

dalhousie university

FACULTY OF ENVIRONMENTAL STUDIES

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Building Description:**Urban Strategy:**

The most striking element on the site is a corner condition on Queen and Morris St. that provides a scale appropriate for a plaza. The space created is conceived as part of the building, both announcing its presence and creating a new public space. This space is the public foyer of the building.

Building Organisation:

The building is organised along a circulation atrium that channels occupant traffic into the three finger blocks that contain the program. In turn the Blocks are interspersed with courtyard gardens or outdoor atria.

The circulation atrium is west facing and louvered along its façade to minimise sunlight intensity in the space. On the ground floor of the atrium are the public counters, waiting areas and communal areas that are also supported by a restaurant that transitions to the outside plaza. Access to the interspersed courtyards is possible from the ground floor.

The triple height atrium allows access to the subsequent floors by means of two flights of stairs that begin on the ground floor right up to the last floor, creating a fantastical feeling of accent for the users. Elevators are also utilised in the central block and open to the mezzanine style corridors that look into the atrium.

The upper floors have communal areas in small pockets off the atrium corridor that service the office spaces, washrooms, laboratories and lecture halls. These communal areas are thresholds between the circulation core and the program finger blocks.

The building envelope maximises on natural day lighting and ventilation through strategical corridor placement with large windows and slender form for natural ventilation. Louvers are incorporated into the upper floor façade so as to buffer sunlight when need arises. The louvers on the south facades are combined with Photovoltaic panels laid on the louvers vertical and rotate through the day following the sun to maximise solar energy gain.

While an effective balance is maintained between the uses of advanced automatic controls, the building also allows the users to exercise control of the environment by means of open able windows and ventilation slats.

Maximised use of natural day lighting and ventilation are a fundamental requirement in the creation of good office environment. The heating, cooling and ventilation requirements of the building change with the seasons. The office block is centrally located, "middle finger", on the east – west axis as are the other, to maximise natural daylight and ventilation and has a central corridor so as to let the office rooms take advantage of the views into the landscaped courtyards.

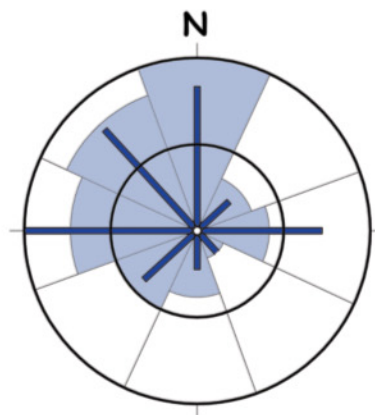
Light shelves on both facades reflect light deep into the space filling the offices with light hence eliminating the need for numerous individual lamp lighting.

Our building is sleek and slender as well as tall in terms of the floor to ceiling height; this creates a fantastical illusion of being in an overwhelmingly large hall. Due to the expected capacity of the building, this will be an advantage so that a feeling of congestion is eliminated.

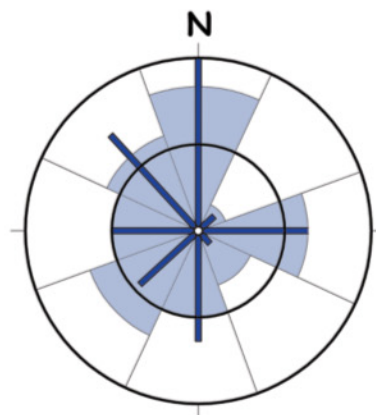
Environmental Impact:

The concept of minimising the impact on the environment through better building design was the driving factor for our design. This we tried to achieve by balancing embodied energy and day to day energy consumption and through strategic site utilisation, in a way giving back to the site what we took away. We believe that a major percentage of the site has to remain green or unbuilt so as to encourage interaction in and around our building.

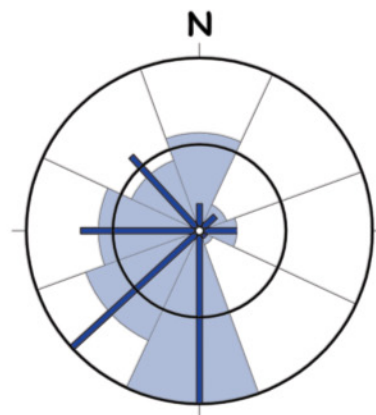
WIND ANALYSIS - (Seasonal)



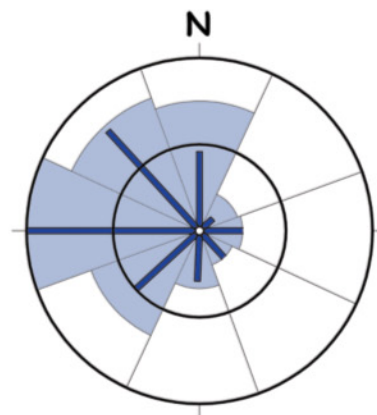
WINTER



SPRING

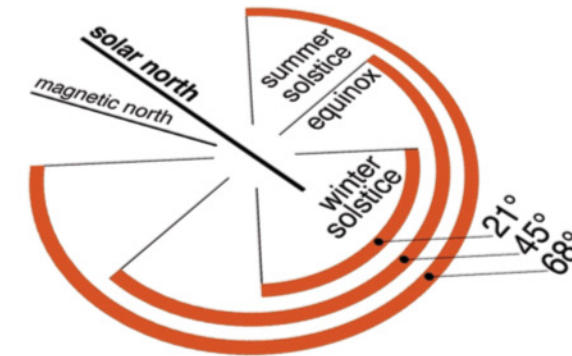
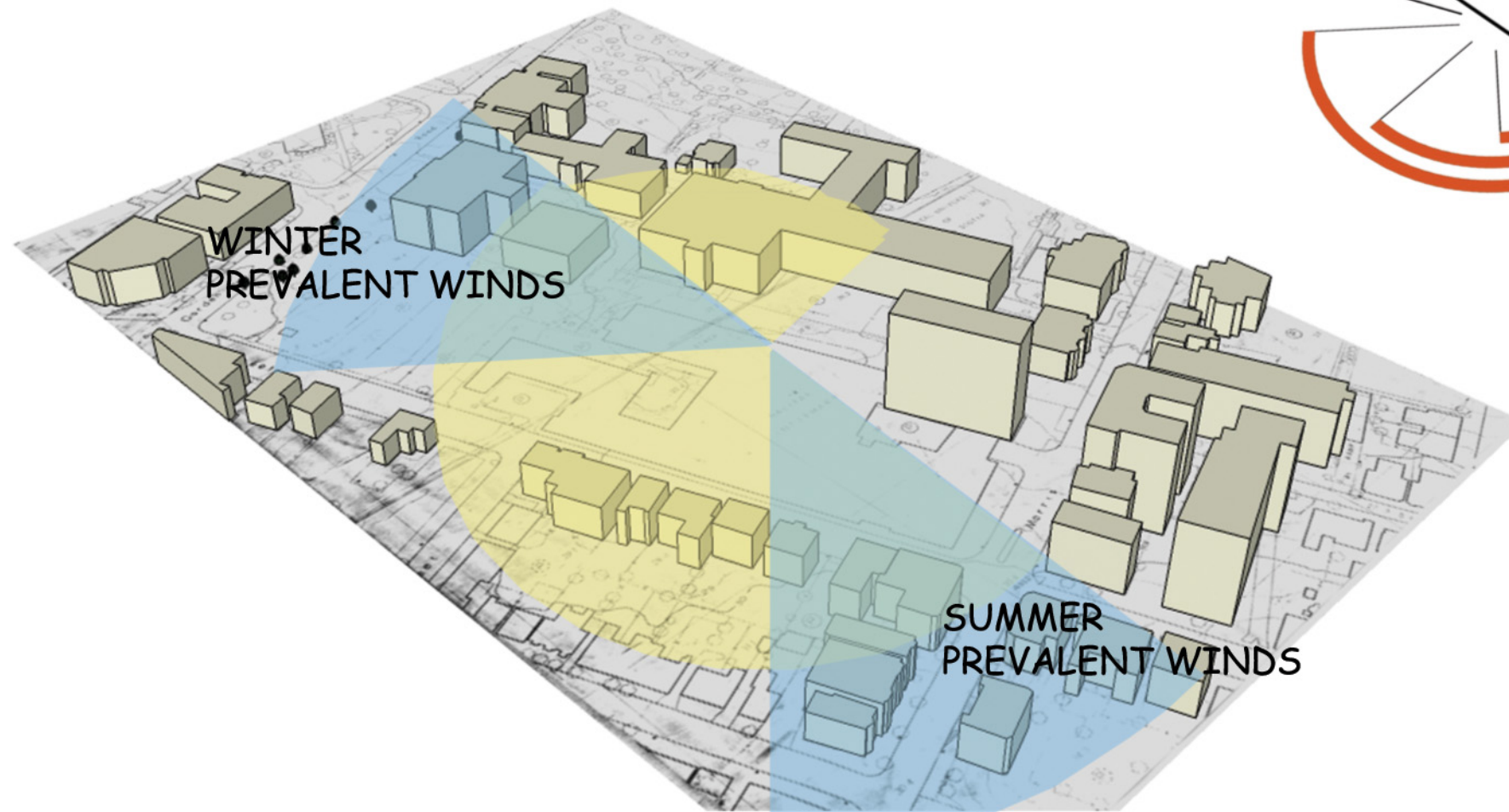


SUMMER



FALL

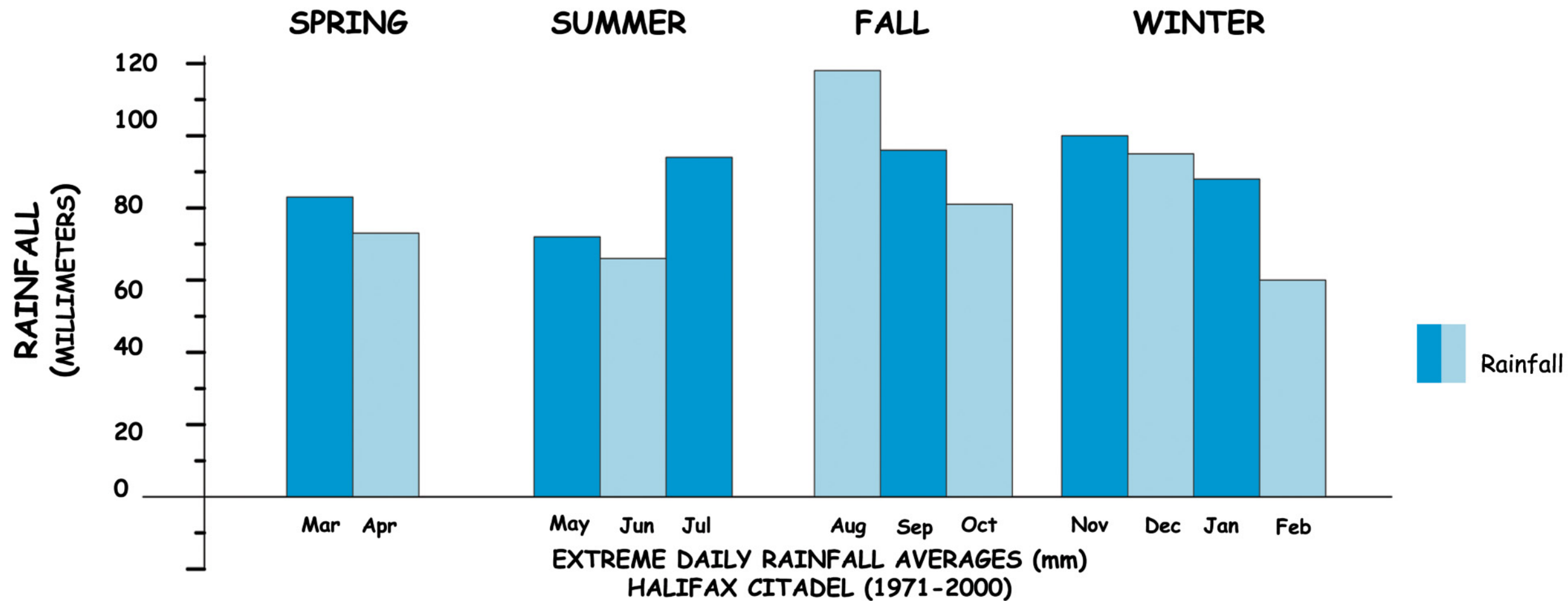
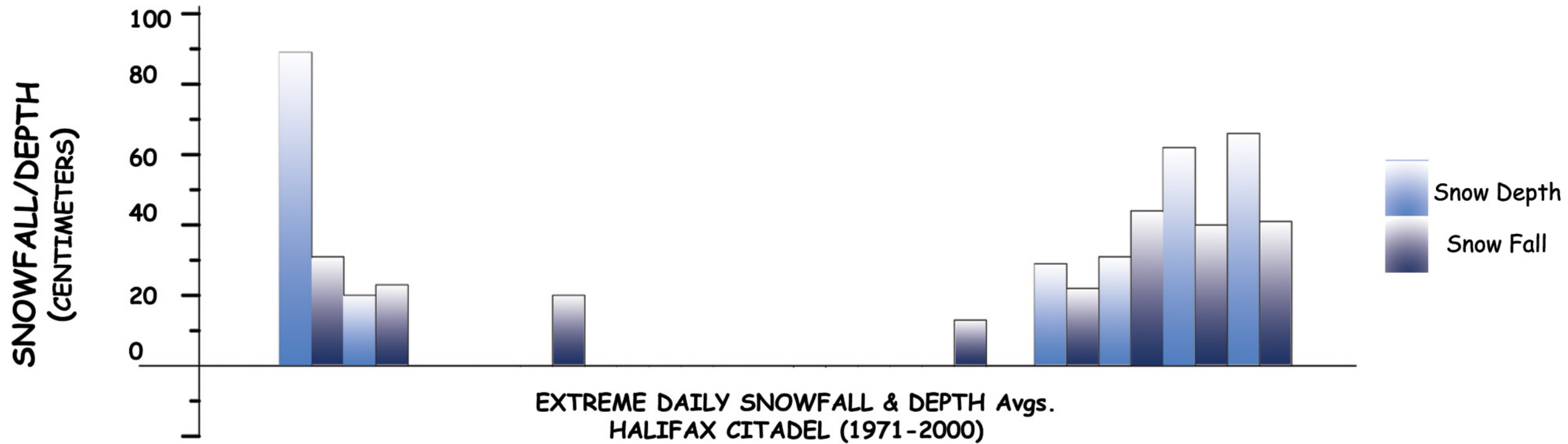
■ - Prevalent Wind direction
| - Magnitude



Sun path trough the year

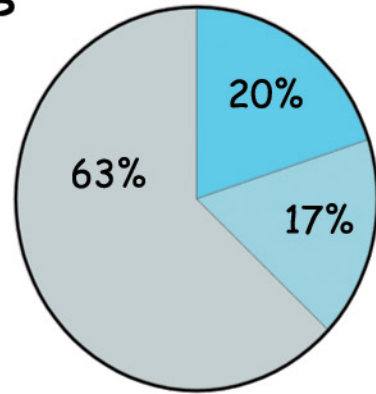
● Area of most sunlight exposure throughout the year.

SNOWFALL/DEPTH & RAINFALL (Seasonal)

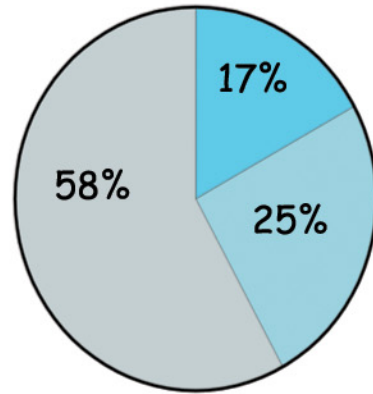


CLOUD COVER AND TEMPERATURE (Seasonal)

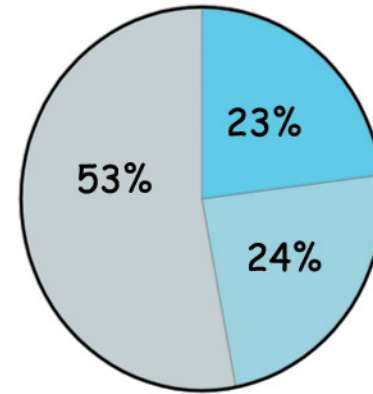
PERCENT HOURS WITH CLOUD COVER



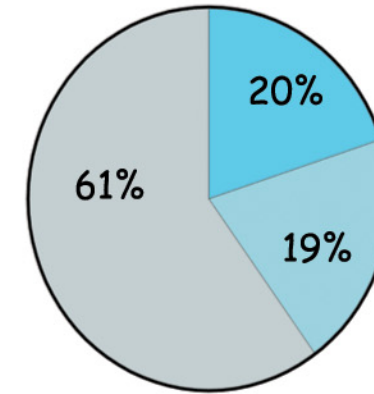
SPRING



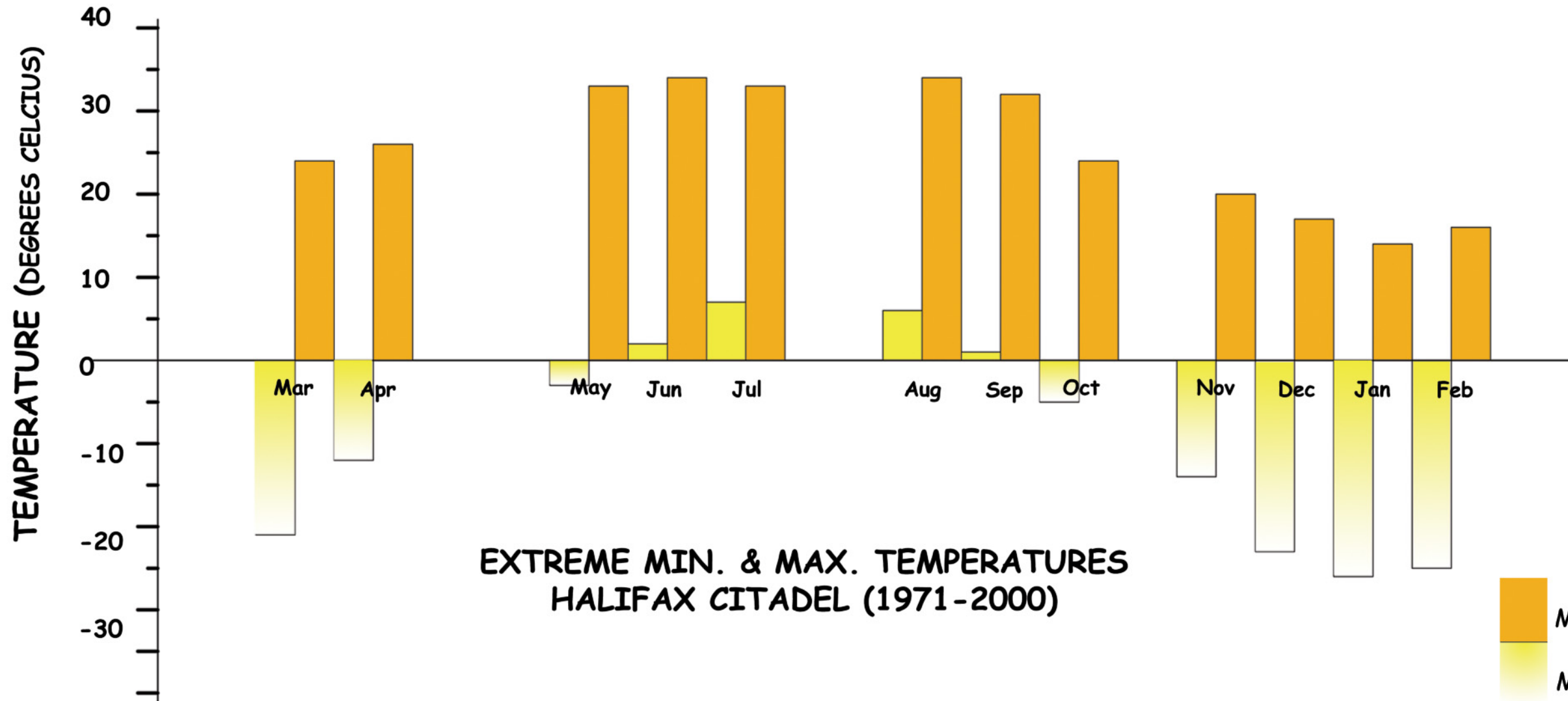
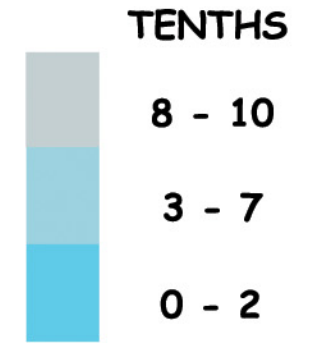
SUMMER



FALL



WINTER



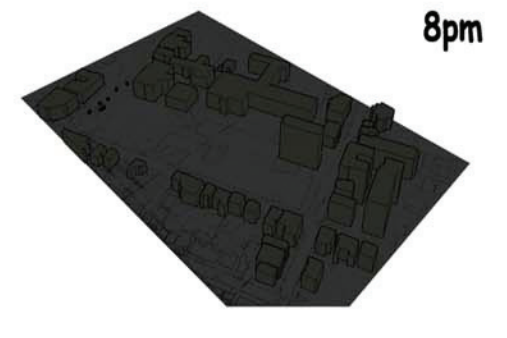
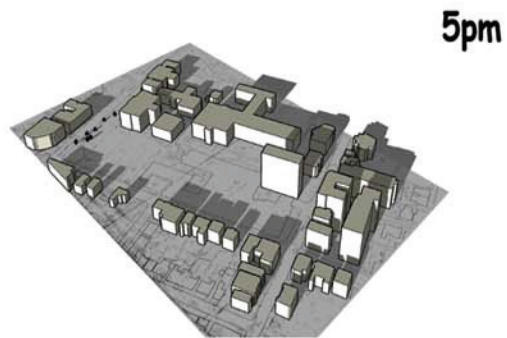
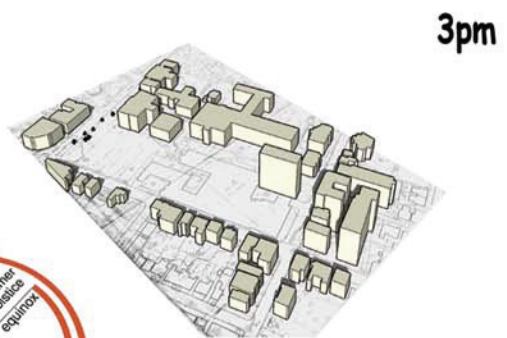
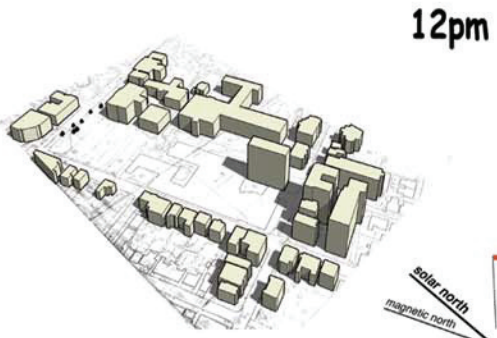
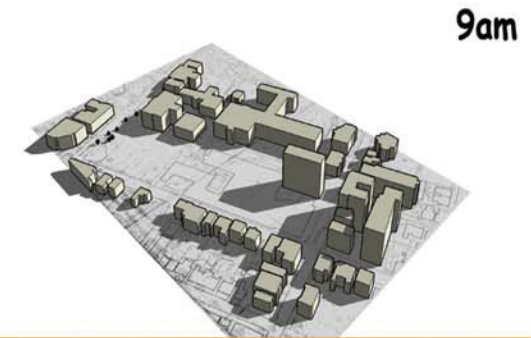
EXTREME MIN. & MAX. TEMPERATURES HALIFAX CITADEL (1971-2000)



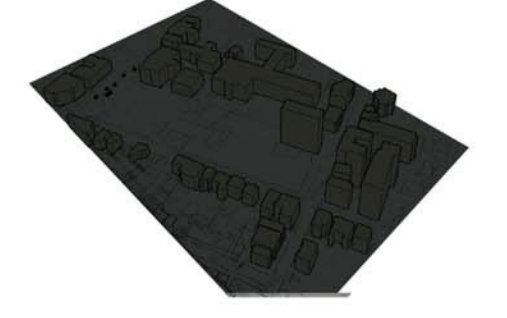
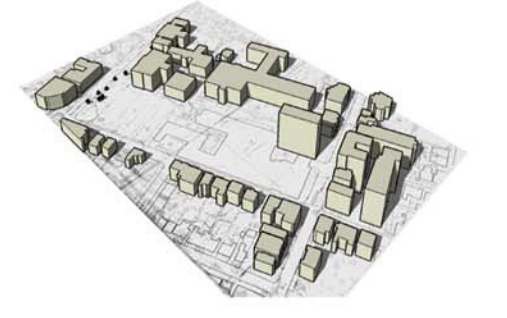
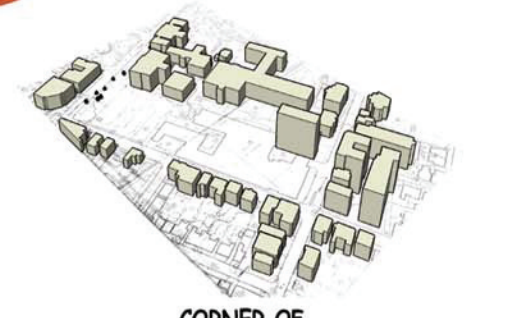
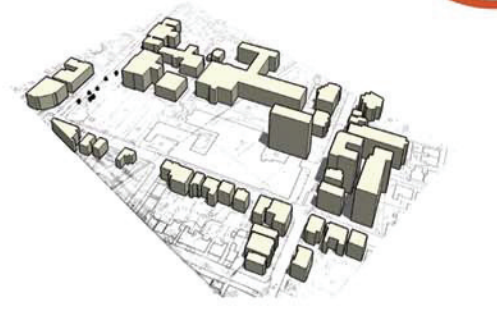
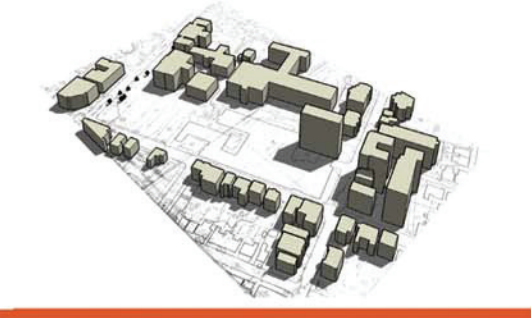
CLIMATIC DATA

SPRING EQUINOX

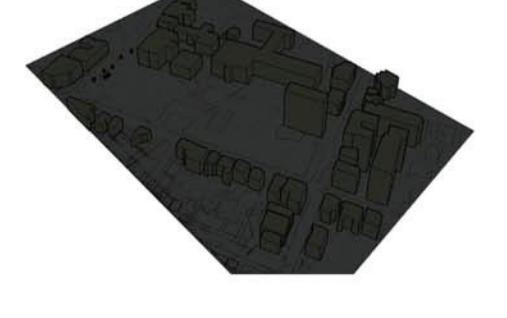
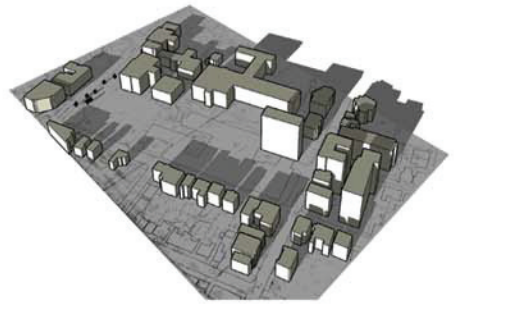
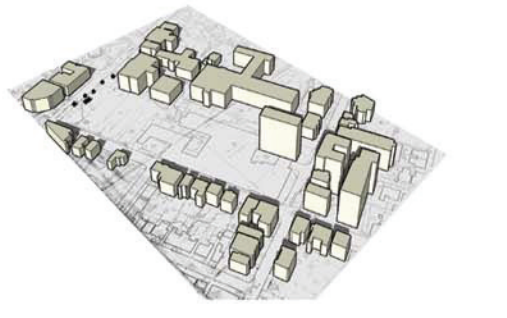
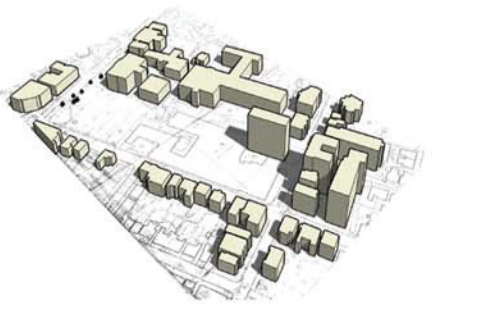
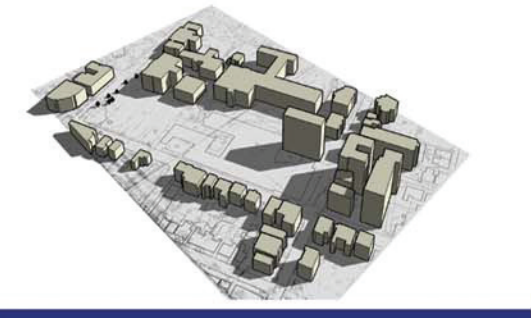
SHADOW STUDY



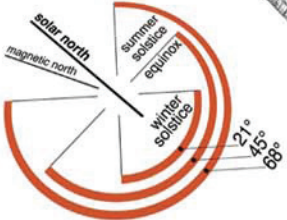
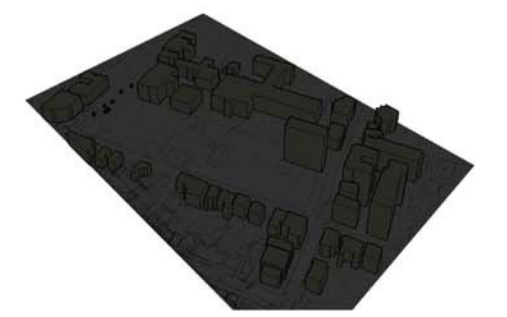
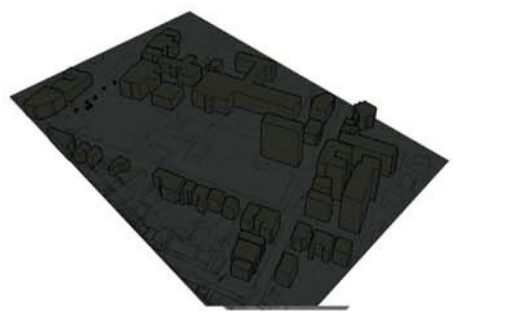
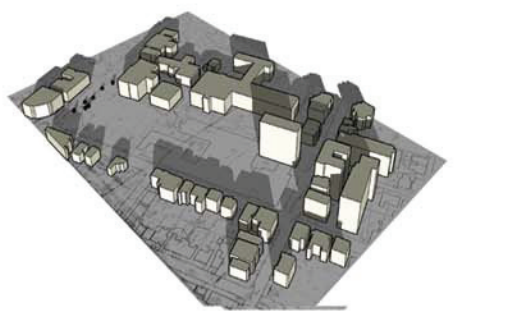
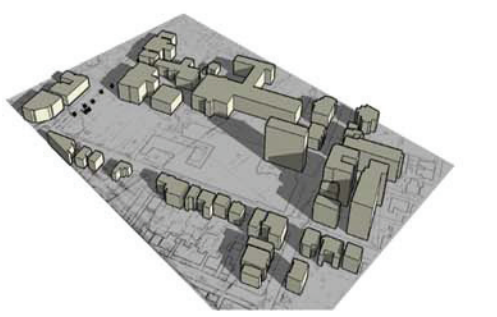
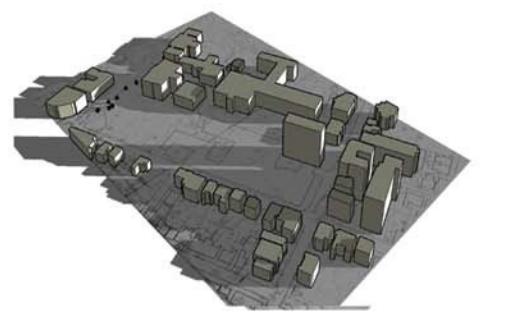
SUMMER SOLSTICE



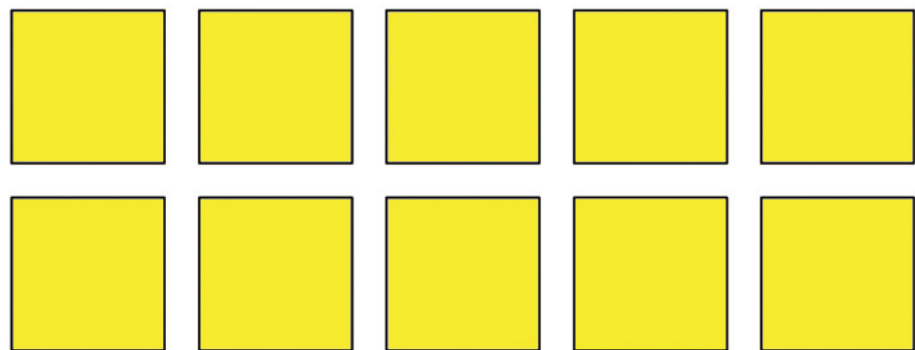
FALL EQUINOX



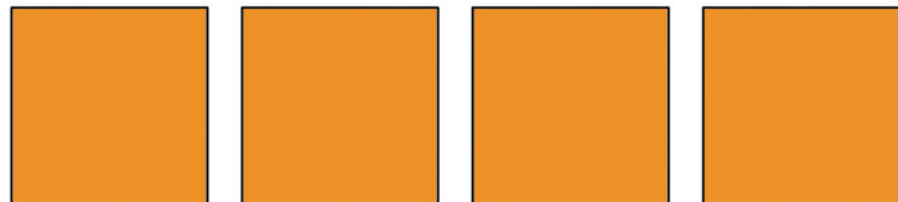
WINTER SOLSTICE



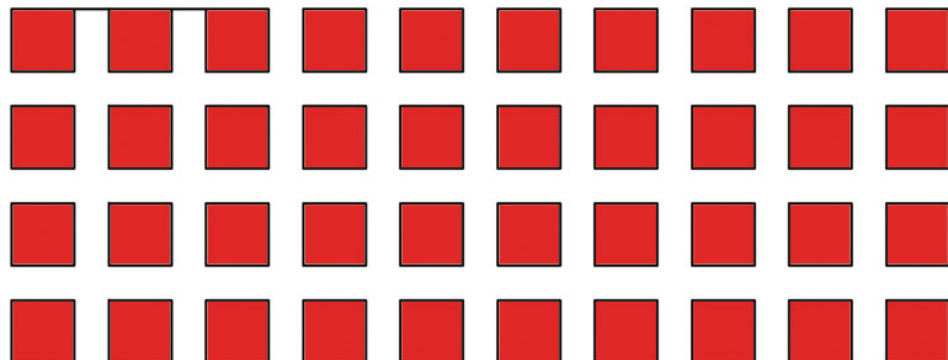
CORNER OF
QUEEN ST. & MORRIS ST..



SEMINAR ROOMS
(10x120 sq.m)



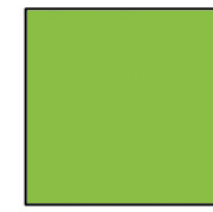
LECTURE ROOMS
(4x200 sq.m)



OFFICES
(40x20 sq.m)



MEDIA CENTER
(200 sq.m)



CAMPUS BOOK STORE
(200 sq.m)



RECEPTION / ADMINISTRATION
(100 sq.m)



RESTAURANT
(100 sq.m)



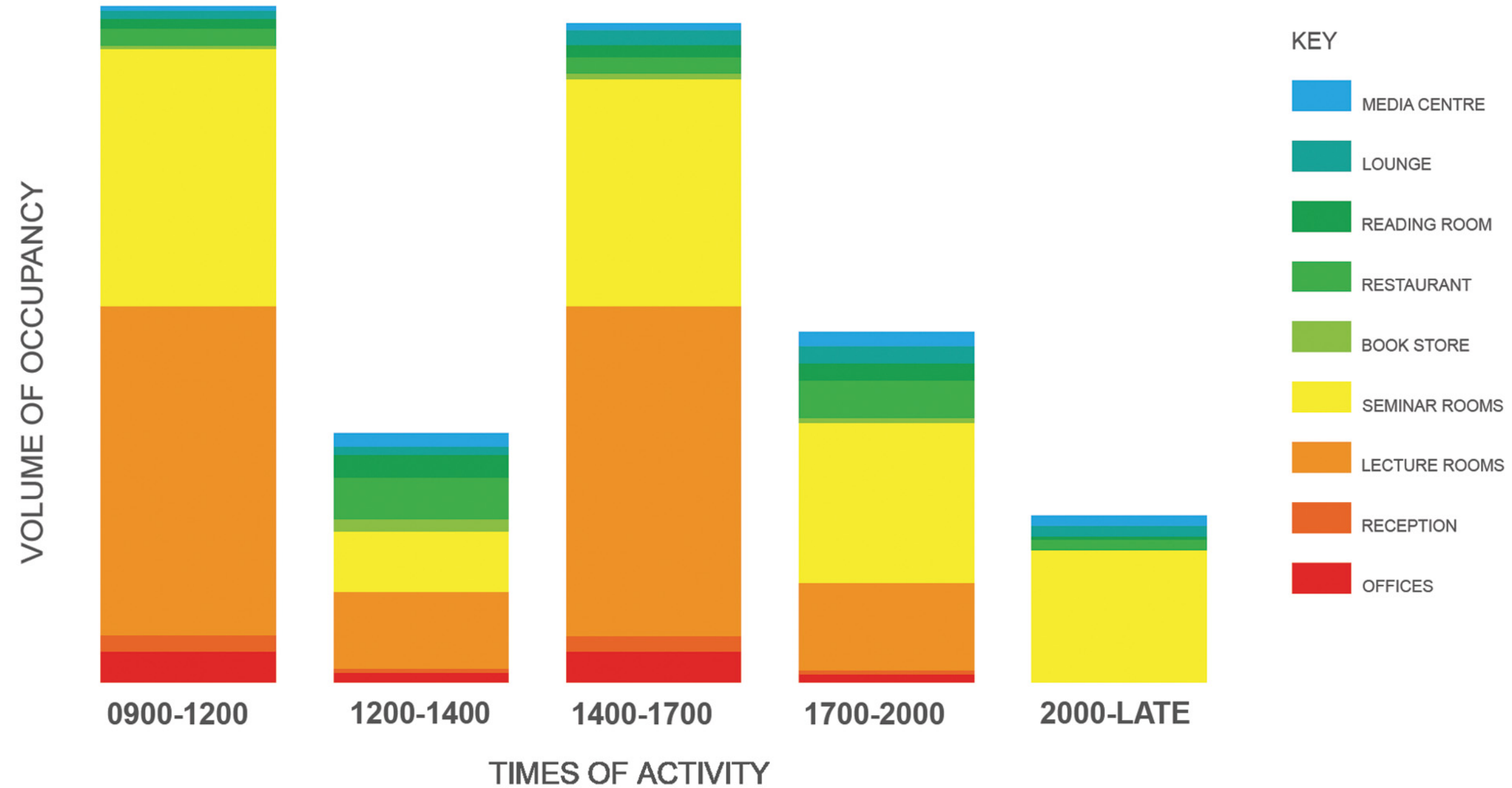
READING ROOM
(100 sq.m)



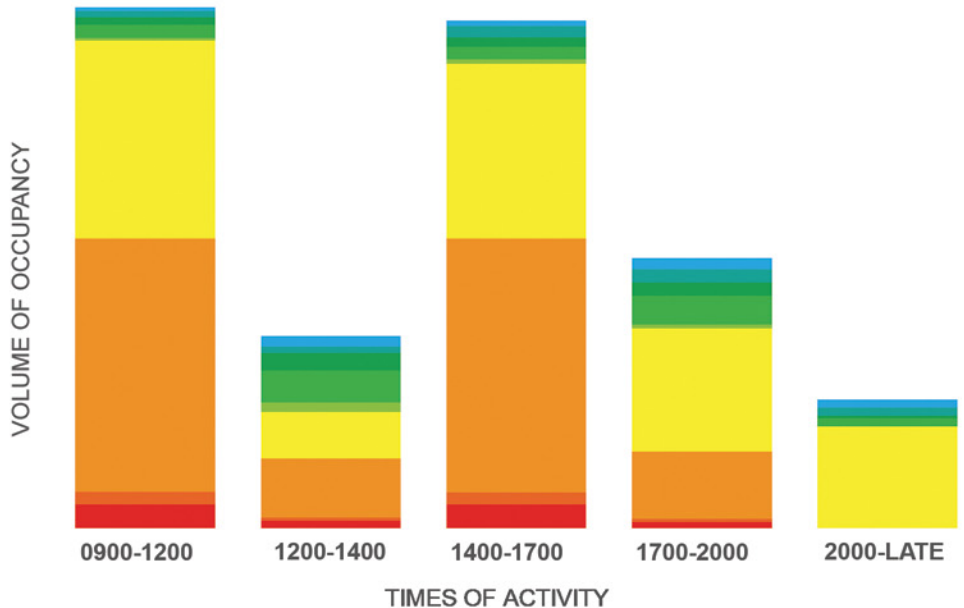
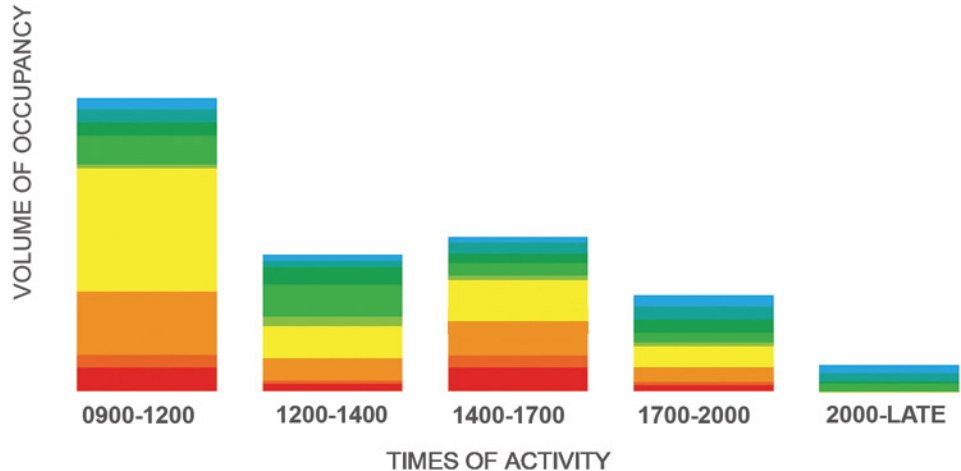
LOUNGE
(100 sq.m)

DAILY FLUCTUATIONS IN ACTIVITY GRAPH

Typical schoolweek day:

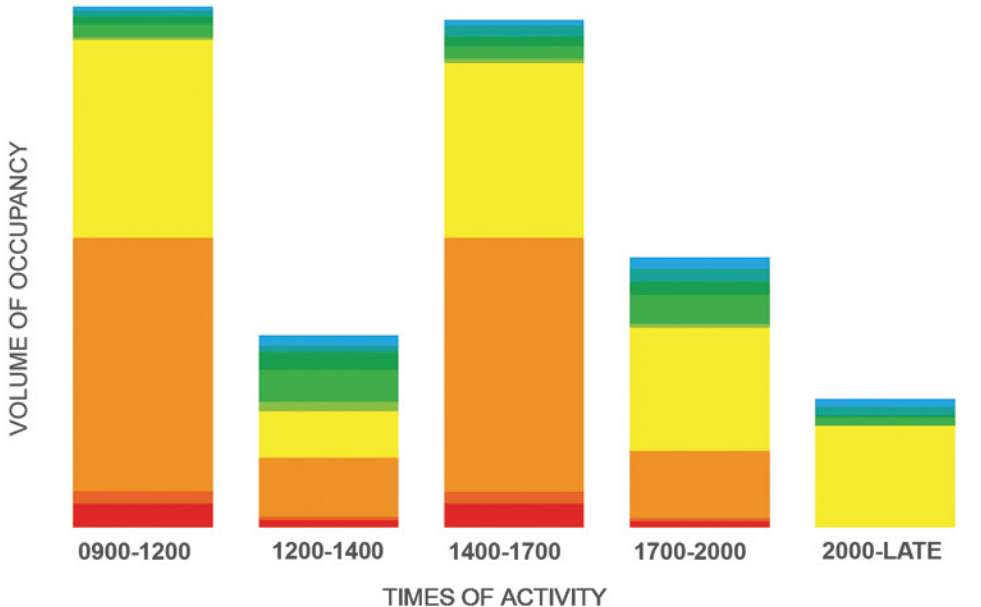
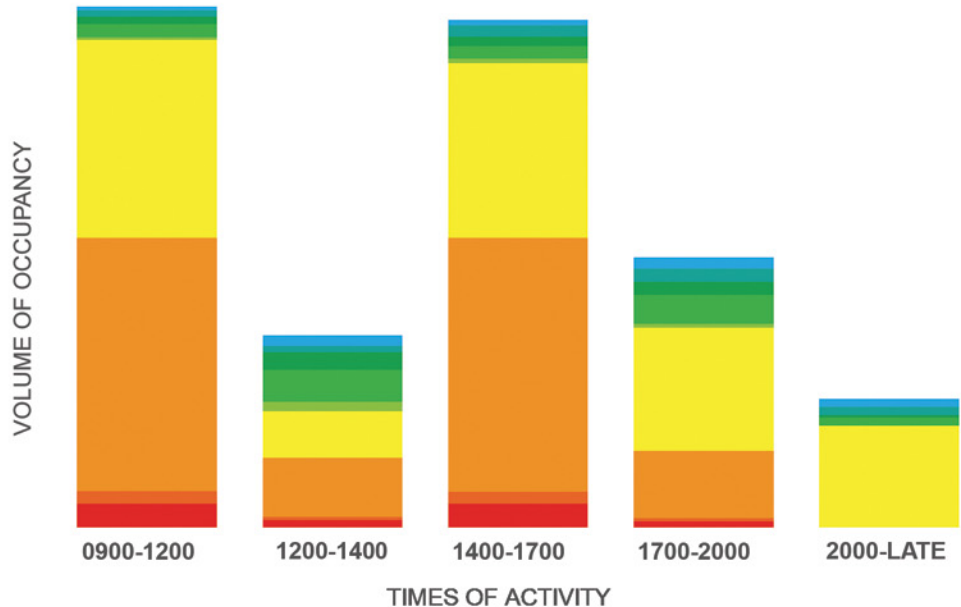


SEASONAL FLUCTUATIONS



SUMMER

FALL



WINTER

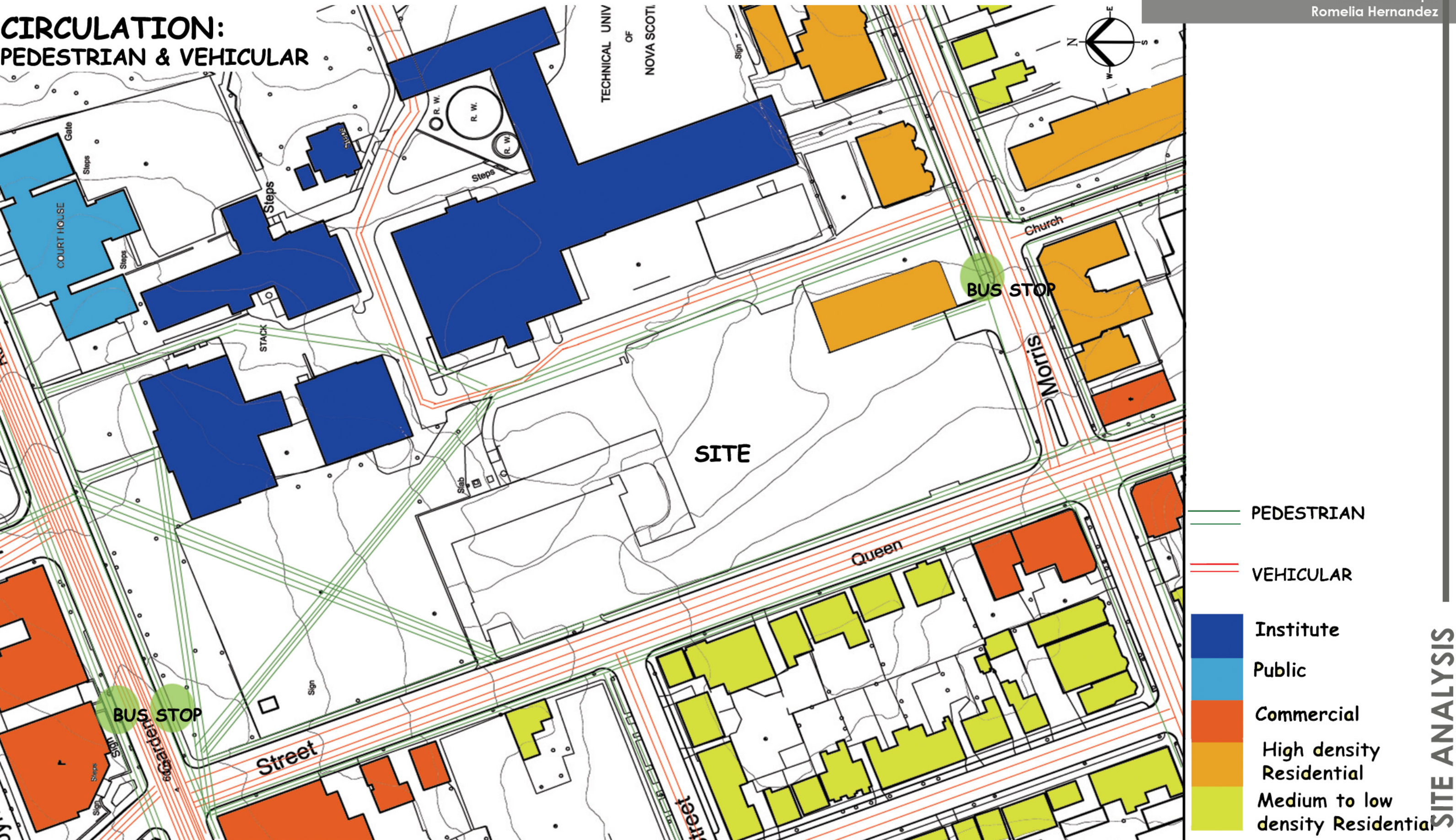
SPRING

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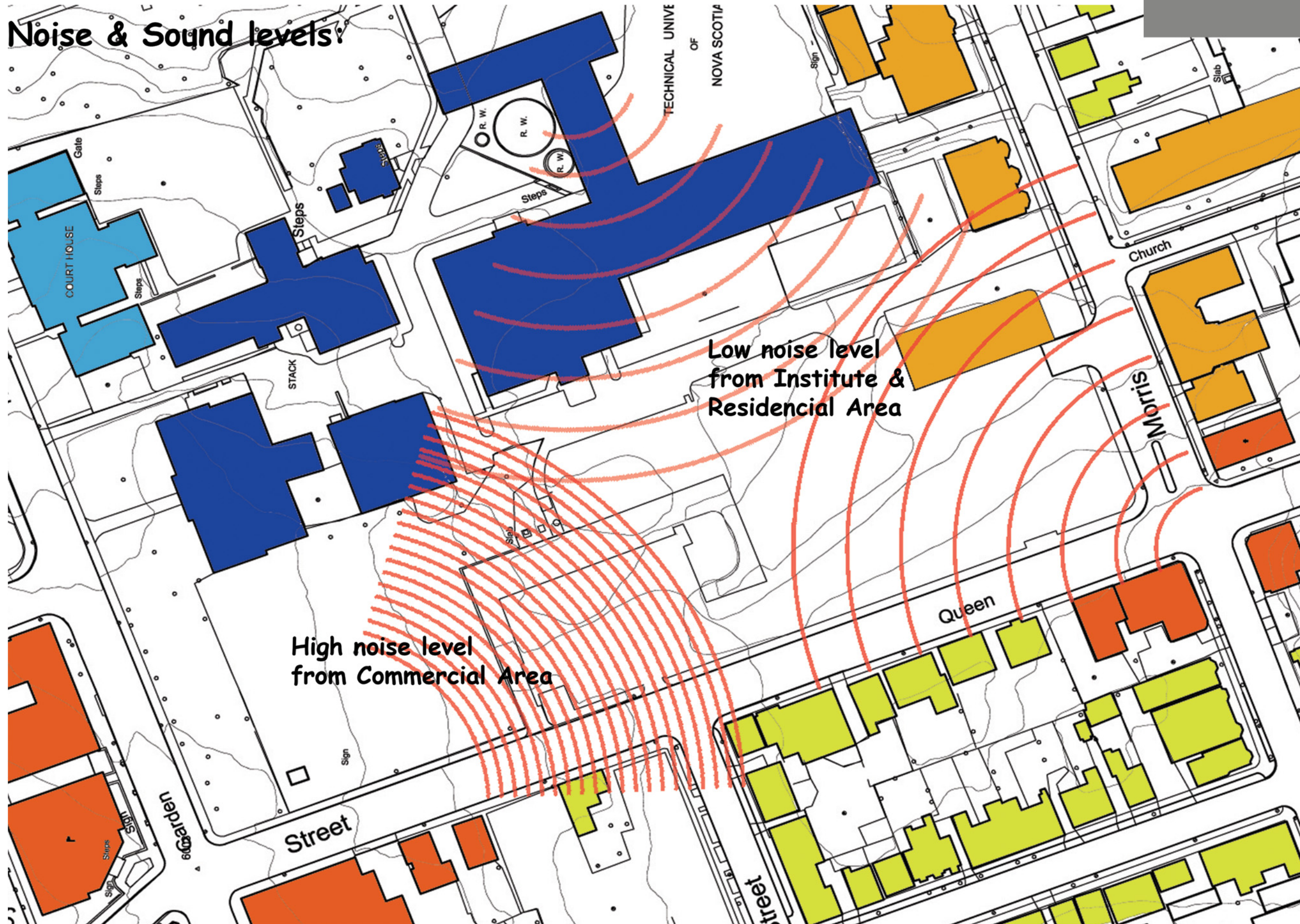
CIRCULATION: PEDESTRIAN & VEHICULAR



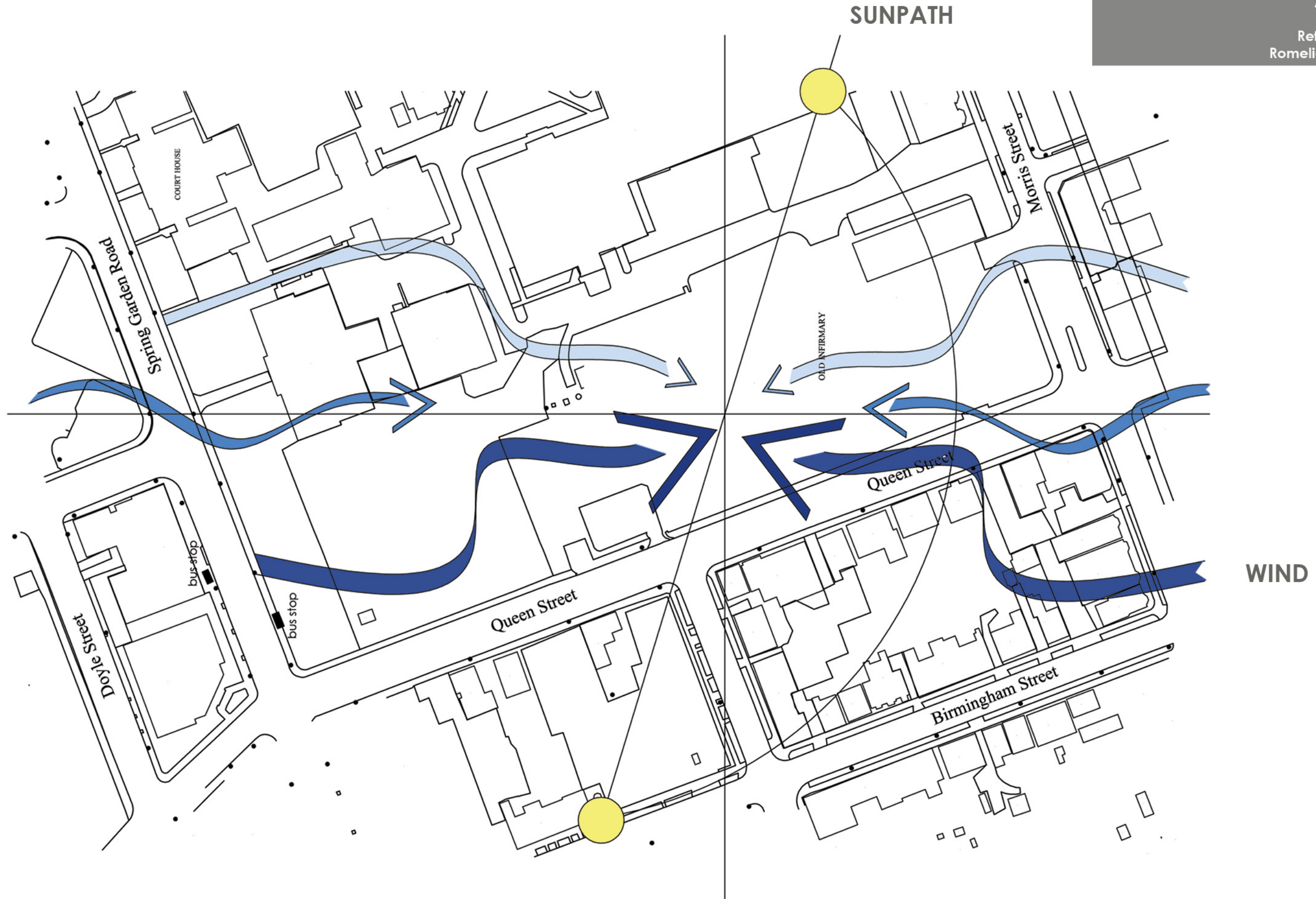
SITE ANALYSIS

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Noise & Sound levels!



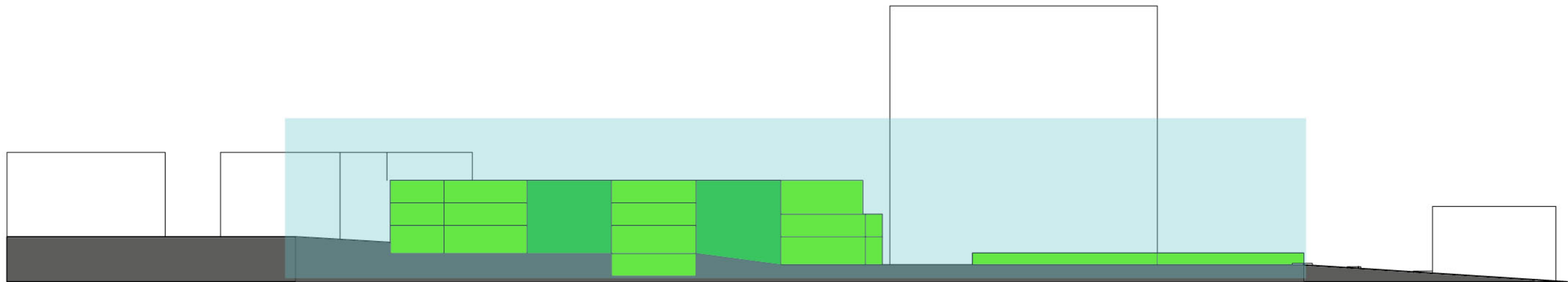
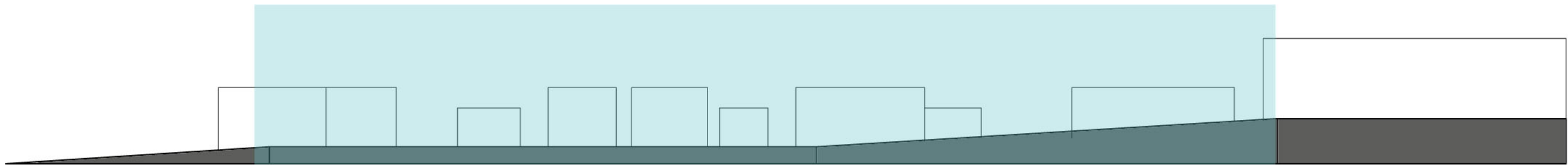
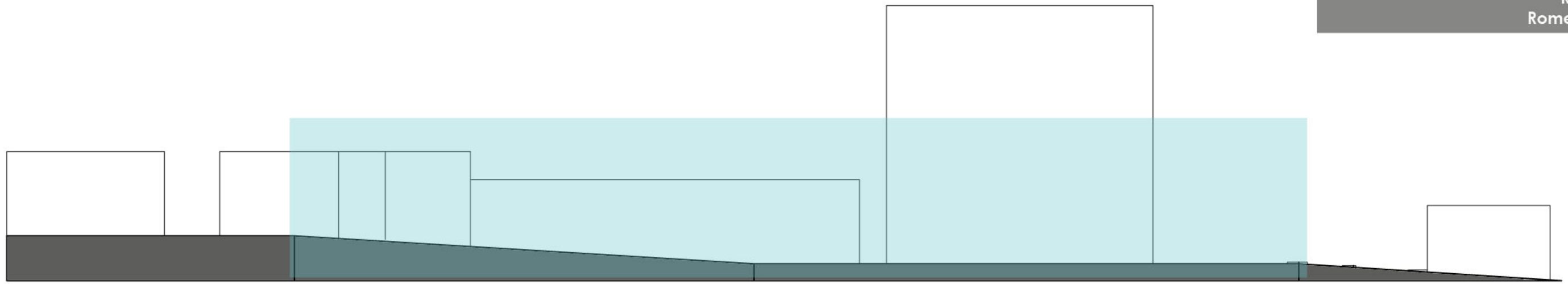
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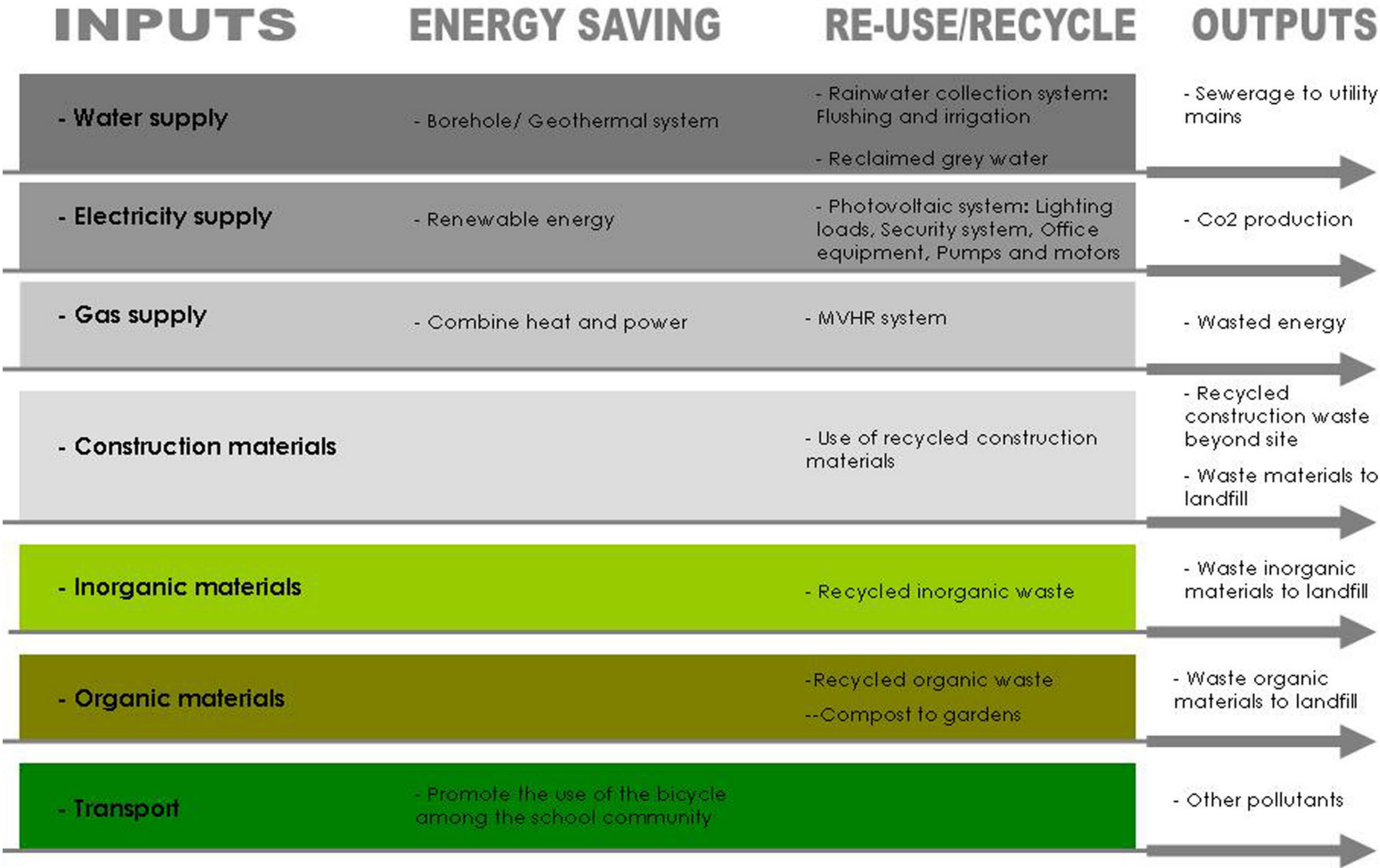


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METABOLISM



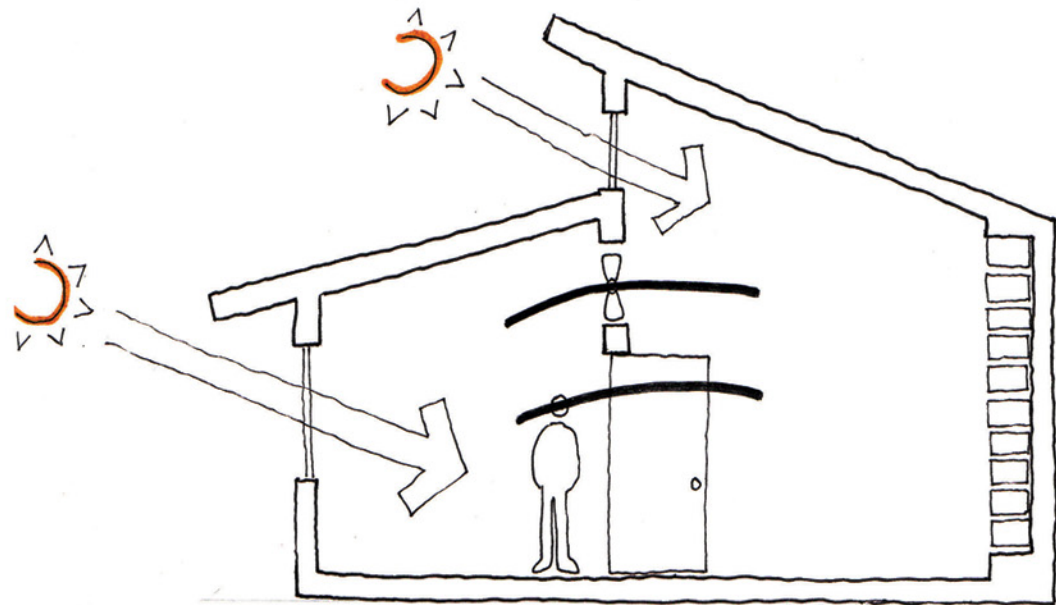
METABOLISM

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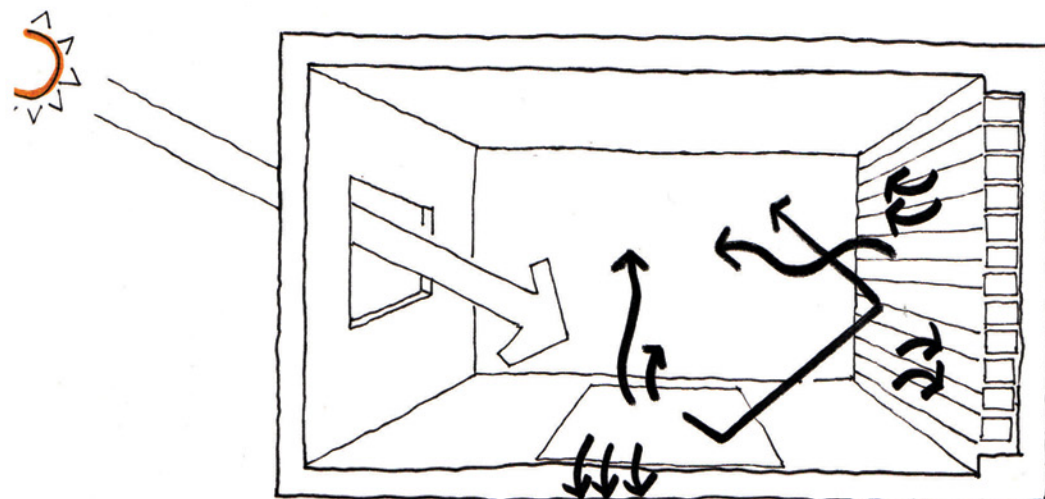


ELECTRICAL LOADS:

Appliance	kWh CONVENTIONAL PRODUCTS	kWh ENERGY SAVING PRODUCTS	POTENTIAL ENERGY SAVINGS
DESKTOP PC	1 hr/y = 50 5 hr/y = 250 8 hr/y = 400	1 hr/y = 25 5 hr/y = 125 8 hr/y = 200	50%
FAX MACHINES	1 hr/y = 30 5 hr/y = 150 8 hr/y = 240	1 hr/y = 13 5 hr/y = 65 8 hr/y = 104	55%
LASER PRINTERS	1 hr/y = 75 5 hr/y = 375 8 hr/y = 600	1 hr/y = 27 5 hr/y = 135 8 hr/y = 216	65%
COPIER (MEDIUM)	1 hr/y = 120 5 hr/y = 600 8 hr/y = 960	1 hr/y = 54 5 hr/y = 270 8 hr/y = 432	55%
COPIER (LARGE)	1 hr/y = 280 5 hr/y = 1400 8 hr/y = 2240	1 hr/y = 120 5 hr/y = 600 8 hr/y = 960	55%
TOTAL			
kWh/unit			
1 Hrs	555 kwh	239 kwh	
5 Hrs	2775 kwh	1195 kwh	
8 Hrs	4440 kwh	1912 kwh	

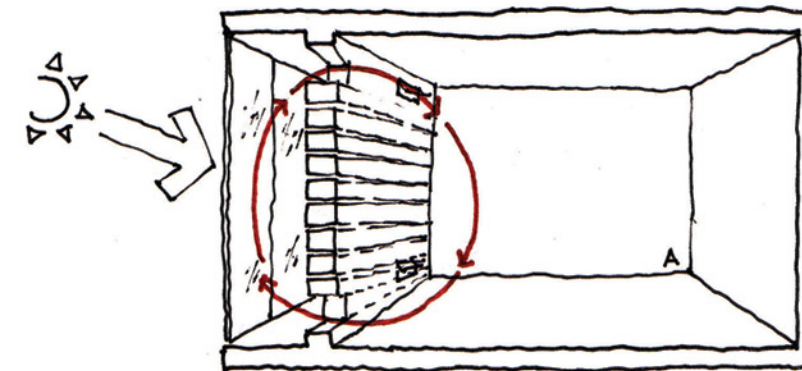


DIRECT GAIN

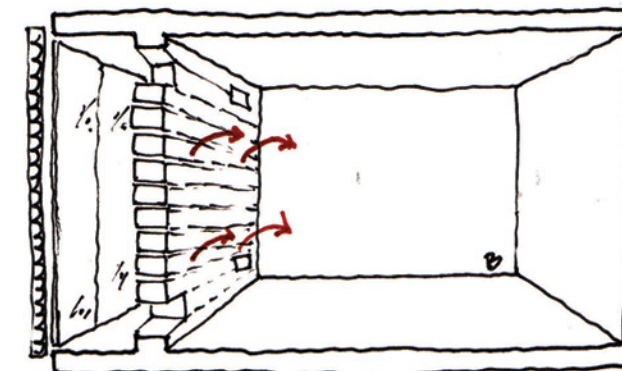


SUN

PASSIVE SOLAR HEATING SYSTEM



TROMBLE WALL SYSTEM



1. a) & b)

This drawing illustrates the main factors affecting the performance of direct gain on buildings which are:

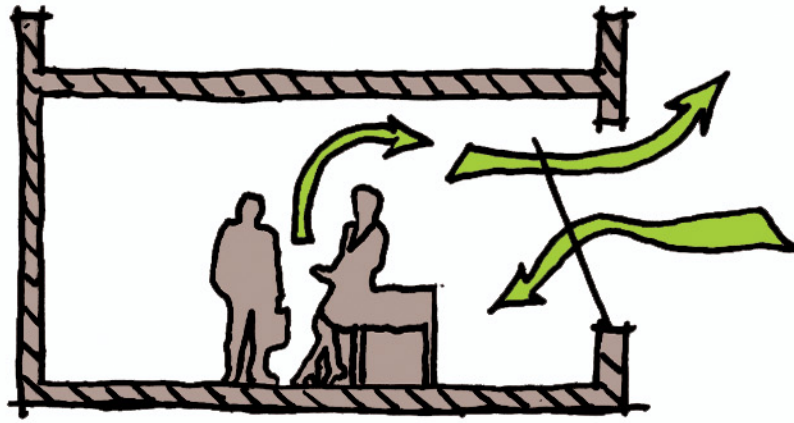
- orientation and location of the solar glazing. The size and type.
- The amount and design details of the mass available for thermal storage
- Heat loss coefficient of the building as a whole
- Thermal coupling between solar and nonsolar rooms
- control options of heat gain and loss through the glazing.

2. a) & b)

This drawing illustrates the advantages of tromble walls which are:

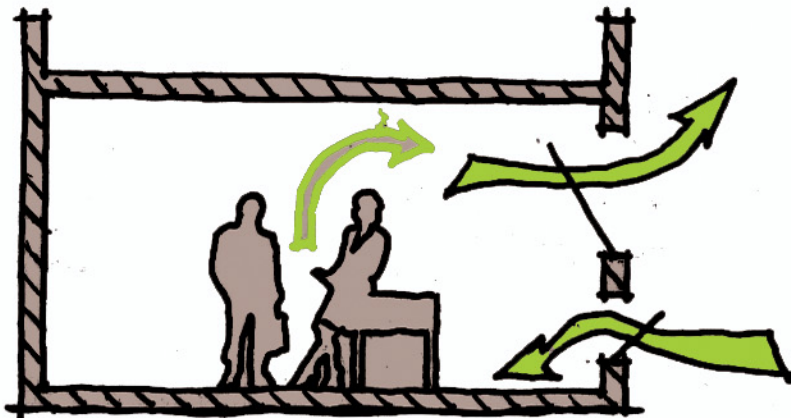
- The indoor temperatures are more stable than in most other passive systems.
- Excessive sunshine and its associated functional problems, does not penetrate into the spaces.
- Installation is relatively inexpensive where construction would normally be masonry.

NATURAL VENTILATION SYSTEMS:



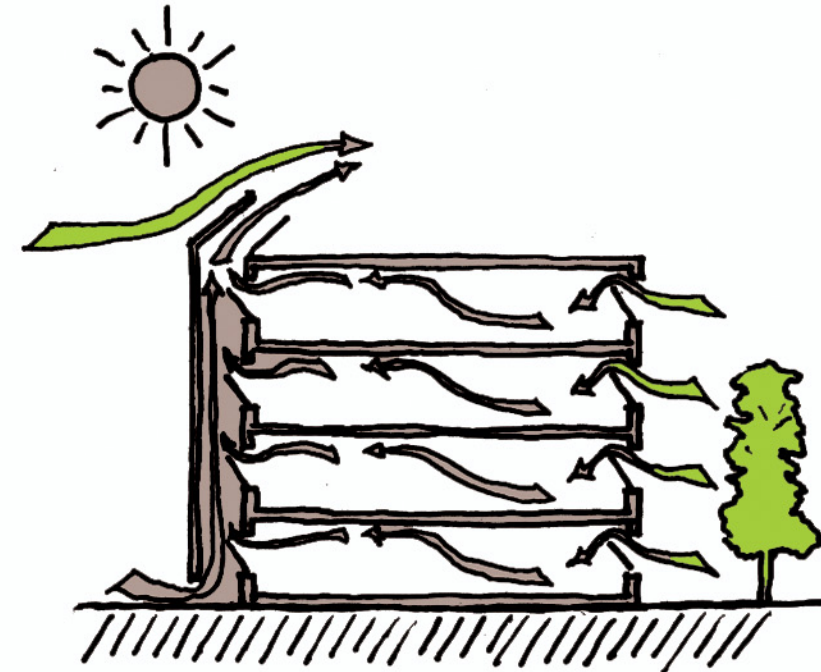
Single Sided Ventilation:

Rooms with windows on one side only. Cold air stream in, and warm air will stream out again through the same window. This kind of ventilation is normal and generally practised, but is only useful up to a certain room depth



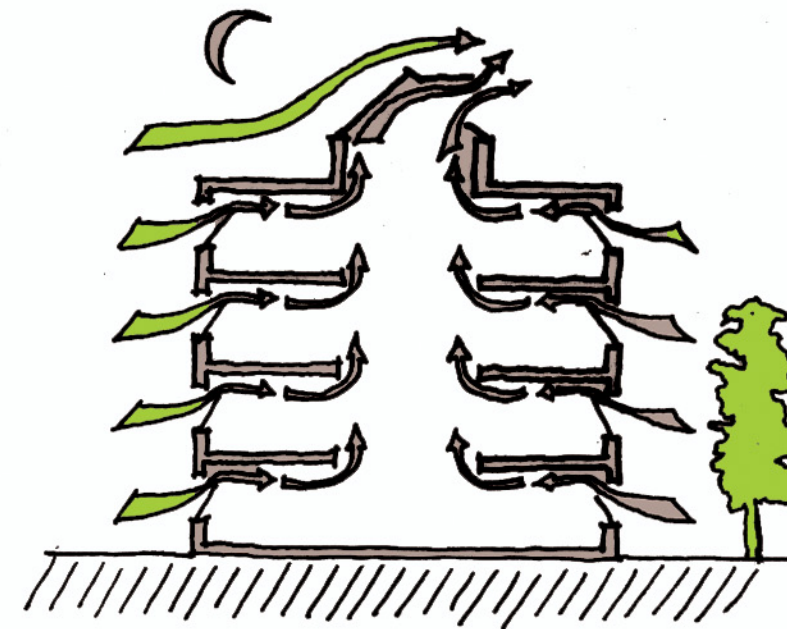
Single Sided Double Opening:

An advancement of the single sided principle provides a double opening, which is considerably more efficient.



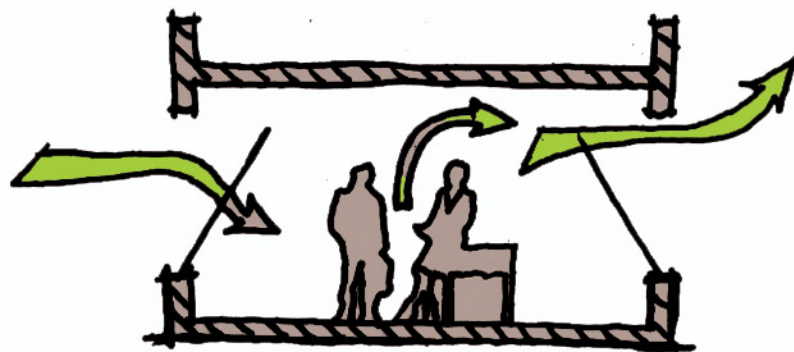
Stack Ventilation:

In a similar way to smoke ventilation, the natural buoyancy of hot air is used to allow venting through high level vents. Replacement fresh air enters from the lower vents. An advancement of this system is via a double facade. This works on the same principle as the previous but also offers an ideal solution when the building is adjacent to roads and areas of high acoustic emissions.



Passive Cooling:

Floor slabs can absorb heat build up during daytime usage through a combination of solar gain, electronic equipment and user occupancy. As the external temperature drops at night, the building can be cooled by partially opening the vents around the building. Often called night-cooling or night purging



Cross Ventilation:

In the case of cross-ventilation (windows open on both sides of the room/building) the pressure difference is used between the side of the building facing the wind and the side away from the wind. The +ve pressure on the windward &/or vacuum effect on the lee side of the building, causes air movement through the building from the windward to the lee side.

In order to obtain the optimal airflow with minimal draught, the windows on the windward side are opened less than on the lee side.