ARCHITECTURE & ENVIRONMENT

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zainab adil namiq

Sup.by :m. fenk

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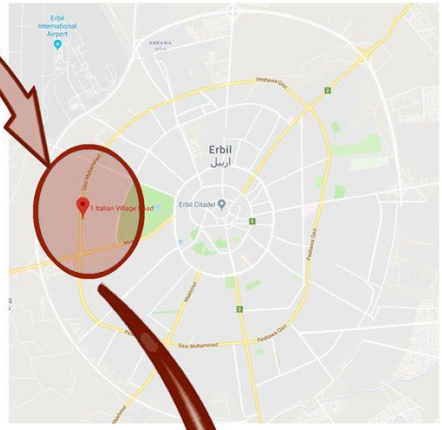
- **Location**
- **Sun analysis of the site which include :**
  - Sky dome and Sun path diagram
  - Orientation and surrounding
  - solar gain(orientation of the space with regard to heat gain))
  - Calculate the space between houses " if available "
- **light analysis of single house :**
  - Ratio of the window size to floor area, type of window .
  - Shading devices analysis for one house(I-Type of shading device used , ii. Material of shading device, iii.Drawing of HSA, VSA for shading devise on the windows)
  - Draw "shading mask on shadow angle protractor" of the shading devices.
- **Thermal analysis of building material :**
  - building material(all the material that used in the building floor, roof, wall).
  - material of doors and windows .
  - any insulation material if available .
- **wind analysis :**
  - site analysis (if there strategies to Protect from the cold winter winds)
  - building analysis in term of wind design (room and partitions and functions).
- Heat gain calculation by occupants for one house.
- Heat gain calculation by ventilation.

➢ Location site :

World

Iraq



Erbil

Italy 1 city

➢ Location site :

Italian 1 city

Address: Iraq – Kurdistan Region – Erbil – between
100m road and 40 m road and near Sami Abdurrahman park .

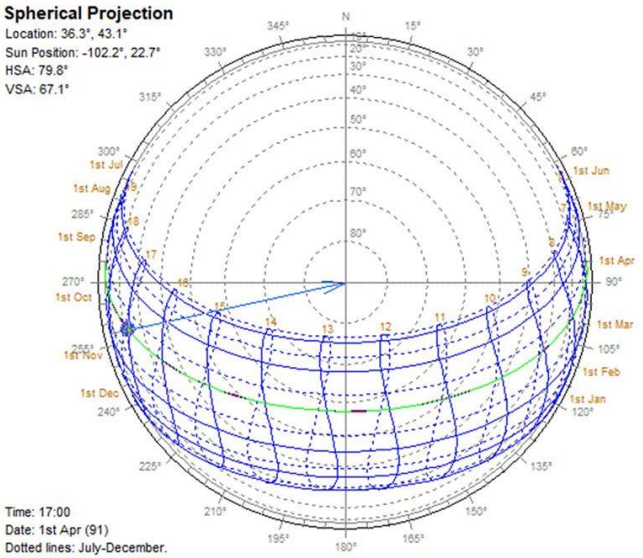
Erbil to Italian city by foot

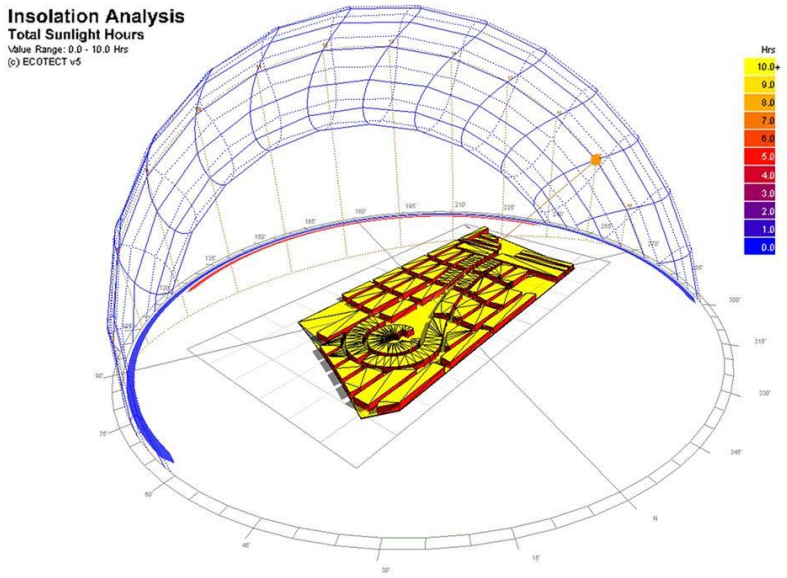
Baghdad to Erbil

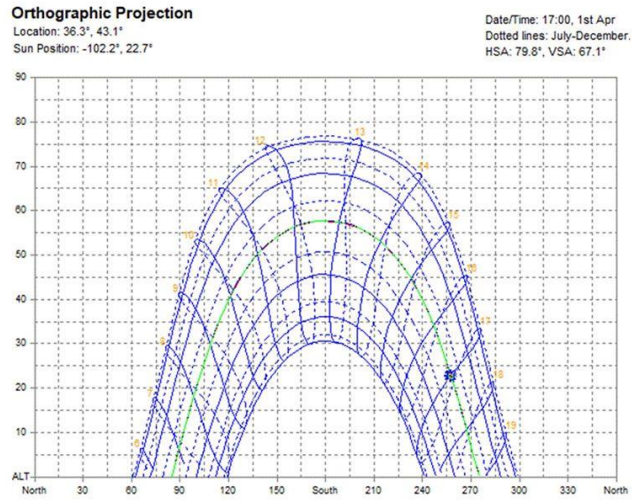
Erbil to Italian city by car

➢ Sun analysis of the site which include :

- Sky dome and Sun path diagram







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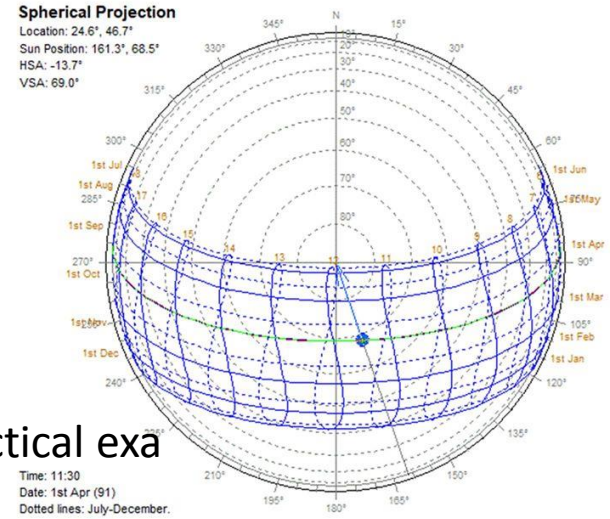
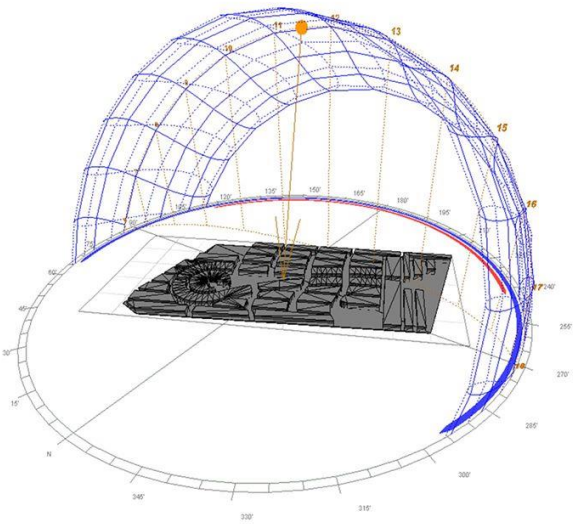
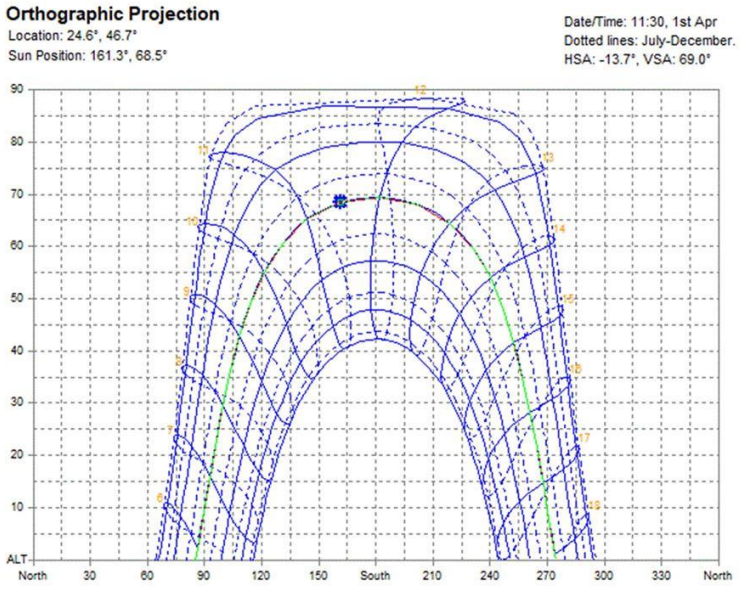


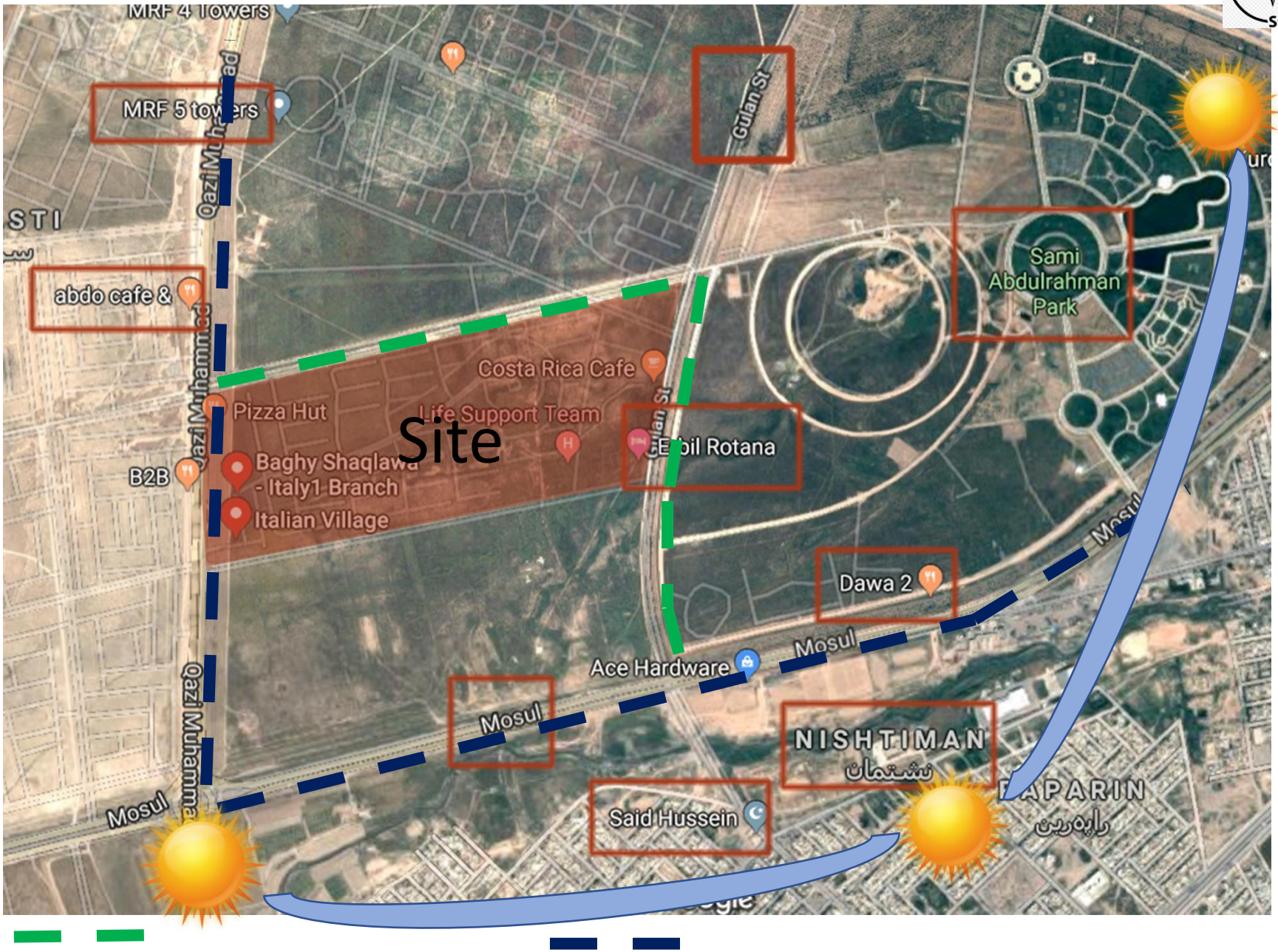
Second sester practical exa



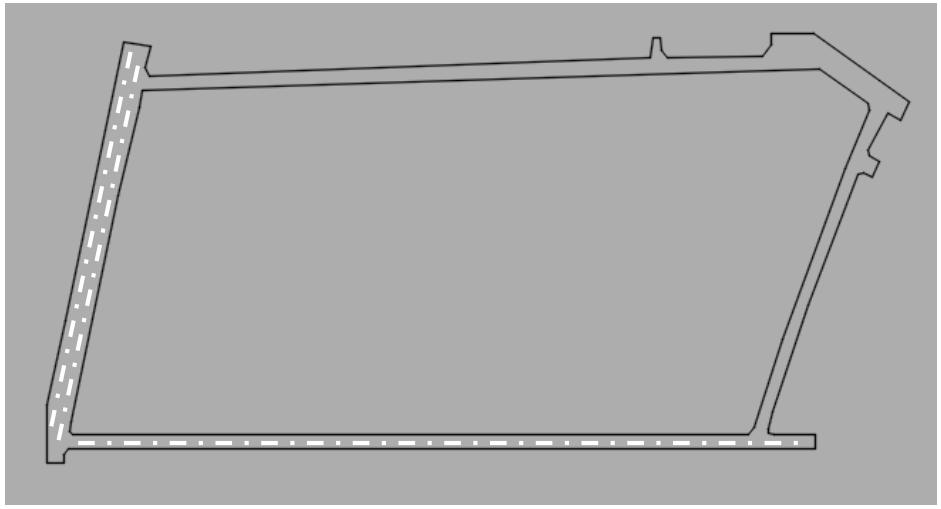


➢ Sun analysis of the site which include :

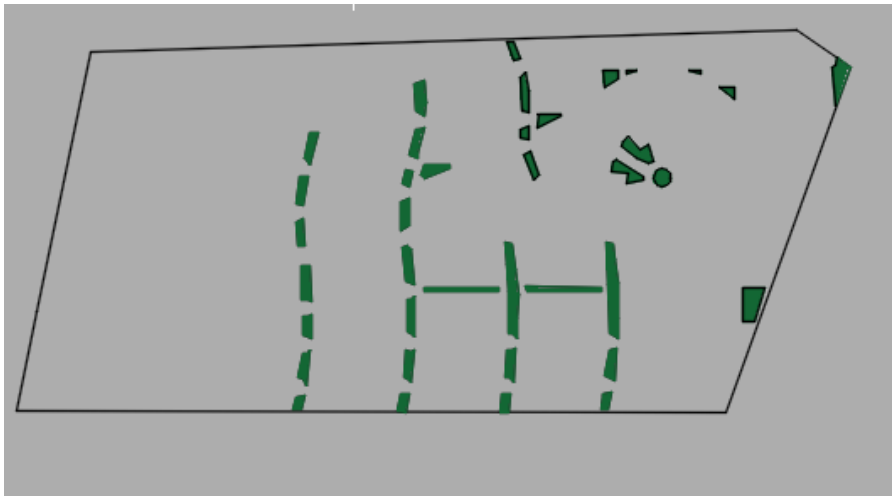
- Orientation of site and surrounding



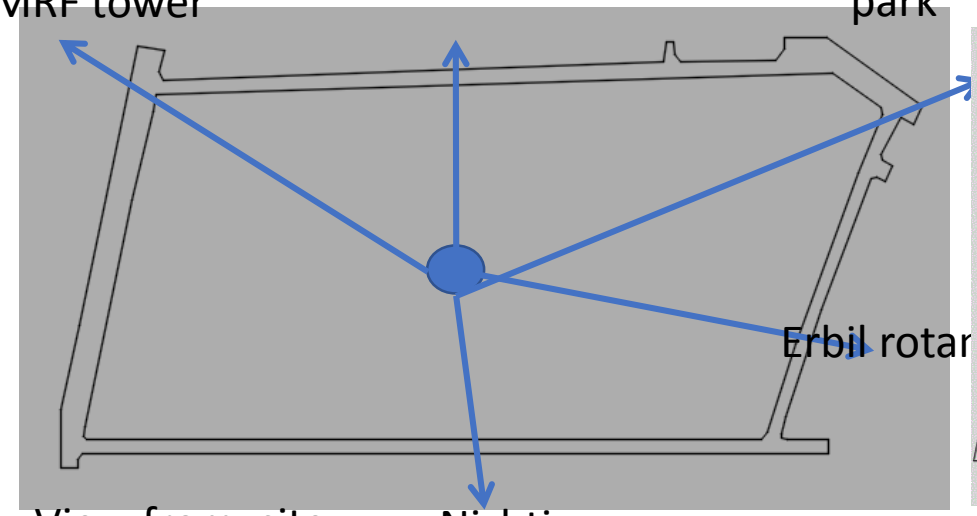
➢ site analysis



Vehicle traffic



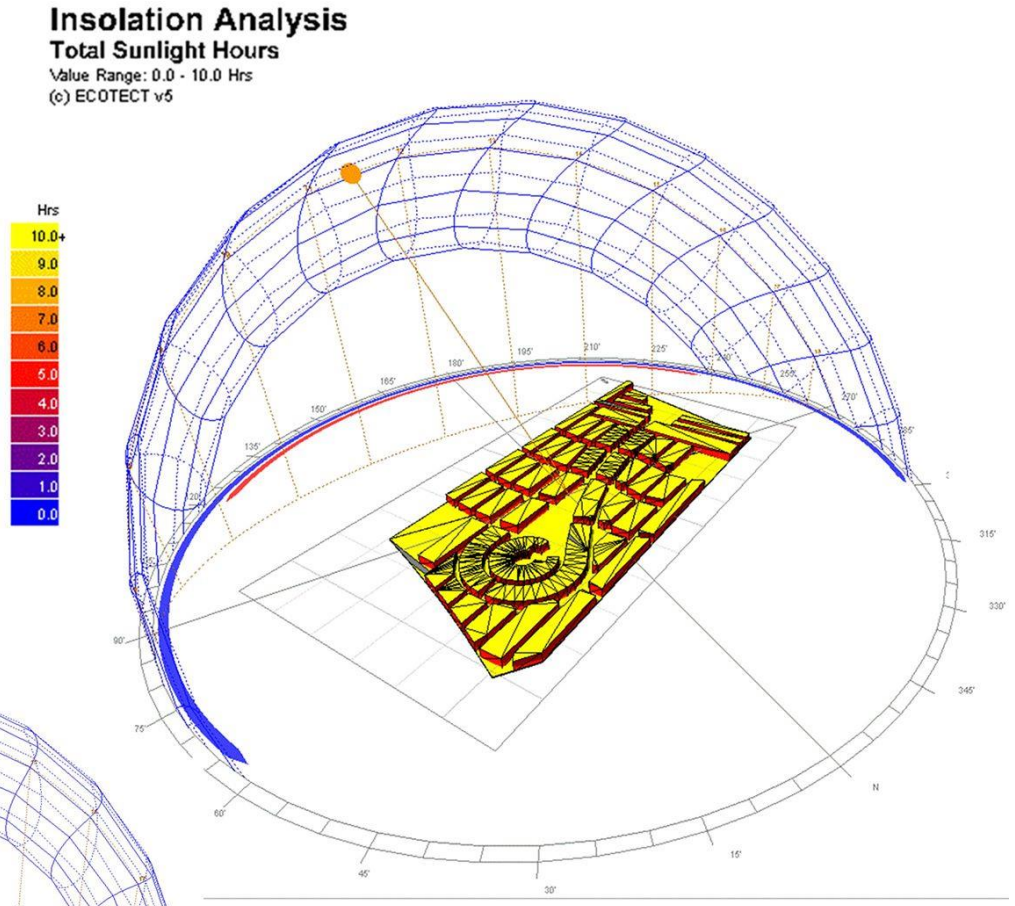
Site vegetation

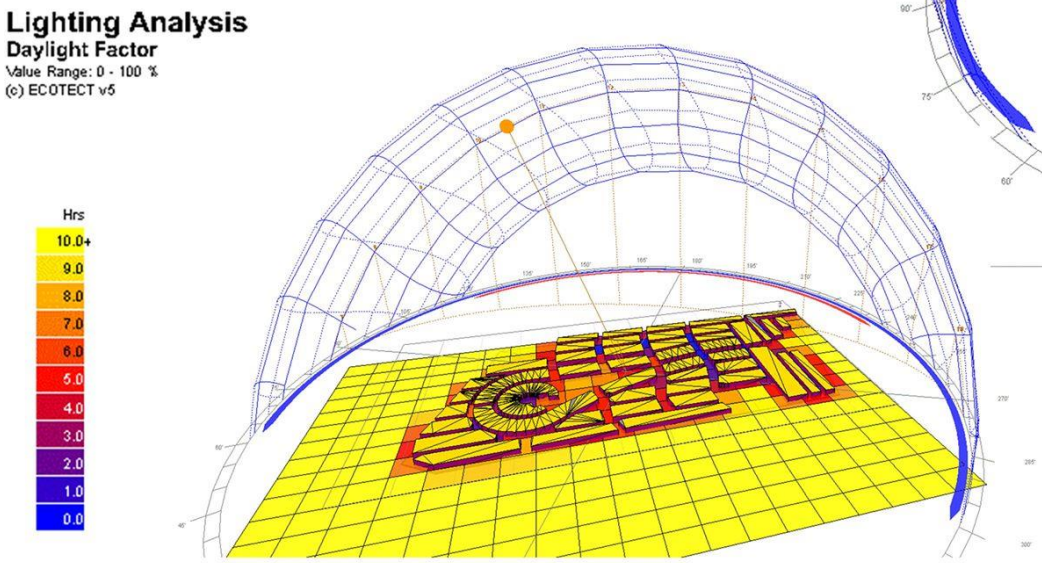


Noise plan

➢ Sun analysis of the site which include :

- solar gain(orientation of the space with regard to heat gain))



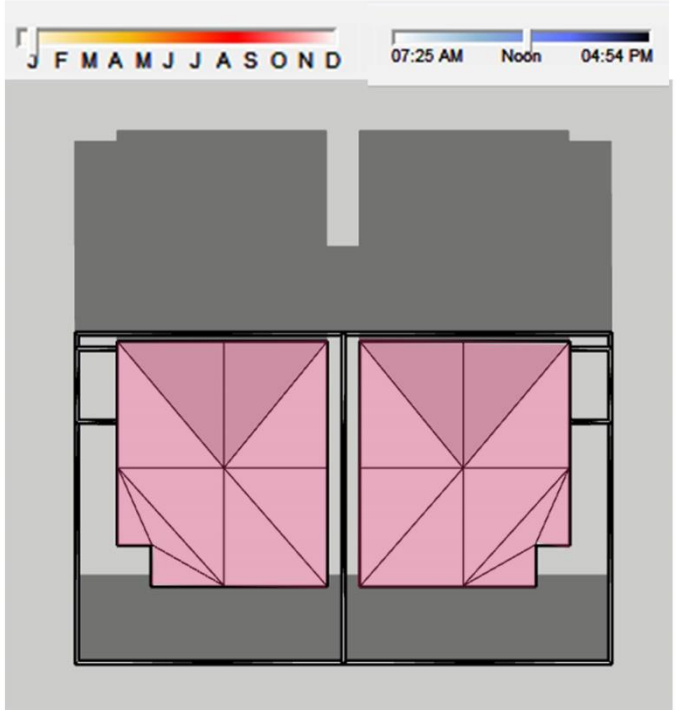


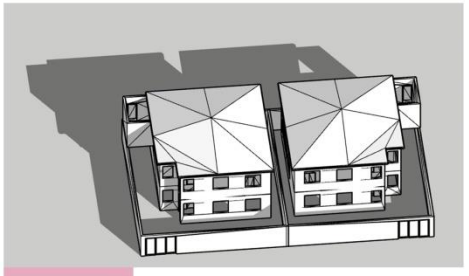
➢ Sun analysis of the site which include :

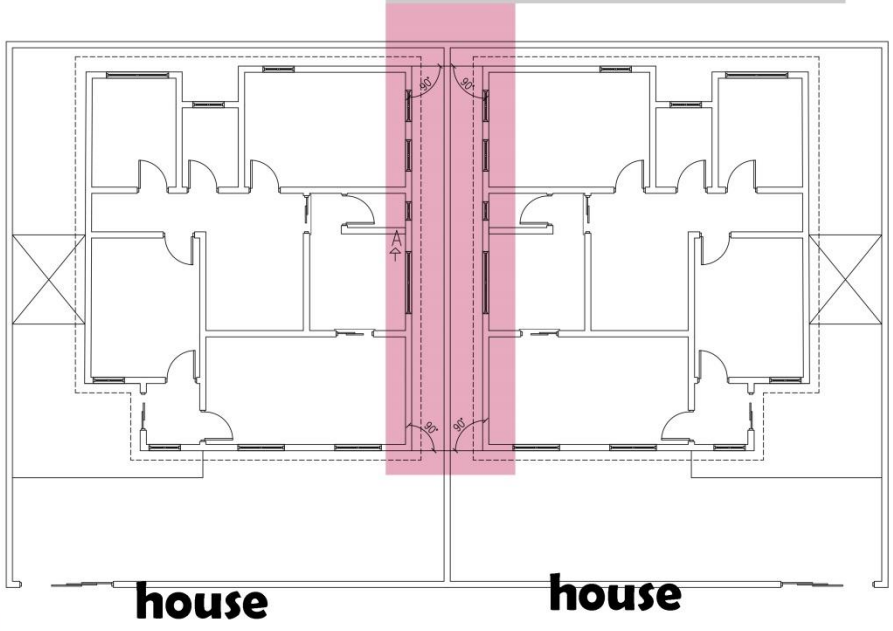
- Calculate the space between houses " if available "

Variables defining open space proportion 1-Function 2- privacy 3-sun heating 4-ventilation 5-Day lighting

hiuses in italy city 1 in erbil have a liitle bit space between them and the angle of this space is 90 degree that is why it is cmpletely shadow or sun light in all month in a year at all times ,so we take two times in january .(non and before non)







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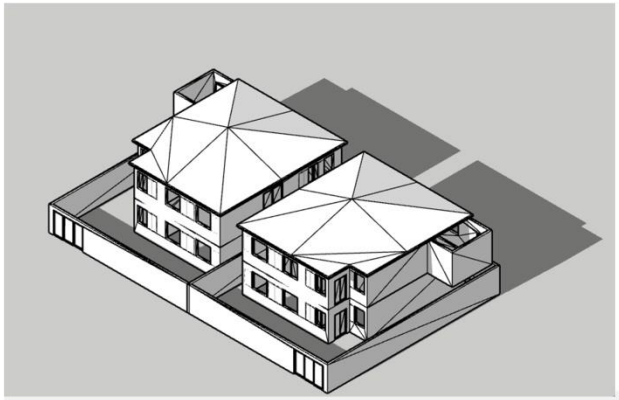
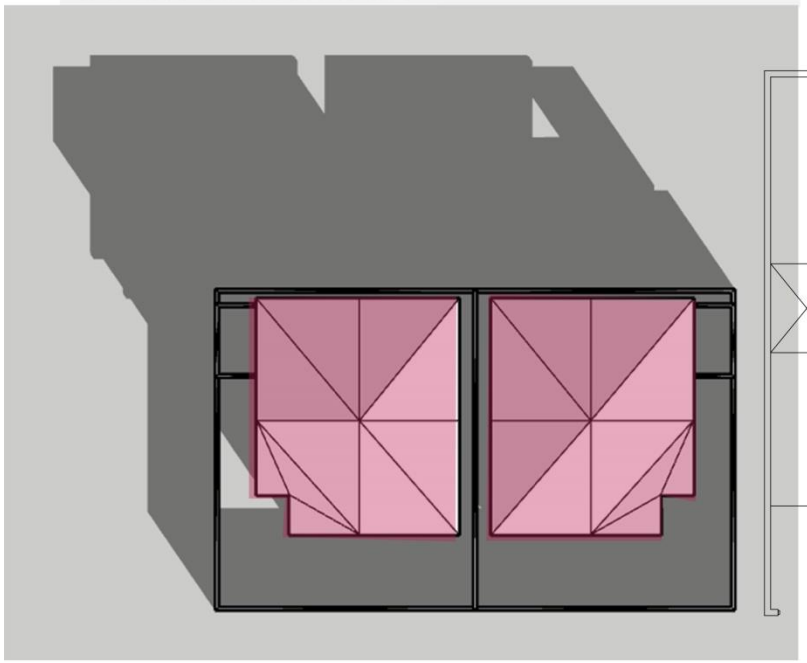
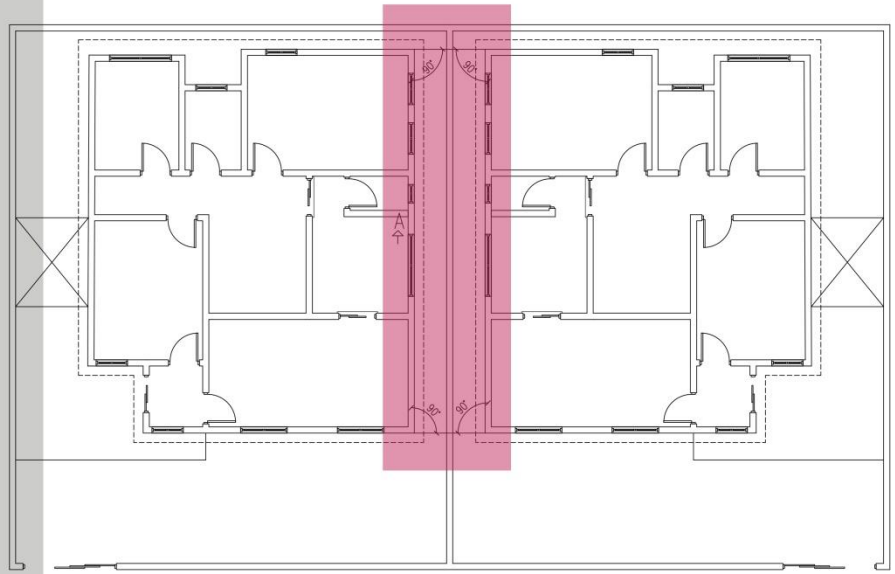
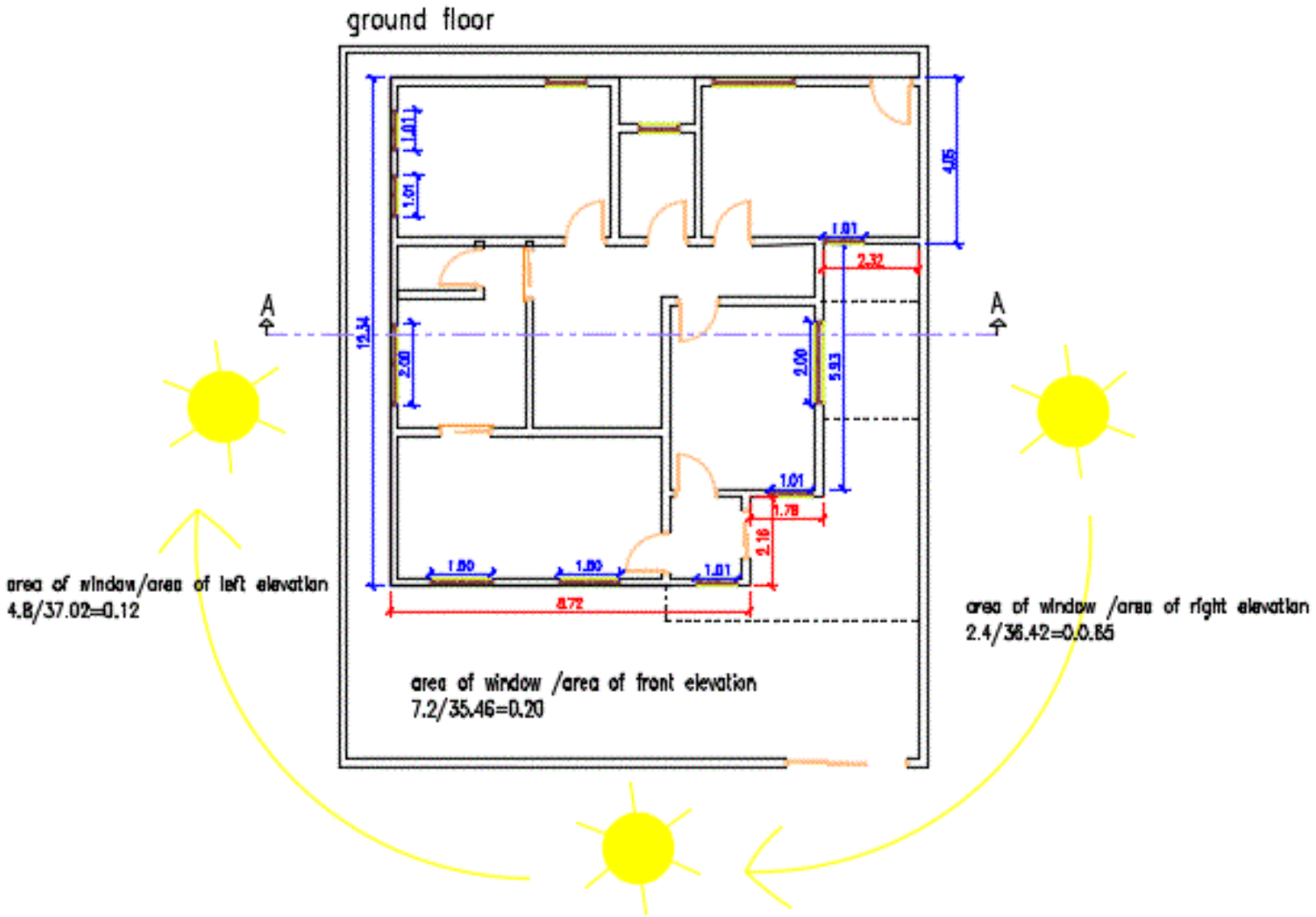






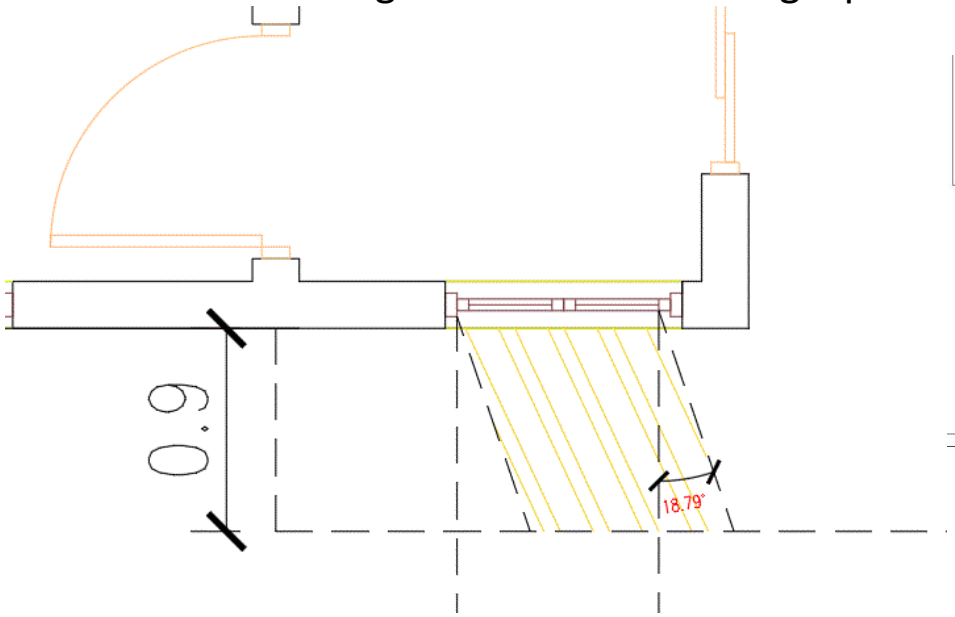
➢light analysis of single house :

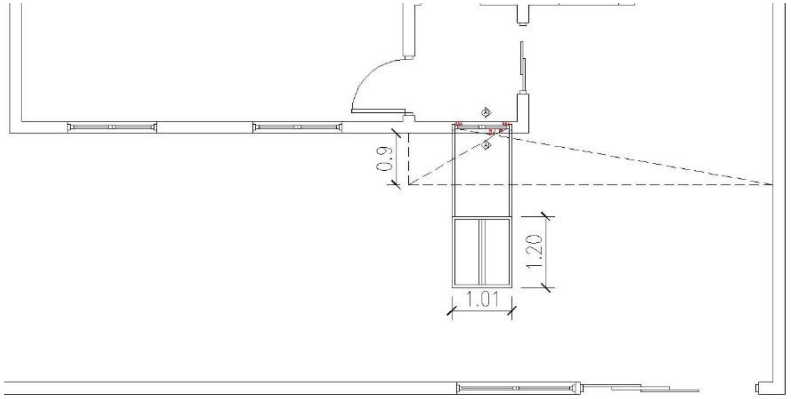
- Ratio of the window size to floor area, type of window.

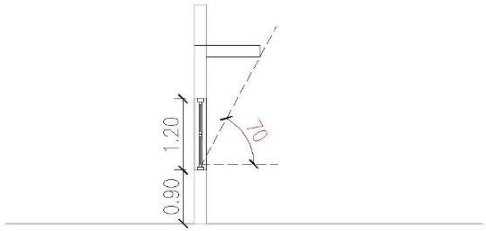


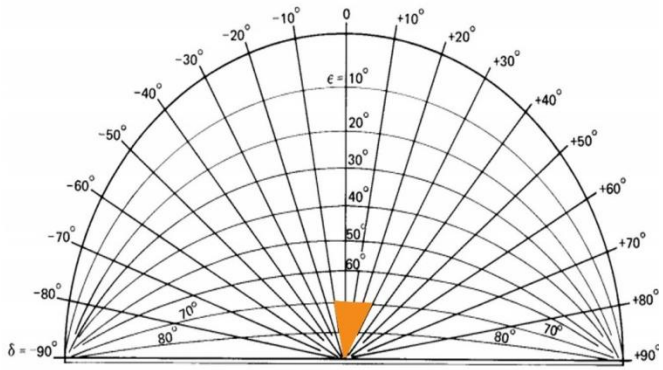
➢light analysis of single house :

- Shading devices analysis for one house(I-Type of shading device used , ii. Material of shading device, iii.Drawing of HSA, VSA for shading devise on the windows)
- Draw "shading mask on shadow angle protractor" of the shading devices



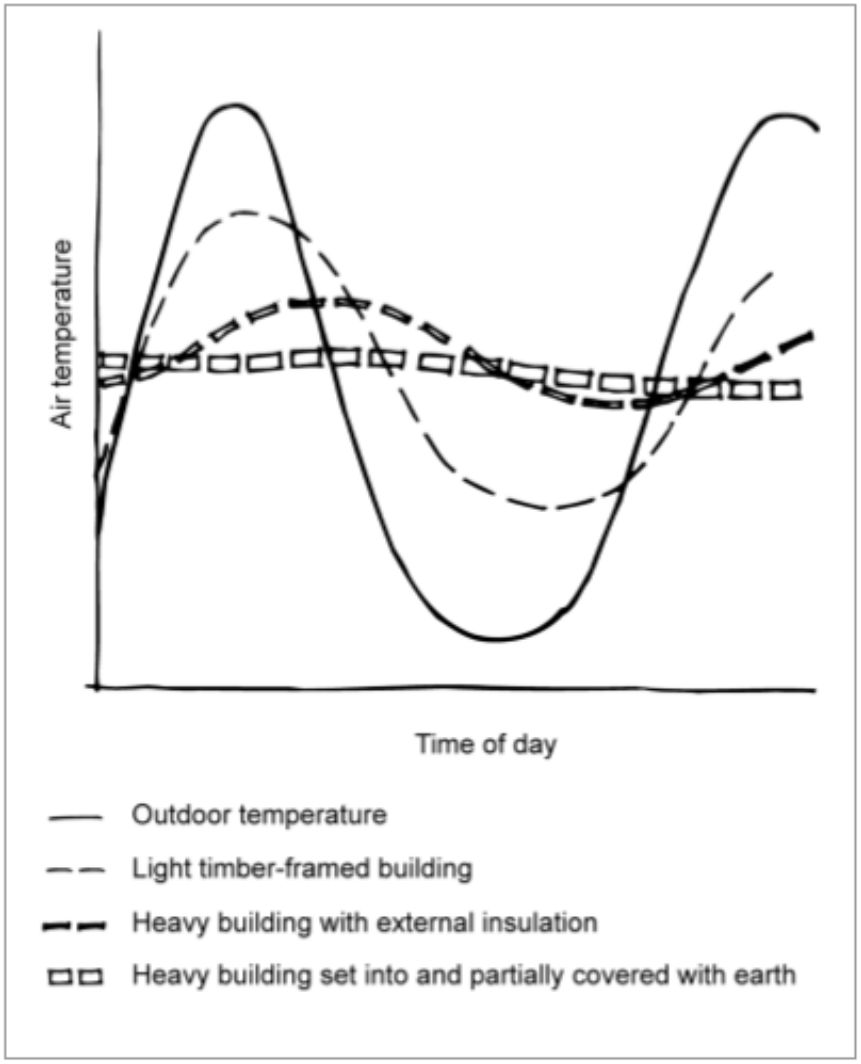






➢Thermal analysis of building material :

- How thermal mass works Thermal mass acts as a thermal battery. During summer it absorbs heat during the day and releases it by night to cooling breezes or clear night skies, keeping the house comfortable. In winter the same thermal mass can store the heat from the sun or heaters to release it at night, helping the home stay warm. Thermal mass is not a substitute for insulation. Thermal mass stores and re-releases heat; insulation stops heat flowing into or out of the building. A high thermal mass material is not generally a good thermal insulator (see Rammed earth). Thermal mass is particularly beneficial where there is a big difference between day and night outdoor temperatures.



Daily temperature fluctuations for different construction methods.

➢Thermal analysis of building material :

- building material(all the material that used in the building floor, roof, wall).

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- building material(all the material that used in the building floor, roof, wall).

It is used tile in the floor and painting in the wall ,
A Paint is essentially a coating or covering material applied on metallic or non-metallic surfaces for decorative or protective purposes

➢Thermal analysis of building material :

- material of doors and windows .

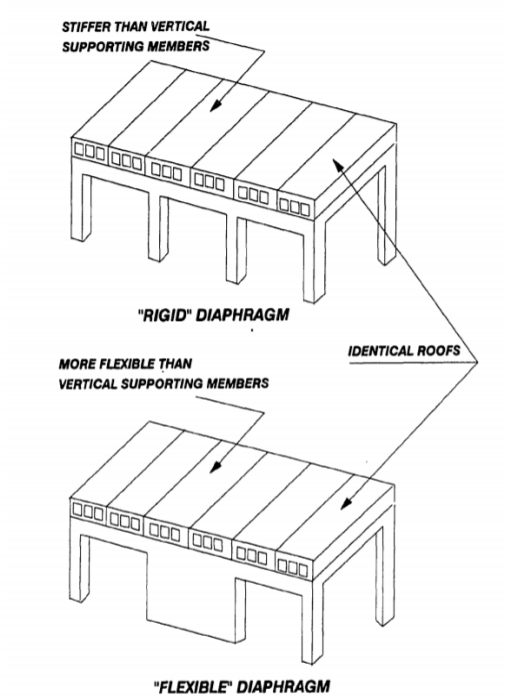
- It used aluminum material of widows and doors.

Here are 10 beneficial features to be found when opting for aluminum windows:

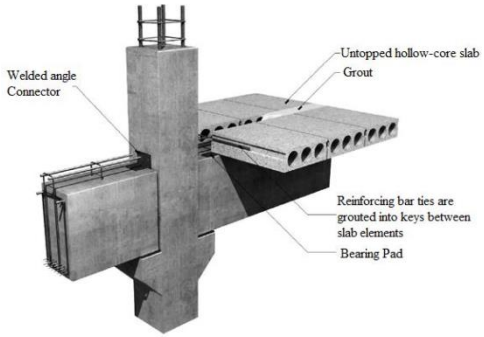
- Naturally **strong** window profiles. ...
- **Durability** and **low** main tenance. ...
- Wide range of **color** finishes. ...
- High thermal performance. ...
- Consistently stable all year round. ...
- Flexible and versatile appearance. ...
- Exceptional lifespan.

➢Thermal analysis of building material :

- any insulation material if available .

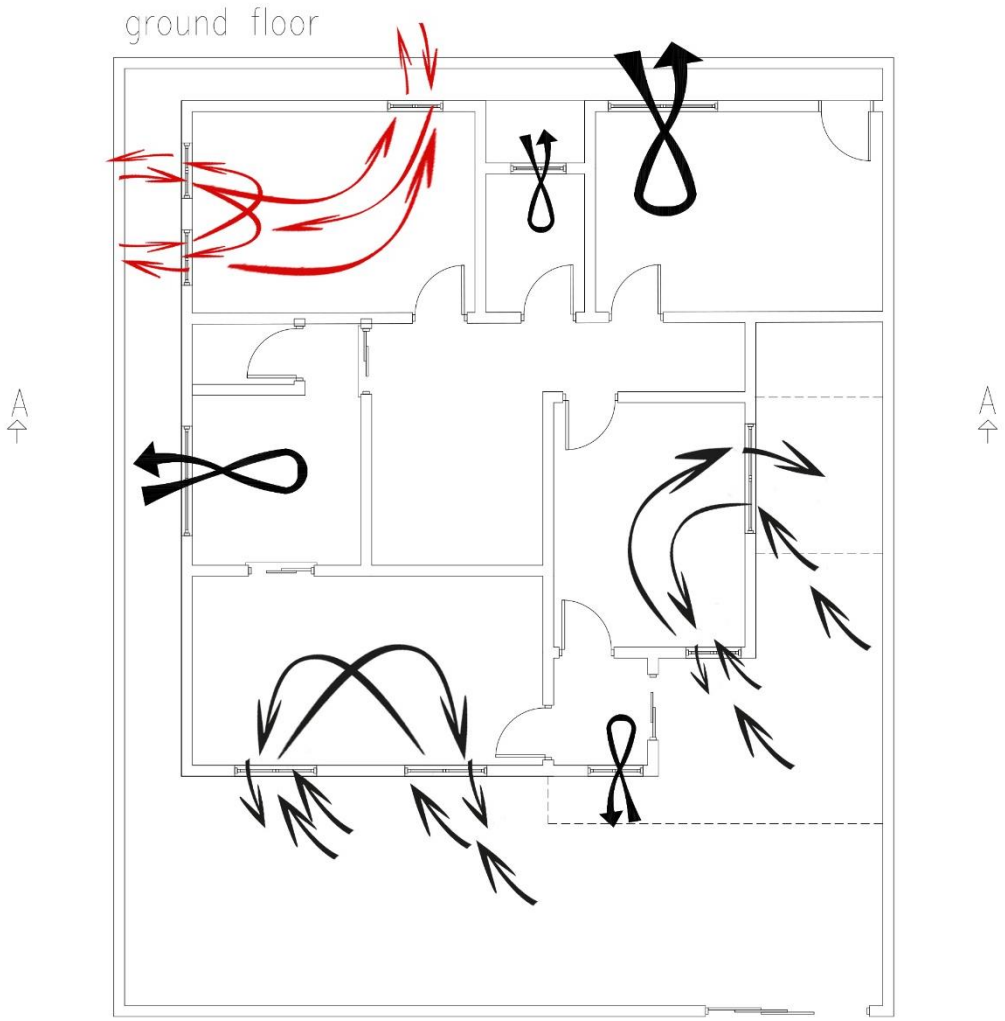


- It is used hollow core as a ceiling because :
- 1. assured quality . 2.excellent lower surface finish ready to paint .3. quick and easy installation 4 excellent fire resistance 5. high load capacity and rigidity 6. easy project implementation giving designers greater versatility .7. easily adapted to enable mounting of ancillary building systems 8 reduced self-weight 9. big cost savings 10 efficient span/depth-ratio leading to reduced storey height 11. high durability and load resistance 12. long spans without the need of temporary supports 13. excellent thermal properties and acoustic insulation 14. green product reduced use of raw material 15. can be used in seismic zones 16.production flexibility.



➢wind analysis :

- site analysis (if there strategies to Protect from the cold winter winds).



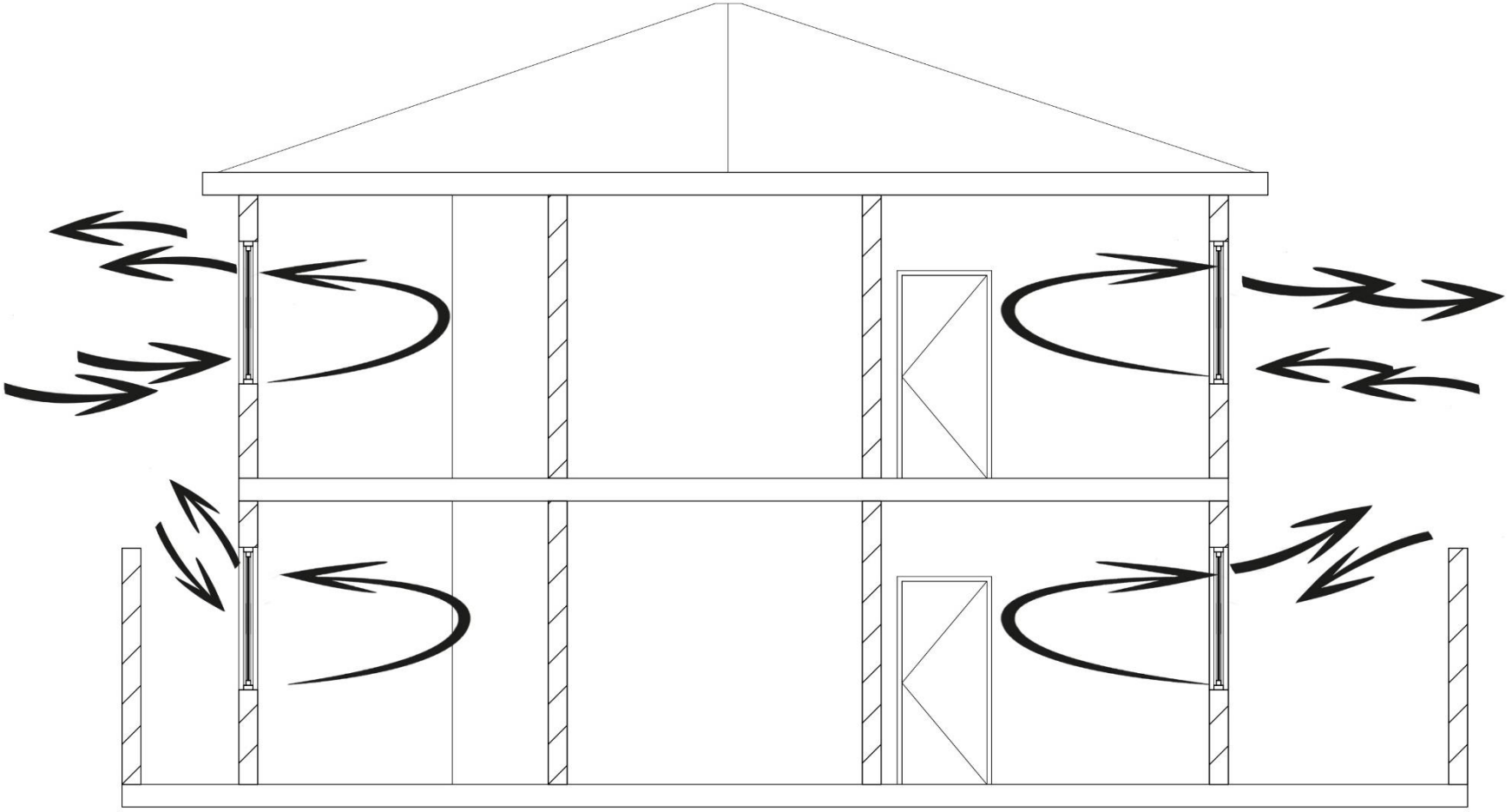
➢wind analysis :

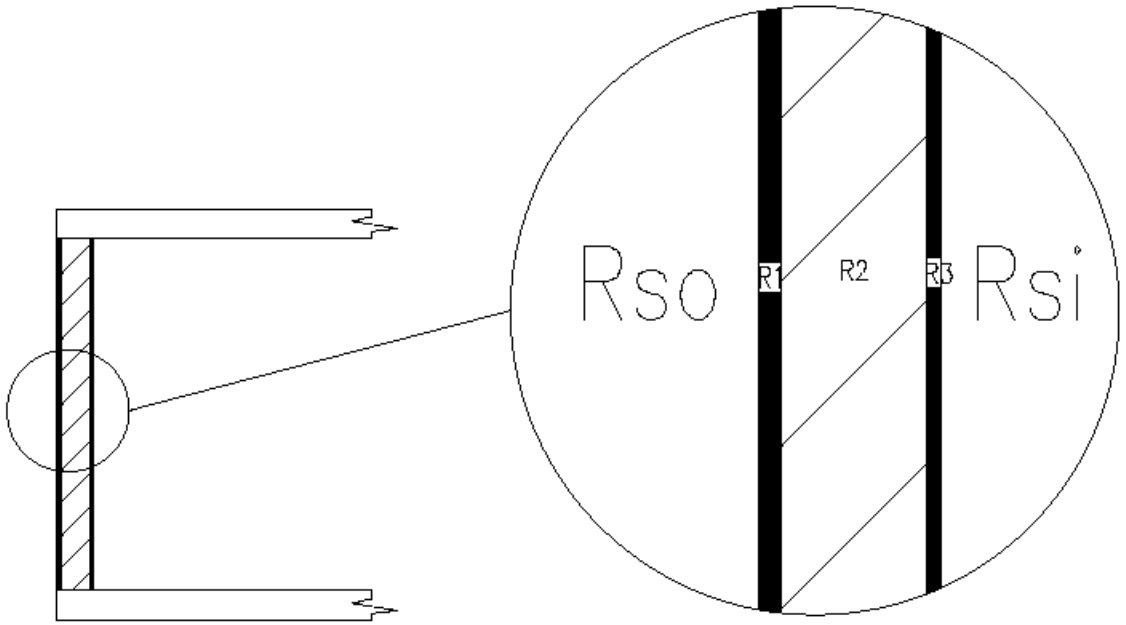
- site analysis (if there strategies to Protect from the cold winter winds).

all the houses have same height and same space that is why there is no effective wind over the houses , there is any difference of wind direction .

➢wind analysis :

- building analysis in term of wind design (room and partitions and functions).

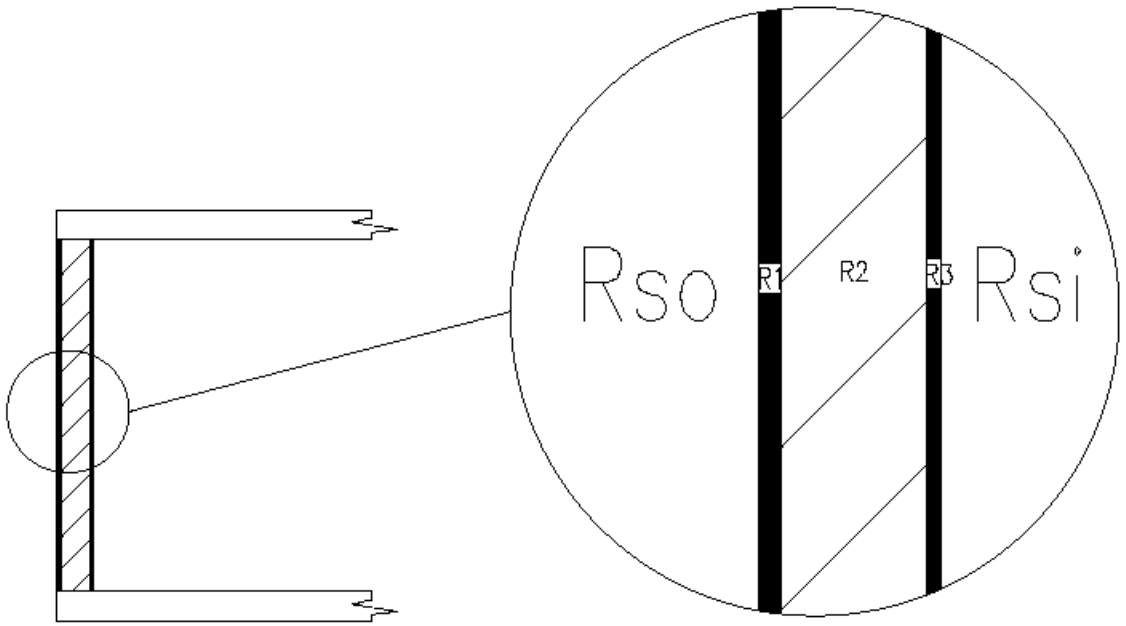




Layers	Thickness /m	Conductivity	Resistance
outside thermal resistance			0.04
cement	0.03m	0.11	0.02m/0.11=0.181
concrete block	0.2m	0.11	0.2m/0.11=1.81
internal plaster	0.02m	2	0.02m/2=0.01
inside thermal resistance			0.13
total thermal resistance			2.171

the overall U-value id then :
U=1/R 1/2.171= 0.460

➢U- value for material :



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inside thermal resistance			0.13
total thermal resistance			2.171

the overall U-value id then :
U=1/R 1/2.171= 0.460

➢Heat gain calculation by occupants for one house

1- KITCHEN (SHF 78.5) (LHF 78.5) (3) person

LATENT HEAT FRACTION = $\frac{\text{LATENT HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{3*78.5}{1000} = 0.23$

SENSIBLE HEAT FRACTION = $\frac{\text{SENSIBLE HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{3*78.5}{1000} = 0.23$

TOTAL HEAT GAIN = 0.23+0.23=0.46

2- RECEPTION (SHF 70) (LHF 44) (5) person

LATENT HEAT FRACTION = $\frac{\text{LATENT HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{5*44}{1000} = 0.22$

SENSIBLE HEAT FRACTION = $\frac{\text{SENSIBLE HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{5*70}{1000} = 0.35$

TOTAL HEAT GAIN = 0.22+0.35=0.57

3- BED ROOMS (SHF 64) (LHF 30) (2) person

LATENT HEAT FRACTION = $\frac{\text{LATENT HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{2*30}{1000} = 0.06$

SENSIBLE HEAT FRACTION = $\frac{\text{SENSIBLE HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{2*64}{1000} = 0.128$

TOTAL HEAT GAIN = 0.06+0.128=0.188

4- FAMILY HALL (SHF 69) (LHF 30) (7) person

LATENT HEAT FRACTION = $\frac{\text{LATENT HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{7*30}{1000} = 0.21$

SENSIBLE HEAT FRACTION = $\frac{\text{SENSIBLE HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{7*69}{1000} = 0.48$

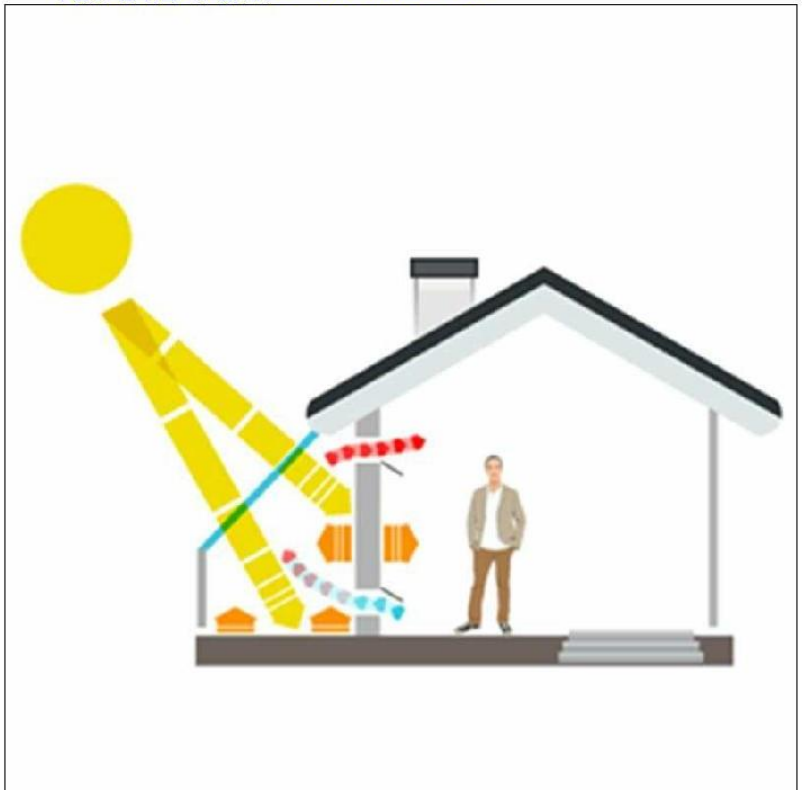
TOTAL HEAT GAIN = 0.21+0.48=0.69

5- FAMILY HALL (SHF 64) (LHF 30) (1) person

LATENT HEAT FRACTION = $\frac{\text{LATENT HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{1*30}{1000} = 0.03$

SENSIBLE HEAT FRACTION = $\frac{\text{SENSIBLE HEAT GAIN}}{\text{TOTAL HEAT GAIN}} - \frac{1*64}{1000} = 0.064$

TOTAL HEAT GAIN = 0.03+0.64=0.94



➢Heat gain calculation by ventilation .

1- KITCHEN air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.5*4.47*3.4} = 336.4$

2- reception air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{6.41*3.45*3.4} = 239$

3- bed room 1 air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{5.17*3.68*3.4} = 278$

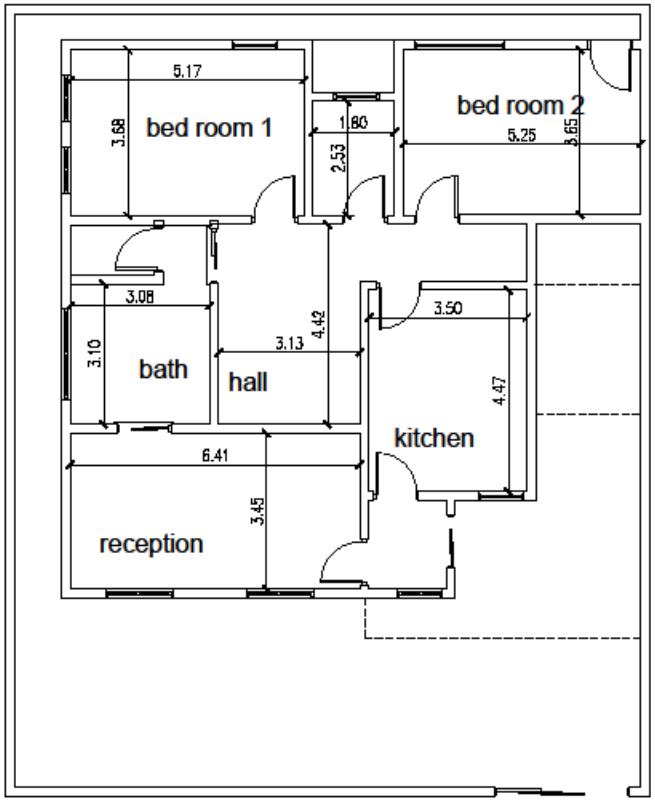
4- bed room 2 air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.65*5.25*3.4} = 276$

5- bath air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.08*3.10*3.4} = 554$

6- open space air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{1.8*2.53*3.4} = 1162$

7- hall air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.13*4.42*3.4} = 382.6$

ground floor



➢Heat gain calculation by ventilation .

3- bed room 1
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{5.17*3.68*3.4} = 278$

3- bed room 2
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{4.47*3.48*3.4} = 394.78$

3- bed room 3
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{6.41*3.45*3.4} = 239$

5- office
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.08*3.10*3.4} = 554$

5- bath
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{2.7*3.49*3.4} = 561.97$

6- open space
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{1.8*2.65*3.4} = 1109$

7- hall
air change = $\frac{\text{CFM} * 60\text{min}}{\text{volume of room}} = \frac{300 * 60\text{min}}{3.13*4.42*3.4} = 382.6$

first floor