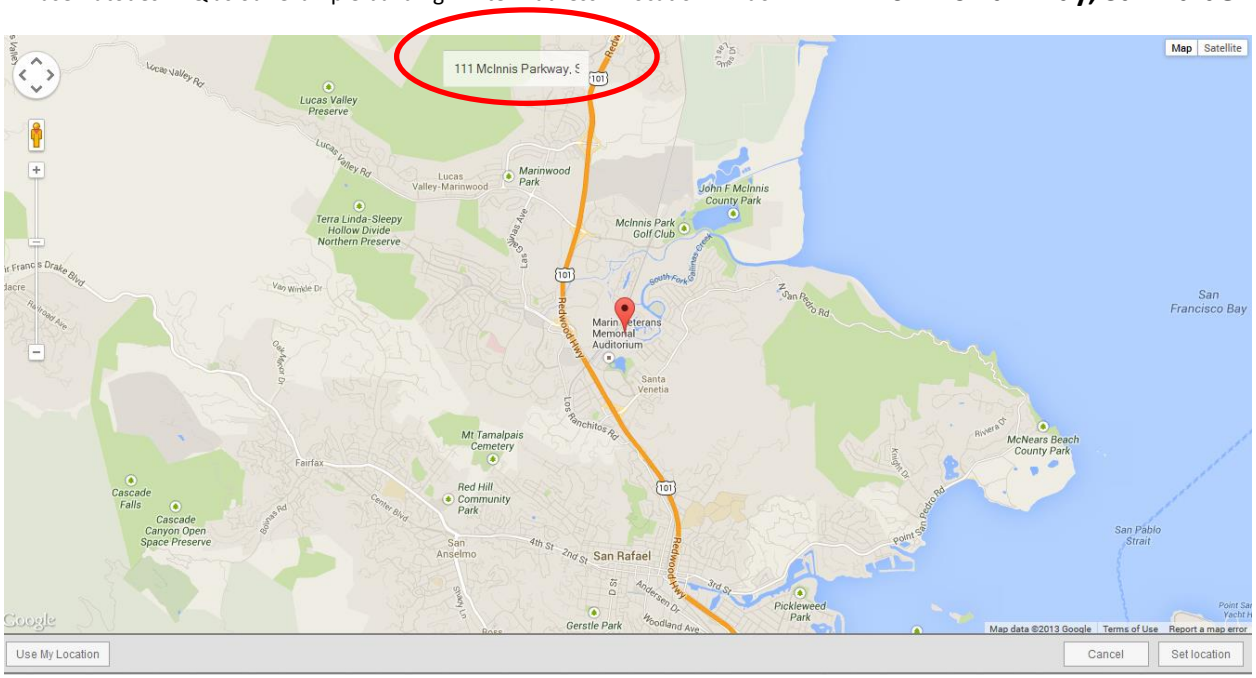
1. Go to http://beta.autodeskformit.com/ & then sign in to your Autodesk Account



2. Click Location, then set location

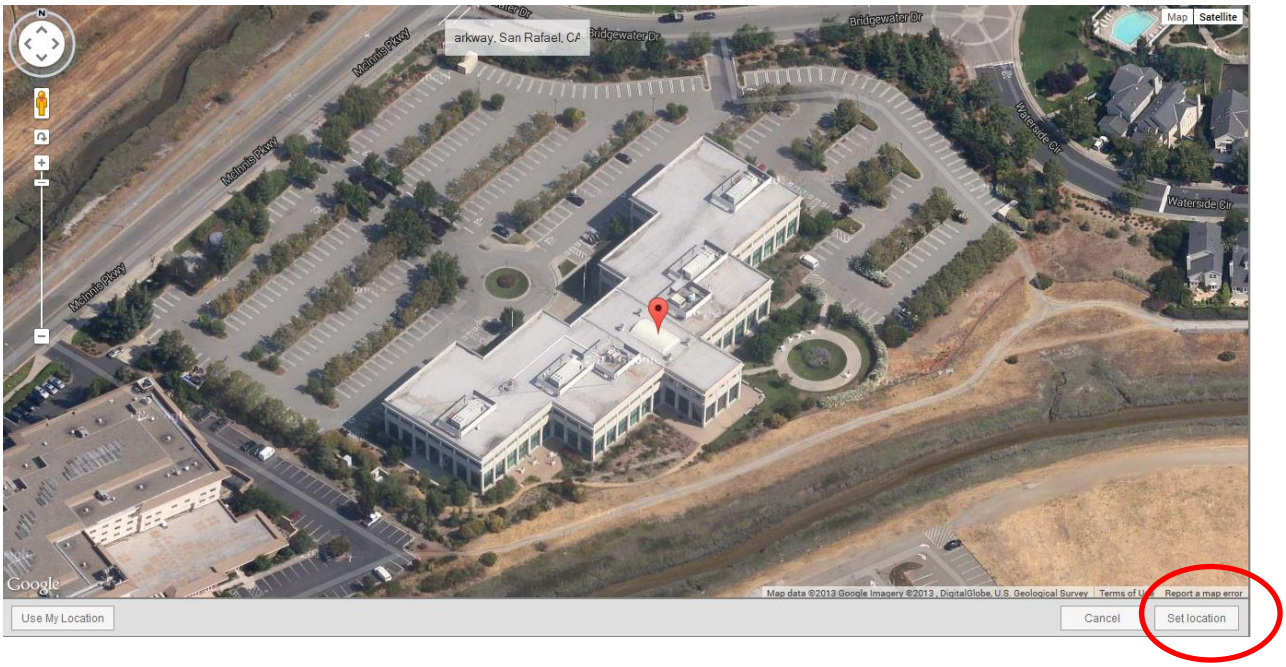


3. We will use Autodesk HQ as our example building: Enter Address in location window– **111 McInnis Parkway, San Rafael CA**



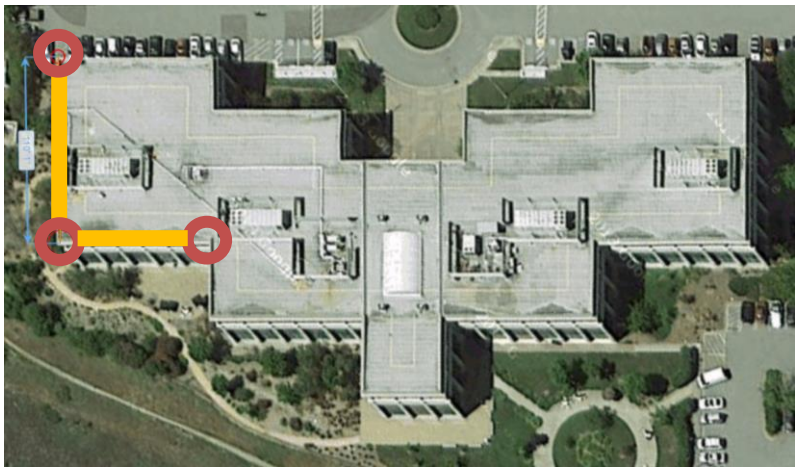
4. **Switch to satellite view** & zoom in to building location, visible in the satellite view (see pic below)
If the red marker is not on the appropriate building, it can be moved by dragging and dropping to the desired location

Once building is in view, **Set Location**

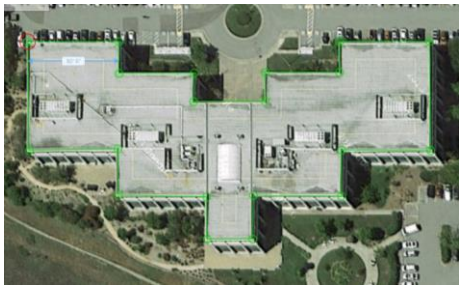


5. Use scrolling mouse controls and screen controls  to zoom in to building. Orient building image so that you can see a relatively flat view of the roof.

6. Hit the SKETCH line tool, and hover over a corner of the building, then click a corner to the start of your line

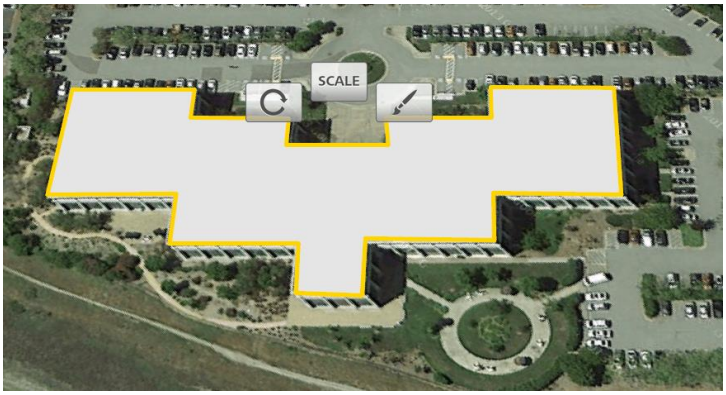


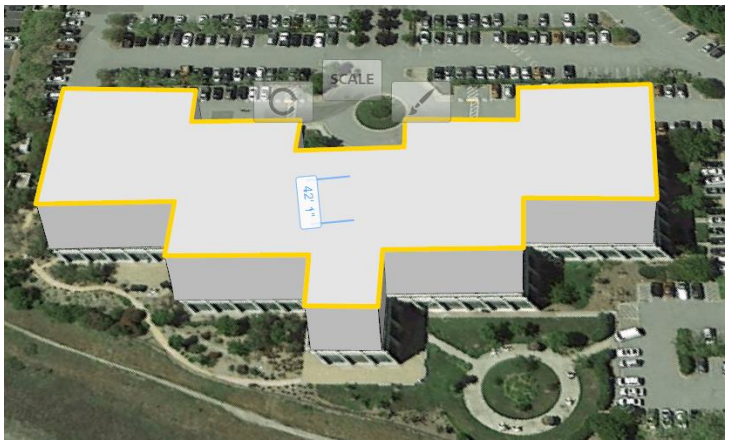
Work your way around the building with the sketch line tool, and click at each corner. Keep in mind, there is currently no ortho snapping in the beta, so do your best to keep the lines straight.



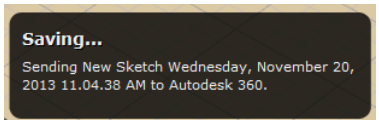
Once lines have been drawn around the building and successfully connected to the endpoint, lines will appear in GREEN. Then, the building mass is visible in WHITE.

7. Orient the camera so you are looking at the building footprint at about a 45 degree angle. Extrude the mass to the building height of approximately 42ft by grabbing the yellow roof portion and pulling up with your mouse. If you cannot extrude the surface, try double clicking on it.

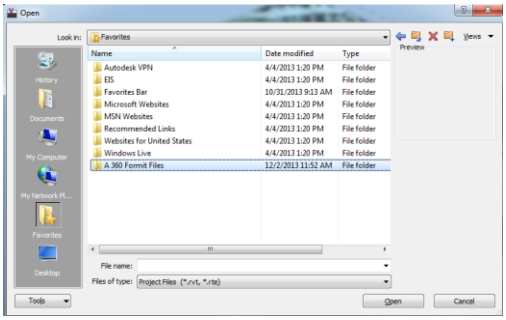




8. Save to Autodesk 360 



9. **Open in Revit or Vasari**
   - Download the RVT file from Autodesk 360 browser and then open the project file in Vasari
   - Open (dialog box) > Appropriate Folder (user determined)
   - Select the *.rvt file and click Open



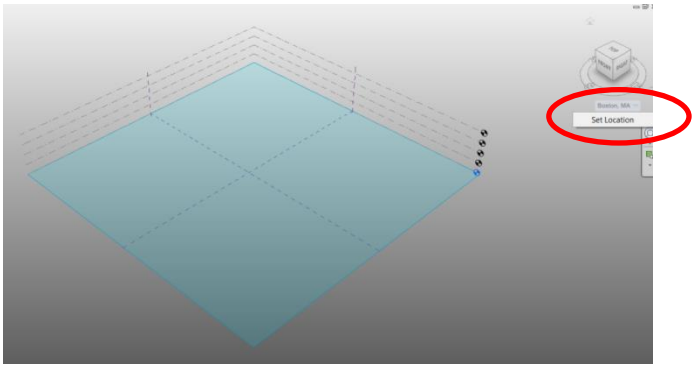
VASARI -Beta 3.O

Autodesk® Vasari is an easy-to-use, expressive design tool for creating building concepts. Vasari goes further, with integrated analysis for energy and carbon, providing design insight where the most important design decisions are made. And, when it's time to move the design to production, simply bring your Vasari design data into the Autodesk® Revit® platform for BIM, ensuring clear execution of design intent. Vasari is focused on conceptual building design using both geometric and parametric modeling. It supports performance-based design via integrated energy modeling and analysis features.

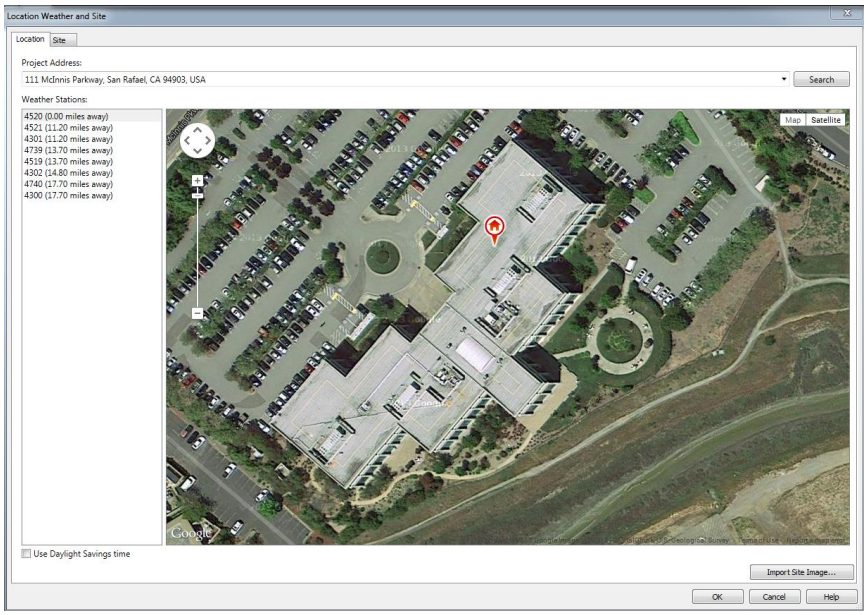
We are showing you this as an alternative to the FormIt workflow because it is useful to know how to create massing models in the Revit family of products – which includes Vasari.

Creating a Mass Form in Vasari

1. Open Vasari 3.0 (Beta available for free from http://autodeskvasari.com/)
2. Start a "New Project"
3. Once open, in the upper right hand corner, click **Sign In.**
    a. Log into Autodesk 360 (if you don't have an Autodesk ID, sign up here: http://autodeskvasari.com/main/authorization/signUp?
    b. Check that Vasari is connected to Green Building Studio webservice
    If you have not downloaded a trial of Green Building Studio using your same Autodesk ID account, please do so prior to running energy analysis in Vasari
4. Click **Set Location**



a. Enter your project address & hit search
b. Select Satellite View
c. Zoom in and locate building
d. Drag and drop red pin so that it sits on top of building



e. Then, **Import Site Image**

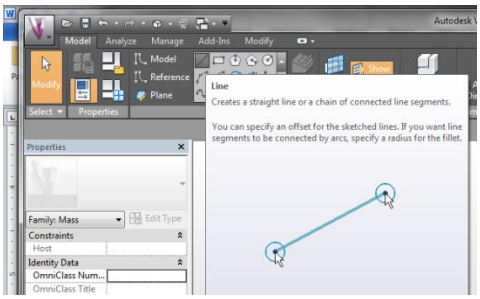
f. Ensure that the subject building takes up the majority of the view window, then finalize import

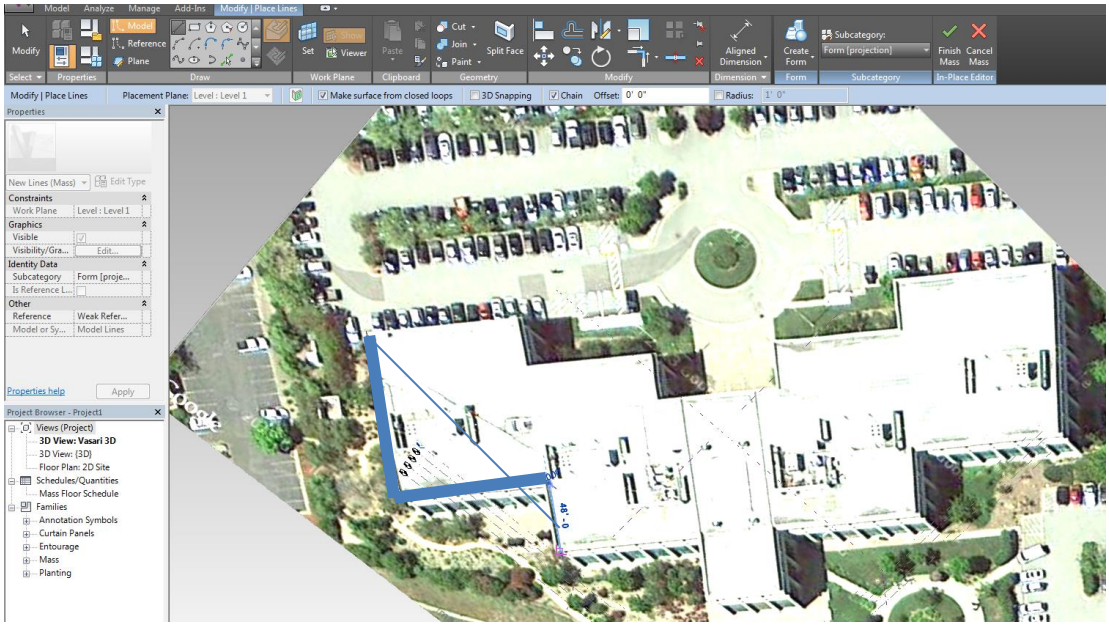
5. Once image is imported use the view cube to **Orient for Top View**
    a. Use your scrolling mouse to zoom in and out

View Cube

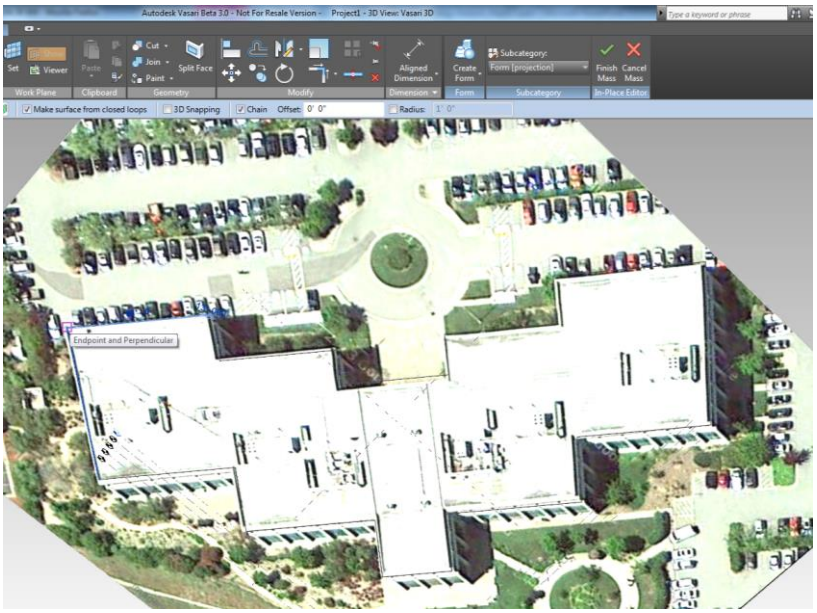
6. Click **Create Mass** in the Model tab 

    a. Remember to be on the “Top” of the 3D view cube to get the top level plan view
7. **Draw model lines** over the image



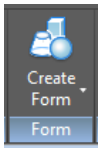


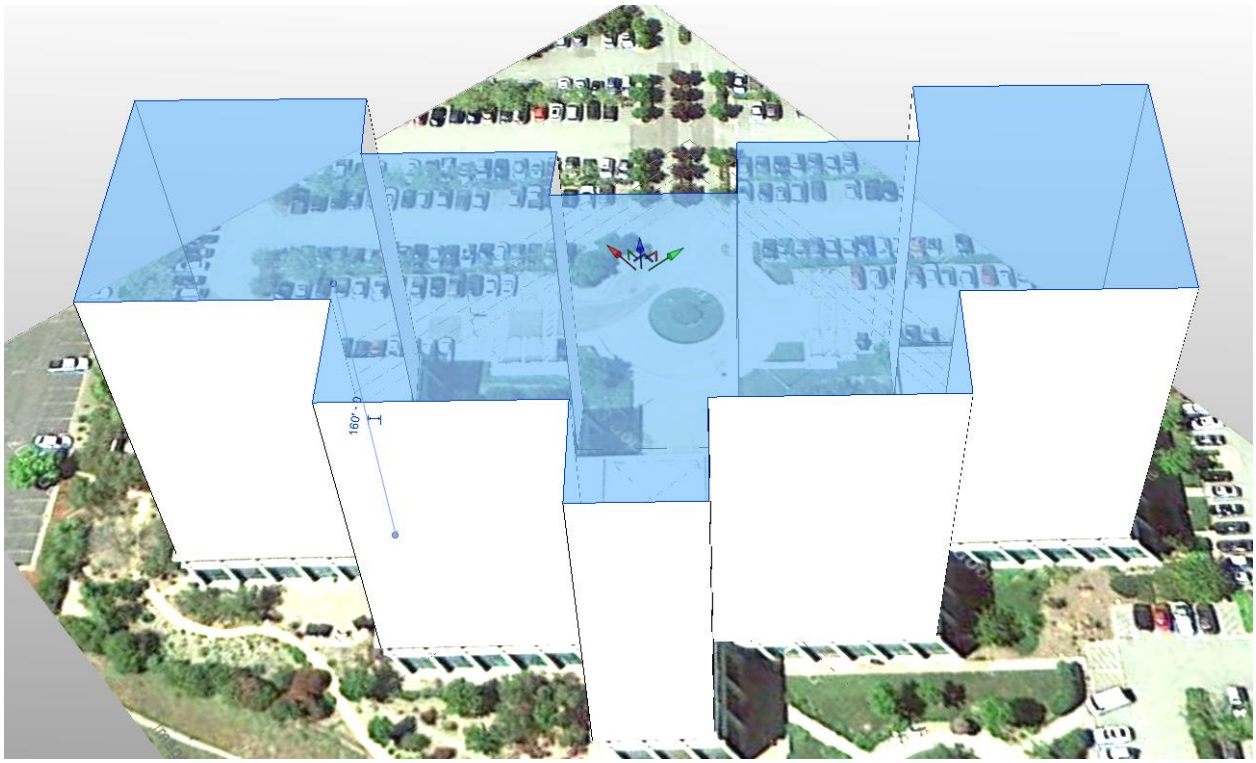
- Start in a corner and **draw line** towards the next corner
- *Pay Attention to Cues* when drawing such as “Perpendicular and Extension”, “Endpoint”



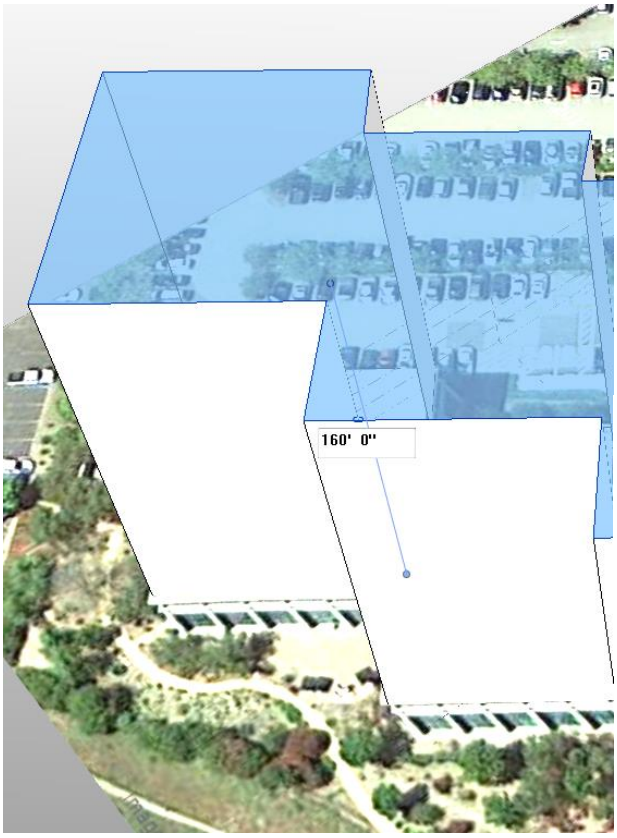
- When you reach **Endpoint**, click to close the shape

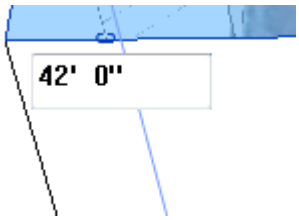
8. Click on **Create Form, Solid Form**





a. With the top of the mass highlighted, you will also see the building height. Modify to known building height of **42 feet**
   i. Click the text that references building height, in this example 160 feet, and type 42 feet in its place

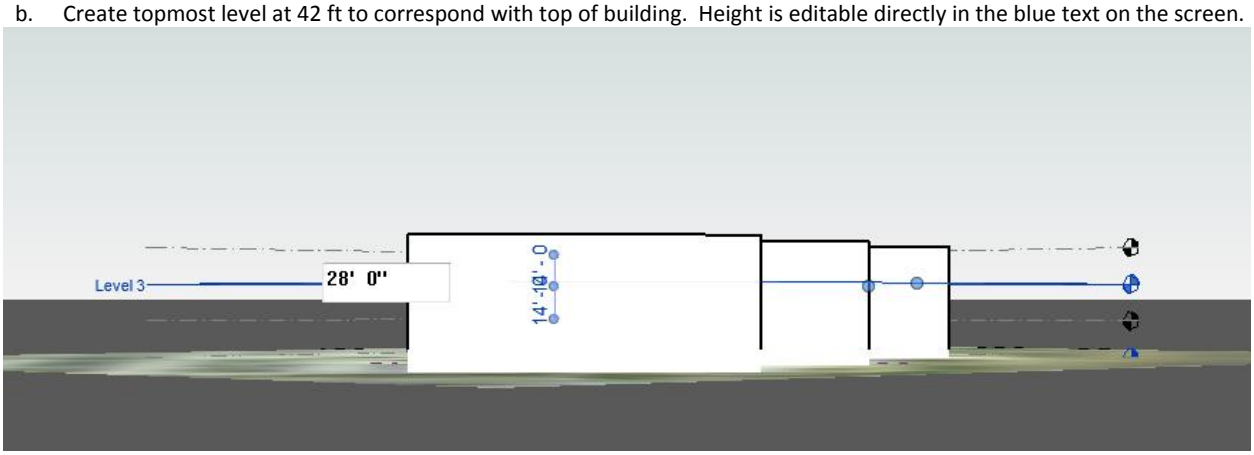




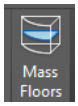
Building will adjust to altered height

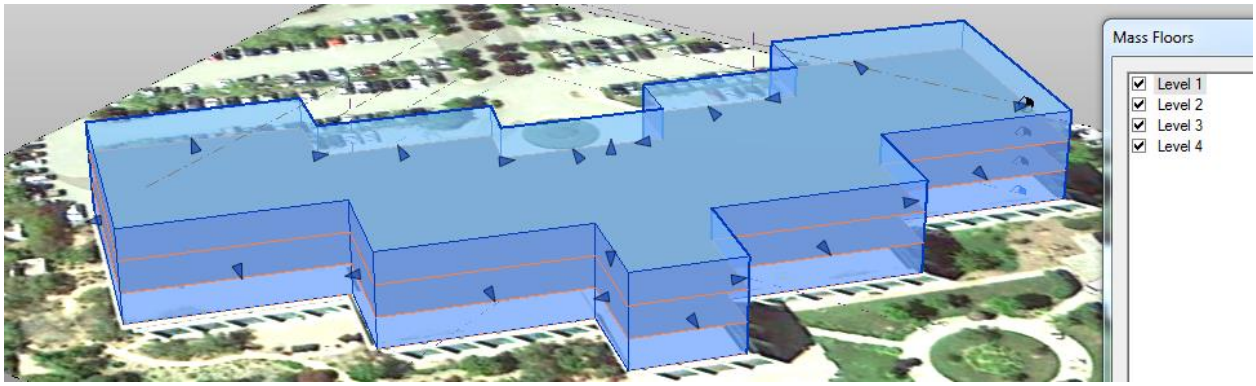
9. Click Finish Mass in the ribbon (green check mark icon 

    a. To edit a mass again, select it and click Edit In-Place or just double click it
    b. You may want to delete or disable the Raster image if it is distracting
10. Levels: Now look at the #of levels. The San Rafael building has 3 floors, and requires a total of 5 levels (ground, 1,2,3)
    a. Edit the elevation of individual levels if needed to reflect assumed F:F height of 14 feet (default is 10')
    b. Create topmost level at 42 ft to correspond with top of building. Height is editable directly in the blue text on the screen.

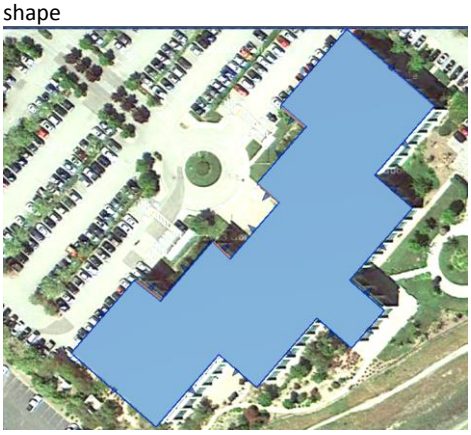


    c. Increase levels or decrease levels based on number of levels in your subject building
        a. Point and click on individual levels, then use copy/paste (or Model -> Level) to add levels
    d. If you start at the bottom of the building and add levels using the correct heights, you can then copy and paste those levels up the building until you reach the top
    **Note that as you copy and paste levels, level heights are in 4ft increments. These can be altered by typing in proper level elevations, similar to how it was done with building height*
    e. Double check your number of levels & elevation of levels upon reaching the top
        a. There should be levels at: 0, 14, 28, 42 feet
    f. Double check that your top level elevation matches the building height elevation at 42 feet

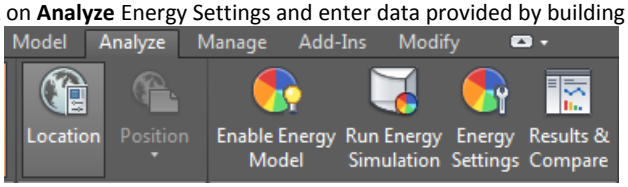
11. Click on **Mass Floors** to add floors at all levels of interest 



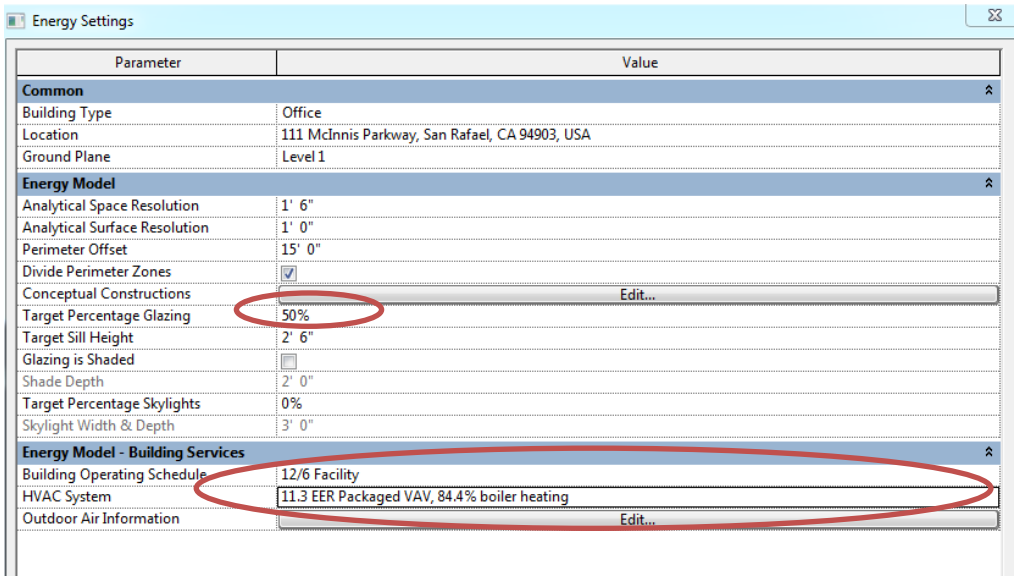
12. Calibrate to Gross Square Footage. In the case of the San Rafael building, the GSF is 115,000 however the modeled building footprint is larger. In actuality the building has some double height areas and other idiosyncrasies that we have not modeled in this rapid approach, but we can try and account for these by calibrating to the GSF.
    a. Orient for a top view of the building
    b. Pull shape handles inward to shrink the footprint of the building, try and pull equally from all sides & retaining building shape



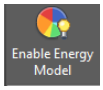
13. Click on **Analyze** Energy Settings and enter data provided by building manager

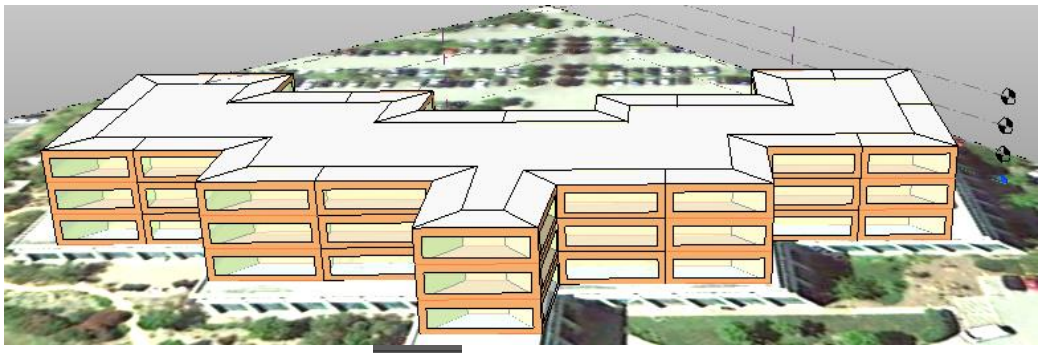


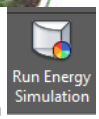
    a. Adjust energy settings to reflect appropriate building type, schedule, HVAC system, Glazing %, and Conceptual Constructions, ETC.



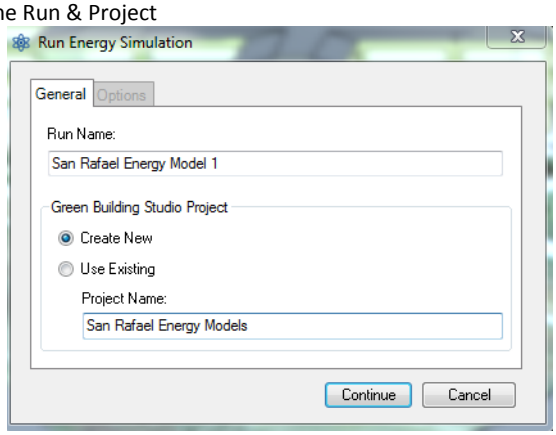
Mass Model	Constructions
Mass Exterior Wall	Lightweight Construction – Typical Mild Climate Insulation
Mass Interior Wall	Lightweight Construction – No Insulation
Mass Exterior Wall - Underground	High Mass Construction – Typical Mild Climate Insulation
Mass Roof	Typical Insulation - Cool Roof
Mass Floor	Lightweight Construction – No Insulation
Mass Slab	High Mass Construction – No Insulation
Mass Glazing	Double Pane Clear – No Coating
Mass Skylight	Double Pane Clear – No Coating
Mass Shade	Basic Shade
Mass Opening	Air

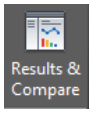
14. Click **Enable Energy Model** to Activate the Model and Autozoning 





15. Click on **Analyze** & **Run Energy Simulation**
16. Name Run & Project





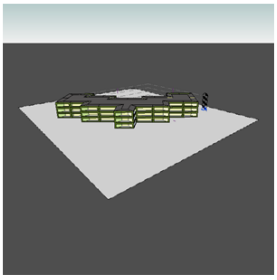
17. Click **Results and Compare** to view Energy Report (takes 2-5 minutes to process)
    a. View energy report in window; can export as GBXML, PDF or other formats

Results > San Rafael Energy Models > San Rafael Energy Model 1

AUTODESK.

San Rafael Energy Models
San Rafael Energy Model 1
Analyzed at 11/20/2013 2:13:26 PM
Version 2014.2.31.6140(DOE-2.2-44e4)

Energy Analysis Result



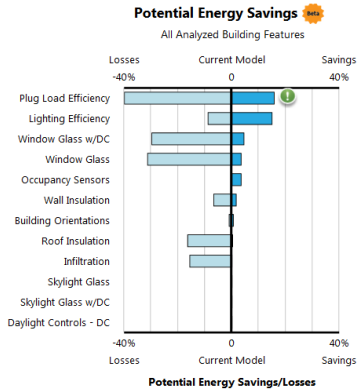
Building Performance Factors

Location:	111 McInnis Parkway, San Rafael, CA 94903, USA
Weather Station:	4520
Outdoor Temperature:	Max: 97°F/Min: 27°F
Floor Area:	116,760 sf
Exterior Wall Area:	51,057 sf
Average Lighting Power:	1.01 W / ft²
People:	380 people
Exterior Window Ratio:	0.50
Electrical Cost:	$0.12 / kWh
Fuel Cost:	$0.80 / Therm

Energy Use Intensity

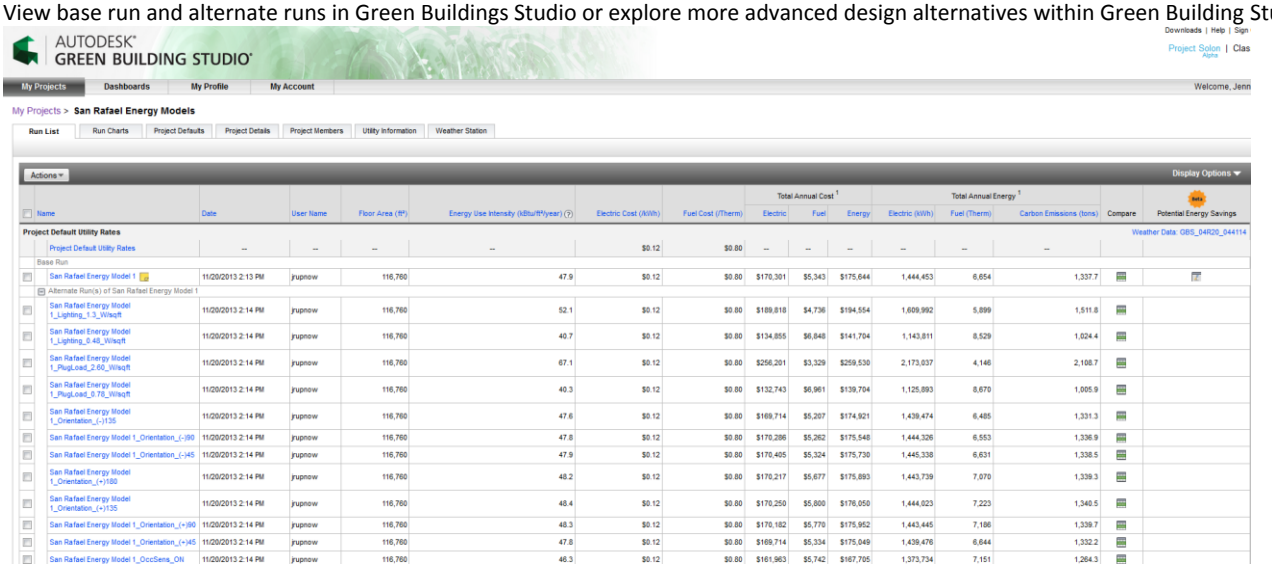
Electricity EUI:	12 kWh / sf / yr
Fuel EUI:	6 kBtu / sf / yr
Total EUI:	48 kBtu / sf / yr

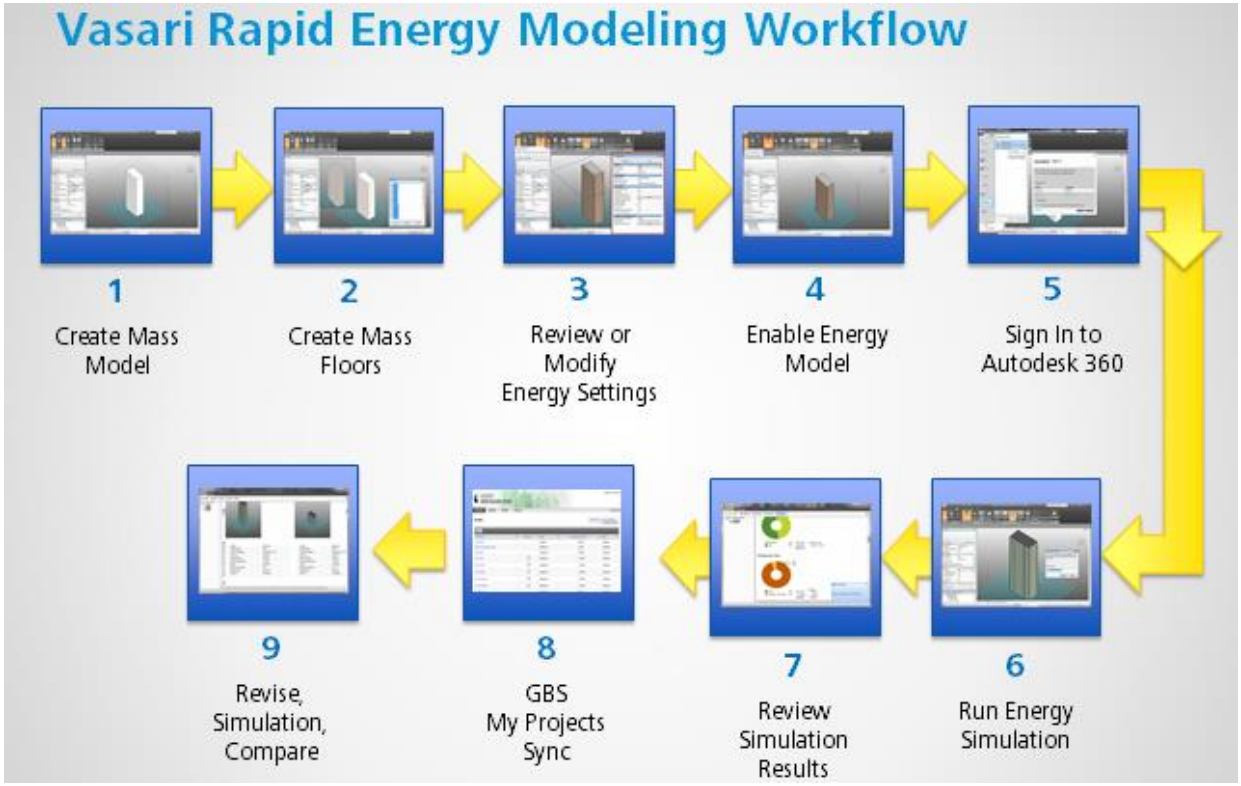
After creating and reviewing your initial energy report, make design or construction changes or fine-tune the model in Vasari and create new energy reports for side-by-side comparison.



18. For more detailed analysis and testing various design alternatives, select "**Open the Project in GBS".**

19. View base run and alternate runs in Green Buildings Studio or explore more advanced design alternatives within Green Building Studio




Vasari Rapid Energy Modeling Workflow
1
Create Mass Model
2
Create Mass Floors
3
Review or Modify Energy Settings
4
Enable Energy Model
5
Sign In to Autodesk 360
6
Run Energy Simulation
7
Review Simulation Results
8
GBS My Projects Sync
9
Revise, Simulation, Compare