Task 1:
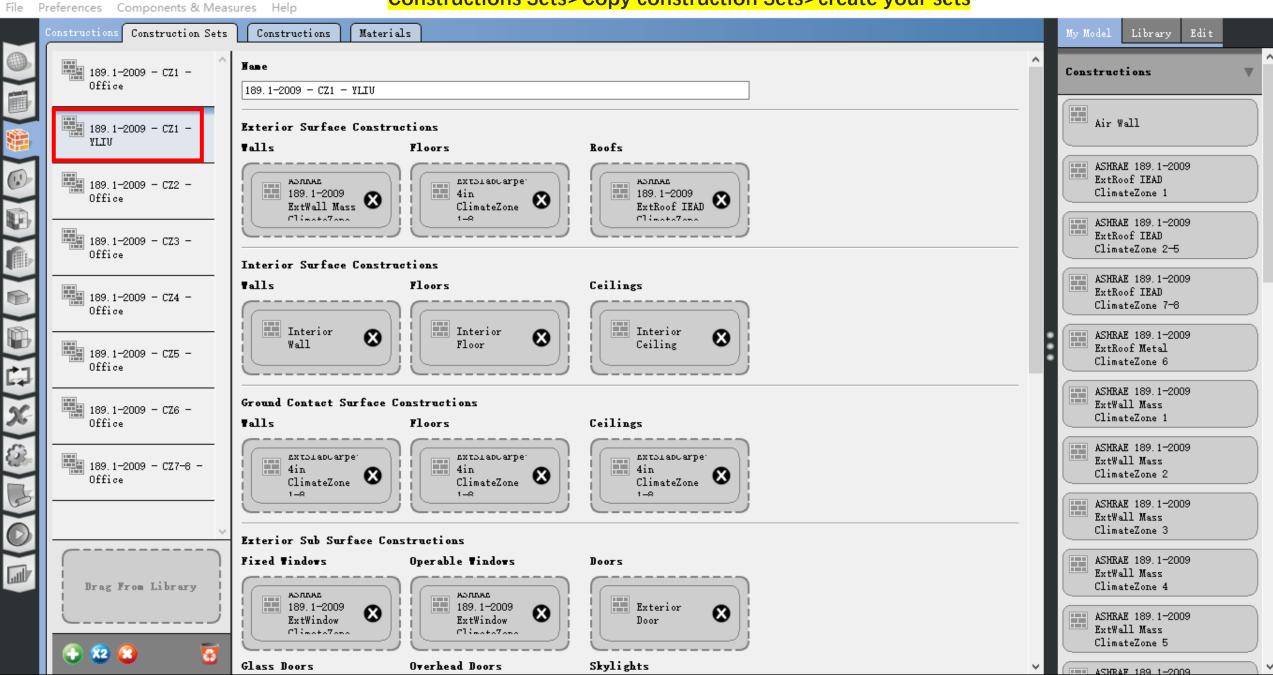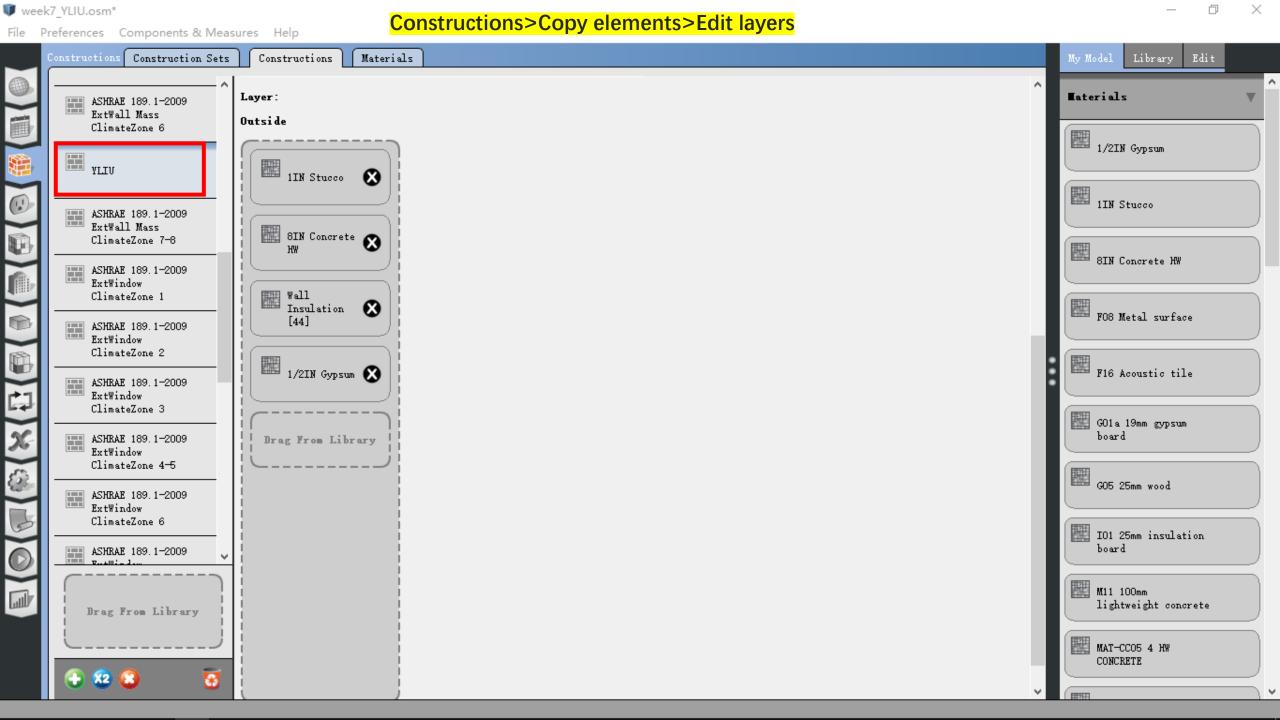
a) **Solar radiation**: It is electromagnetic energy emitted by the sun (Wavelength filed: 0-2.5 micrometer max for 0.5 μ m).

b) **Direct solar radiation**: The solar radiation that reaches the Earth's surface without being diffused is called direct beam solar radiation.

c) **Diffuse Radiation**: Diffuse radiation is the solar radiation that is absorbed, scattered, or reflected by water vapor, dust particles or pollution when passing through the atmosphere.

d) **Atmospheric absorption**: due to some atmospheric components which absorb the incident radiation in specific wavelength bands which modifies its energetic spectrum, when the sun is perpendicular to the plan of the horizon, it crosses the minimum thickness of the atmosphere.

e) **Availability**: Solar radiation available on the Earth's surface for conversion in other energy forms (such as solar electrical energy) depends on: the suns position, the weather condition, the site's sea level, and the daylight hours.

f) **Measurement Instrument**: we can use pyranometers to measure the total solar energy.

Load the Weather File

File   Preferences   Components & Measures   Help

Site   Weather File & Design Days   Life Cycle Costs   Utility Bills

Weather File   Change Weather File

Name: Piacenza

Latitude: 44.92

Longitude: 9.73

Elevation: 134

Time Zone: 1

Download weather files at www.energyplus.gov

Measure Tags (Optional):

ASHRAE Climate Zone

CEC Climate Zone

Select Year by:

○ Calendar Year   2000

◉ First Day of Year   Sunday

Daylight Savings Time: off

Starts

○ Define by Day of The Week And Month   First   Sunday   January

○ Define by Date   2000/1/1

Ends

○ Define by Day of The Week And Month   First   Sunday   January

○ Define by Date   2000/1/1

Design Days   Import From DDY

▼ **Design Days**

| Date | Temperature | Humidity | Pressure Wind Precipitation | Solar | Custom |

Design Day Name	All	Day Of Month	Month	Day Type	Daylight Saving Time Indicator
	☐	Apply to Selected	Apply to Selected	Apply to Selected	

week7_YLIU.osm*

File   Preferences   Components & Measures   Help

Constructions | **Construction Sets** | Constructions | Materials

My Model | Library | Edit

Name

189.1-2009 - CZ1 - YLIU

Constructions

189.1-2009 - CZ1 - Office

189.1-2009 - CZ1 - YLIU

189.1-2009 - CZ2 - Office

189.1-2009 - CZ3 - Office

189.1-2009 - CZ4 - Office

189.1-2009 - CZ5 - Office

189.1-2009 - CZ6 - Office

189.1-2009 - CZ7-8 - Office

Drag From Library

Exterior Surface Constructions

Walls

ASHRAE 189.1-2009 ExtWall Mass ClimateZone

Floors

ExtSlabCarpe 4in ClimateZone 1-8

Roofs

ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone

Interior Surface Constructions

Walls

Interior Wall

Floors

Interior Floor

Ceilings

Interior Ceiling

Ground Contact Surface Constructions

Walls

ExtSlabCarpe 4in ClimateZone 1-8

Floors

ExtSlabCarpe 4in ClimateZone 1-8

Ceilings

ExtSlabCarpe 4in ClimateZone 1-8

Exterior Sub Surface Constructions

Fixed Windows

ASHRAE 189.1-2009 ExtWindow ClimateZone

Operable Windows

ASHRAE 189.1-2009 ExtWindow ClimateZone

Doors

Exterior Door

Glass Doors   **Overhead Doors**   **Skylights**

Air Wall

ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone 1

ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone 2-5

ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone 7-8

ASHRAE 189.1-2009 ExtRoof Metal ClimateZone 6

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 1

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 2

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 3

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 4

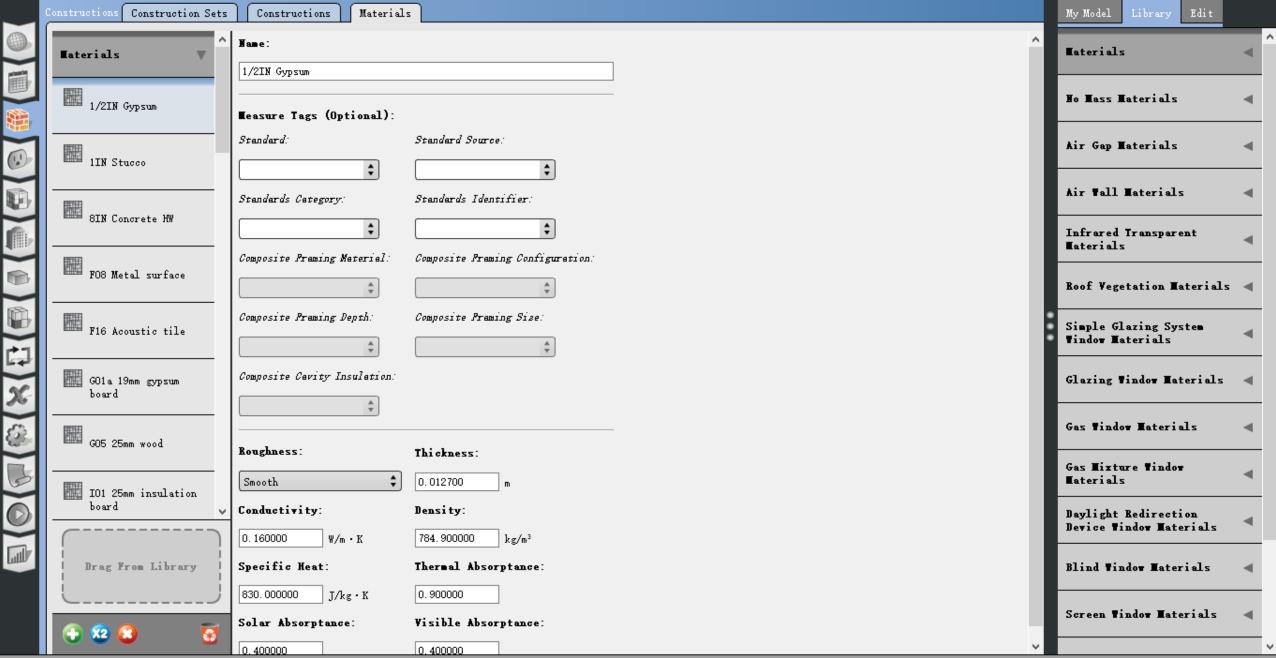ASHRAE 189.1-2009 ExtWall Mass ClimateZone 5

ASHRAE 189.1-2009

week7_YLIU.osm*

File   Preferences   Components & Measures   Help

Constructions | Construction Sets | Constructions | Materials

My Model | Library | Edit

Materials

Layer:

Outside

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 6

YLIU

ASHRAE 189.1-2009 ExtWall Mass ClimateZone 7-8

ASHRAE 189.1-2009 ExtWindow ClimateZone 1

ASHRAE 189.1-2009 ExtWindow ClimateZone 2

ASHRAE 189.1-2009 ExtWindow ClimateZone 3

ASHRAE 189.1-2009 ExtWindow ClimateZone 4-5

ASHRAE 189.1-2009 ExtWindow ClimateZone 6

ASHRAE 189.1-2009 ExtWindow

1IN Stucco

8IN Concrete HW

Wall Insulation [44]

1/2IN Gypsum

Drag From Library

Drag From Library

1/2IN Gypsum

1IN Stucco

8IN Concrete HW

F08 Metal surface

F16 Acoustic tile

G01a 19mm gypsum board

G05 25mm wood

I01 25mm insulation board

M11 100mm lightweight concrete

MAT-CC05 4 HW CONCRETE

week7_YLIU.osm*

File   Preferences   Components & Measures   Help

Constructions | Construction Sets | Constructions | Materials

My Model | Library | Edit

Materials ▼

| 1/2IN Gypsum |
| 1IN Stucco |
| 8IN Concrete HW |
| F08 Metal surface |
| F16 Acoustic tile |
| G01a 19mm gypsum board |
| G05 25mm wood |
| I01 25mm insulation board |

Drag From Library

Name:

1/2IN Gypsum

Measure Tags (Optional):

Standard:

Standard Source:

Standards Category:

Standards Identifier:

Composite Framing Material:

Composite Framing Configuration:

Composite Framing Depth:

Composite Framing Size:

Composite Cavity Insulation:

Roughness: **Thickness:**

Smooth   0.012700   m

Conductivity: **Density:**

0.160000   W/m·K   784.900000   kg/m³

Specific Heat: **Thermal Absorptance:**

830.000000   J/kg·K   0.900000

Solar Absorptance: **Visible Absorptance:**

0.400000   0.400000

Materials ◀

No Mass Materials ◀

Air Gap Materials ◀

Air Wall Materials ◀

Infrared Transparent Materials ◀

Roof Vegetation Materials ◀

Simple Glazing System Window Materials ◀

Glazing Window Materials ◀

Gas Window Materials ◀

Gas Mixture Window Materials ◀

Daylight Redirection Device Window Materials ◀

Blind Window Materials ◀

Screen Window Materials ◀

Insert edited elements in your set

File   Preferences   Components & Measures   Help

Constructions | Construction Sets | Constructions | Materials

My Model | Library | Edit

189.1-2009 - CZ1 - Office

189.1-2009 - CZ1 - YLIU

189.1-2009 - CZ2 - Office

189.1-2009 - CZ3 - Office

189.1-2009 - CZ4 - Office

189.1-2009 - CZ5 - Office

189.1-2009 - CZ6 - Office

189.1-2009 - CZ7-8 - Office

Drag From Library

Name

189.1-2009 - CZ1 - YLIU

Exterior Surface Constructions

Walls

YLIU

Floors

ExtSlabCarpe 4in ClimateZone 1-8

Roofs

ASHRAE 189.1-2009 ExtRoof IEAD ClimateZone

Interior Surface Constructions

Walls

Interior Wall

Floors

Interior Floor

Ceilings

Interior Ceiling

Ground Contact Surface Constructions

Walls

ExtSlabCarpe 4in ClimateZone 1-8

Floors

ExtSlabCarpe 4in ClimateZone 1-8

Ceilings

ExtSlabCarpe 4in ClimateZone 1-8

Exterior Sub Surface Constructions

Fixed Windows

ASHRAE 189.1-2009 ExtWindow ClimateZone

Operable Windows

ASHRAE 189.1-2009 ExtWindow ClimateZone

Doors

Exterior Door

Glass Doors

Overhead Doors

Skylights

Exterior Door

ExtSlabCarpet 4in ClimateZone 1-8

Interior Ceiling

Interior Door

Interior Floor

Interior Partition

Interior Wall

Interior Window

YLIU

Internal Source Constructions

C-factor Underground Wall Constructions

F-factor Ground Floor Constructions

File   Preferences   Components & Measures   Help

Spaces>apply your sets to all spaces

Spaces | Properties | Loads | Surfaces | Subsurfaces | Interior Partitions | Shading

My Model | Library | Edit

General   Airflow   Custom

Filters: Story   Thermal Zone   Space Type

All   All   All

Space Name	All	Story	Thermal Zone	Space Type	Default Construction Set	Default Schedule Set	Part of Total Floor Area
	☑	Apply to Selected	Apply to Selected	Apply to Selected	Apply to Selected	Apply to Selected	
Space 101	☑	Building Story 1	Thermal Zone 1	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 102	☑	Building Story 1	Thermal Zone 1	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 103	☑	Building Story 1	Thermal Zone 1	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 104	☑	Building Story 1		189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 105	☑	Building Story 1	Thermal Zone 1	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 201	☑	Building Story 2	Thermal Zone 2	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 202	☑	Building Story 2	Thermal Zone 2	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 203	☑	Building Story 2	Thermal Zone 2	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 204	☑	Building Story 2		189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 205	☑	Building Story 2	Thermal Zone 2	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑
Space 301	☑	Building Story 3	Thermal Zone 3	189.1-2009 - Office - O	189.1-2009 - CZ1 - YLIU		☑

Interior Partition Surface ◀

Building Stories ◀

Thermal Zones ◀

Space Types ◀

Default Construction Sets ▼

189.1-2009 - CZ1 - Office

189.1-2009 - CZ1 - YLIU

189.1-2009 - CZ2 - Office

189.1-2009 - CZ3 - Office

189.1-2009 - CZ4 - Office

189.1-2009 - CZ5 - Office

189.1-2009 - CZ6 - Office

week7_YLIU.osm*

File   Preferences   Components & Measures   Help

Schedules | **Schedule Sets** | Schedules

My Model | Library | Edit

Name

Schedule Set YLIU

Default Schedules

Hours of Operation

Drag From Library

Number of People

Office Misc Occ ⊗

People Activity

Office Activity ⊗

Lighting

Office Bldg Light ⊗

Electric Equipment

Office Bldg Equip ⊗

Gas Equipment

Drag From Library

Hot Water Equipment

Drag From Library

Steam Equipment

Drag From Library

Other Equipment

Drag From Library

Infiltration

Office Infil Quarter On ⊗

Schedule Set

189.1-2009 - Office - Vending - CZ4-8 Schedule Set

189.1-2009 - Office - WholeBuilding - Lg Office - CZ1-3 Schedule Set

189.1-2009 - Office - WholeBuilding - Lg Office - CZ4-8 Schedule Set

189.1-2009 - Office - WholeBuilding - Md Office - CZ1-3 Schedule Set

189.1-2009 - Office - WholeBuilding - Md Office - CZ4-8 Schedule Set

189.1-2009 - Office - WholeBuilding - Sm Office - CZ1-3 Schedule Set

189.1-2009 - Office - WholeBuilding - Sm Office - CZ4-8 Schedule Set

Schedule Set YLIU

Drag From Library

Ruleset Schedules ▼

Large Office Activity

Large Office Bldg Equip

Large Office Bldg Light

Large Office Bldg Occ

Large Office ClgSetp

Large Office HtgSetp

Large Office Infil Quarter On

Medium Office Activity

Medium Office Bldg Equip

Medium Office Bldg Occ