Alan Minouei

WEEK 6 TASK

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File Edit View Camera Draw Tools Window Extensions Help

Top

Surface Matching

Intersect and Divide Inter-Zone Surfaces (help)

Intersect in Entire Model | Intersect in Selection

Surface Matching (help)

Match in Entire Model | Match in Selection

Unmatch in Entire Model | Unmatch in Selection

Last Report | Cancel

Default Tray

Entity Info

Materials

Components

Select | Edit | Statistics

3D Warehouse

Components Sampler

Dynamic Components Training

Components

Styles

Shadows

Instructor

Select Tool

Select entities to modify when using other tools or commands.

Tool Operation

1. Click on an entity.

Modifier Keys

Ctrl = Add an entity to set of selected entities

Shift+Ctrl = Subtract an entity from set of selected entities

Select objects. Shift to extend select. Drag mouse to select multiple.

Measurements

Type here to search

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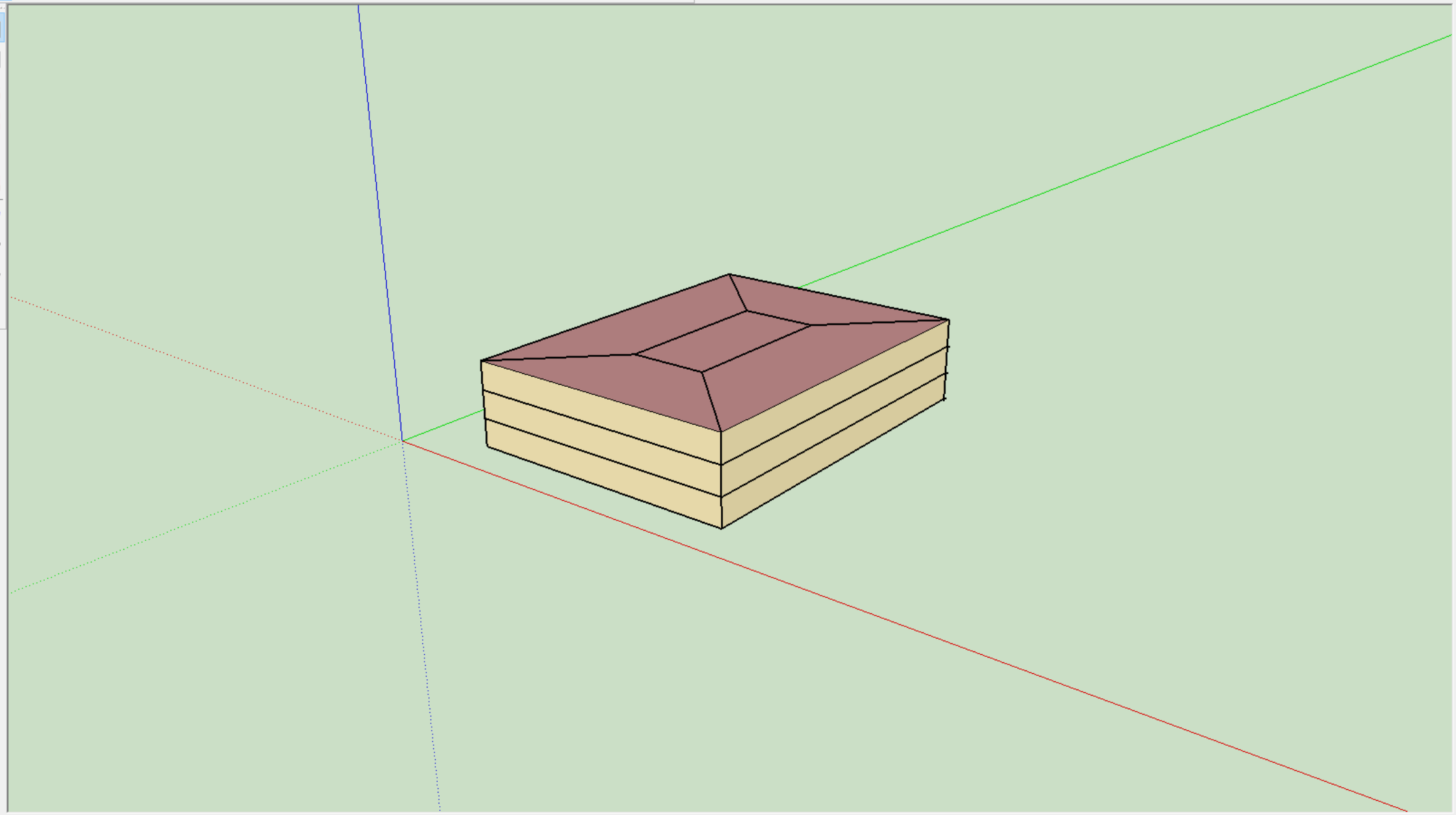
File Edit View Camera Draw Tools Window Extensions Help



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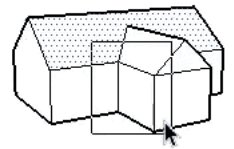

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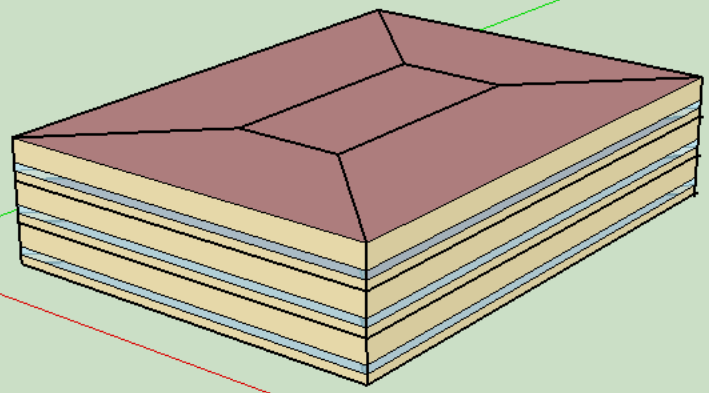

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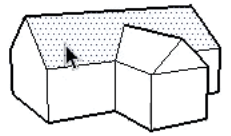

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File Preferences Components & Measures Help

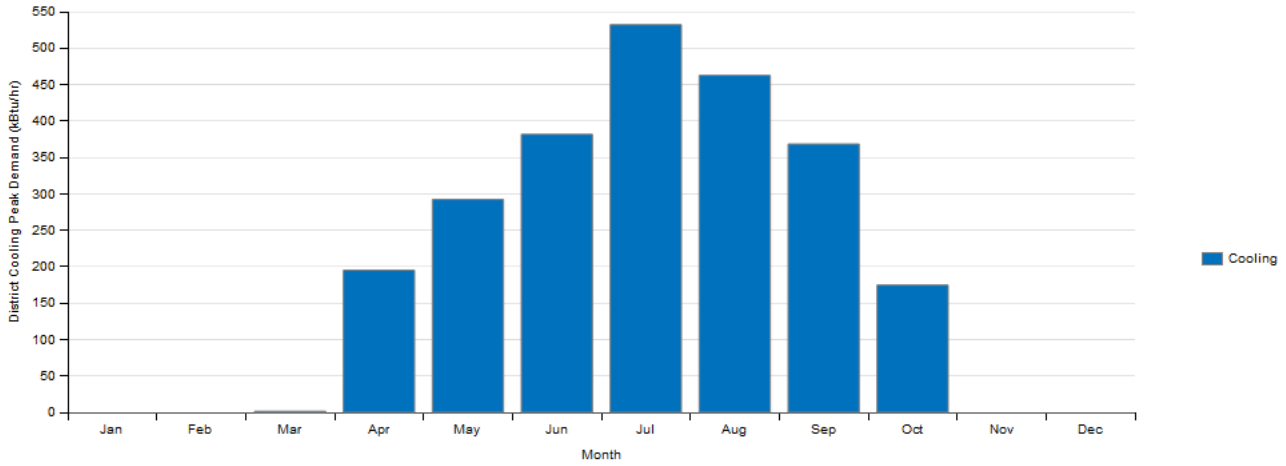
Results Summary

Reports: OpenStudio Results

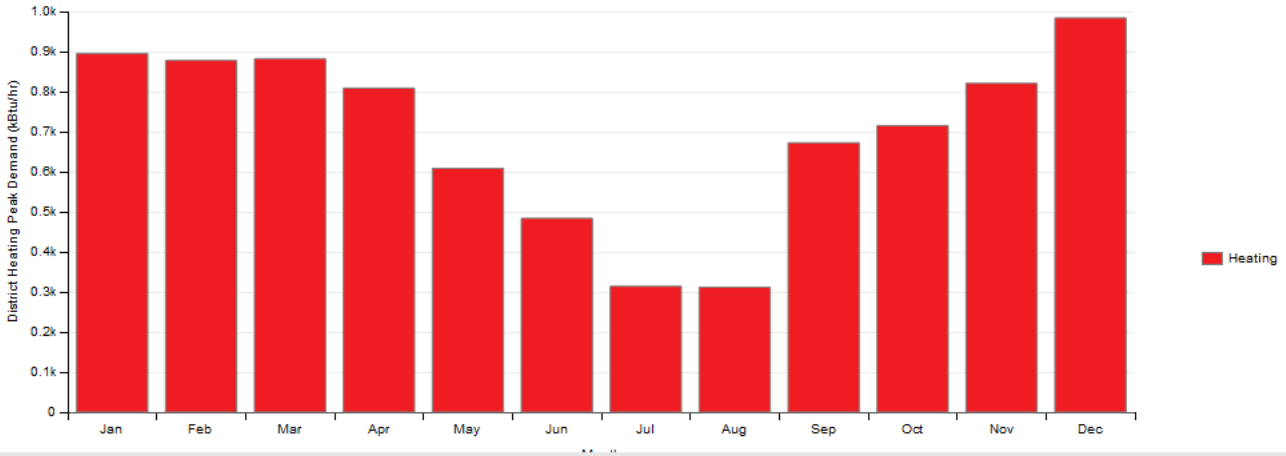
Open ResultsViewer for Detailed Reports

- Model Summary
- Annual Overview
- Monthly Overview
- Utility Bills/Rates
- Envelope
- Space Type Breakdown
- Space Type Summary
- Interior Lighting Summary
- Plug Loads Summary
- Exterior Lighting
- Water Use Equipment
- HVAC Load Profiles
- Zone Conditions
- Zone Overview
- Zone Equipment Detail
- Air Loops Detail
- Plant Loops Detail
- Outdoor Air
- Cash Flow
- Site and Source Summary
- Schedule Overview

District Cooling Peak Demand (kBtu/hr) - view table



District Heating Peak Demand (kBtu/hr) - view table



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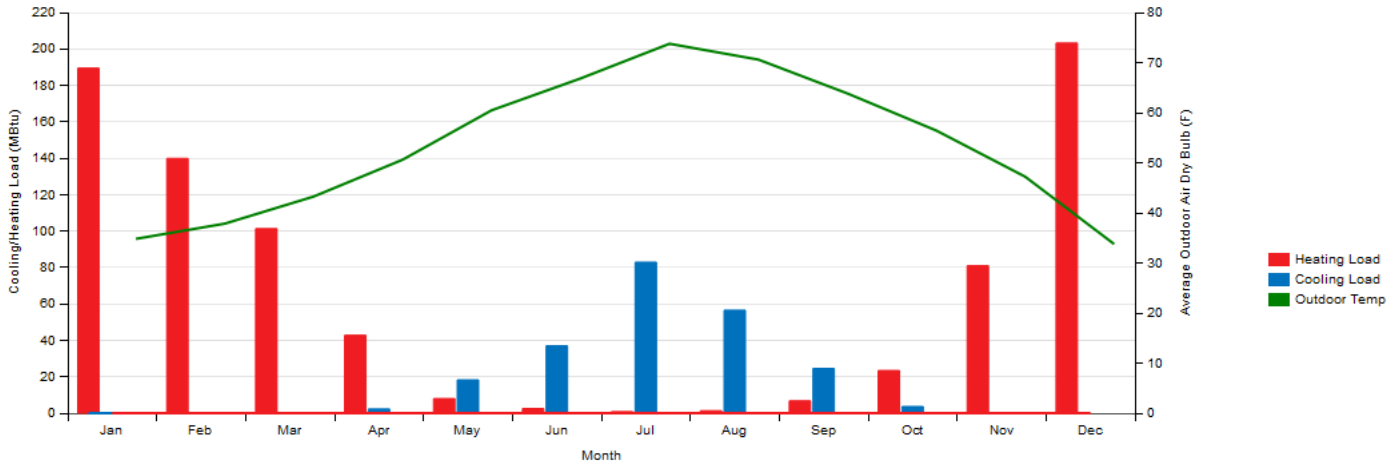
HVAC Load Profiles

Monthly Load Profiles - view table



Zone Conditions

Temperature (Table values represent hours spent in each temperature range)

Zone	Unmet Htg (hr)	Unmet Htg - Occ (hr)	< 56 (F)	56-61 (F)	61-66 (F)	66-68 (F)	68-70 (F)	70-72 (F)	72-74 (F)	74-76 (F)	76-78 (F)	78-83 (F)	>= 88 (F)	Unmet Clg (hr)	Unmet Clg - Occ (hr)	Mean Temp (F)
THERMAL ZONE 1	0	0	0	1817	877	350	2626	852	573	1600	48	17	0	0	0	68.4 (F)
THERMAL ZONE 2	0	0	0	1821	869	348	2638	836	579	1600	51	18	0	0	0	68.4 (F)
THERMAL ZONE 3	0	0	0	1821	872	340	2627	833	572	1620	53	22	0	0	0	68.4 (F)

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$$\frac{\frac{\sigma A(T_1^4 - T_2^4)}{\frac{1}{G_1} + \frac{1}{\epsilon_2} - 1}}{A} = \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = \frac{(5.67 \times 10^{-8})(800^4 - 500^4)}{\frac{1}{0.1} + \frac{1}{0.1} - 1}$$

$= 1035.82 \text{ W/m}^2$

1 % of the $q''_{net\,1-2}$: $q''_{net\,1-2} = q''_{net\,1-2,\,n\,shields} = \frac{1}{100} \times q''_{net\,1-2}$

$q''_{net\,1-2,\,n\,shields} = \frac{Q''_{net\,1-2,\,n\,shields}}{A} =$

$$\frac{\sigma A(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{G_2} - 1\right) + \left(\frac{1}{G_{3,1}} + \frac{1}{\epsilon_{3,2}} - 1\right)\left(\frac{1}{G_{n,1}} + \frac{1}{\epsilon_{n,2}} - 1\right)} / A =$$

$$\frac{\sigma(T_1^4 - T_2^4)}{\left(\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1\right) + \left(\frac{1}{\epsilon_{3.1}} + \frac{1}{\epsilon_{3.2}} - 1\right)\left(\frac{1}{\epsilon_{n,2}} + \frac{1}{\epsilon_{n,2}} - 1\right)} =$$

$\epsilon_1 = \epsilon_2 = \epsilon_3 = \cdots = \epsilon_n = 0.1 \longrightarrow \epsilon = 0.1$

$$\longrightarrow q''_{net\,1-2,\,n\,shields} = \frac{\sigma(T_2^4 - T_1^4)}{(n+1) \times \left(\frac{1}{\delta} + \frac{1}{\delta} - 1\right)} = \frac{1}{n+1} \times \frac{\sigma(T_2^4 - T_1^4)}{\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1}$$

$$= \frac{1}{100} \times q''_{net\,1-2} = \frac{1}{100} \times \frac{\sigma(T_2^4 - T_1^4)}{\frac{1}{\epsilon_1} + \frac{1}{\epsilon_2} - 1} = \frac{1}{100} \times \frac{\sigma(T_2^4 - T_1^4)}{\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1}$$

$$\longrightarrow \frac{1}{n+1} \times \frac{\sigma(T_2^4 - T_1^4)}{\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1} = \frac{1}{100} \times \frac{\sigma(T_2^4 - T_1^4)}{\frac{1}{\epsilon} + \frac{1}{\epsilon} - 1} \quad = n = 99$$

we need 99 shields, which $G = 0.1$.