BIM for Construction

get ready to change

am+ studio srl

BIM design and consultancy

Opportunity

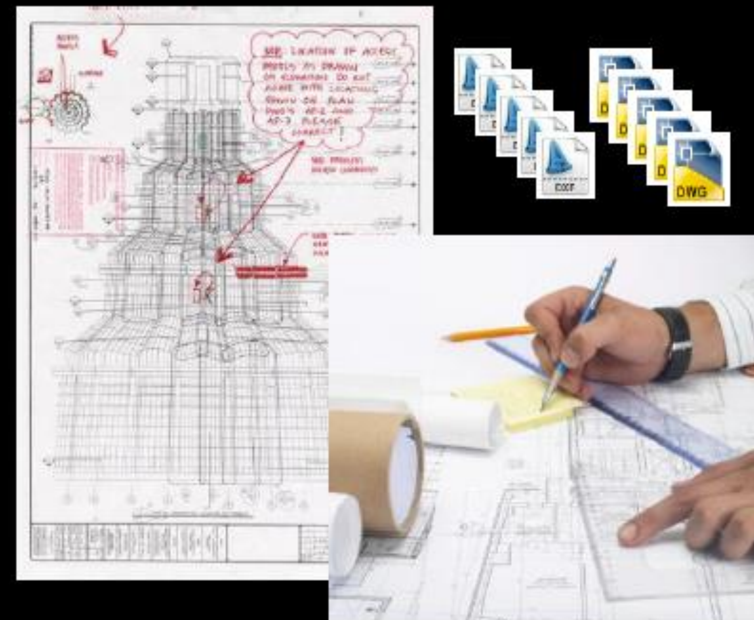
''As much as 30 percent of the cost of construction is wasted in the field due to coordination errors, wasted material, labor inefficiencies, and other problems in the current construction approach.''

CMAA Emerging Technologies Committee Members: Soad Kousheshi, P.E., and Eric Westergren, A/E/C Strategy, Inc., - Building Information Modeling and the Construction Management Practice: How to Deliver Value Today?

CAD vs BIM

Computer-Aided Drafting

- Computerized design system
- Graphical information
- Reasoning for lines
- Many files in many different formats
- Difficult collaboration
- Difficult communication
- Hard to review the work

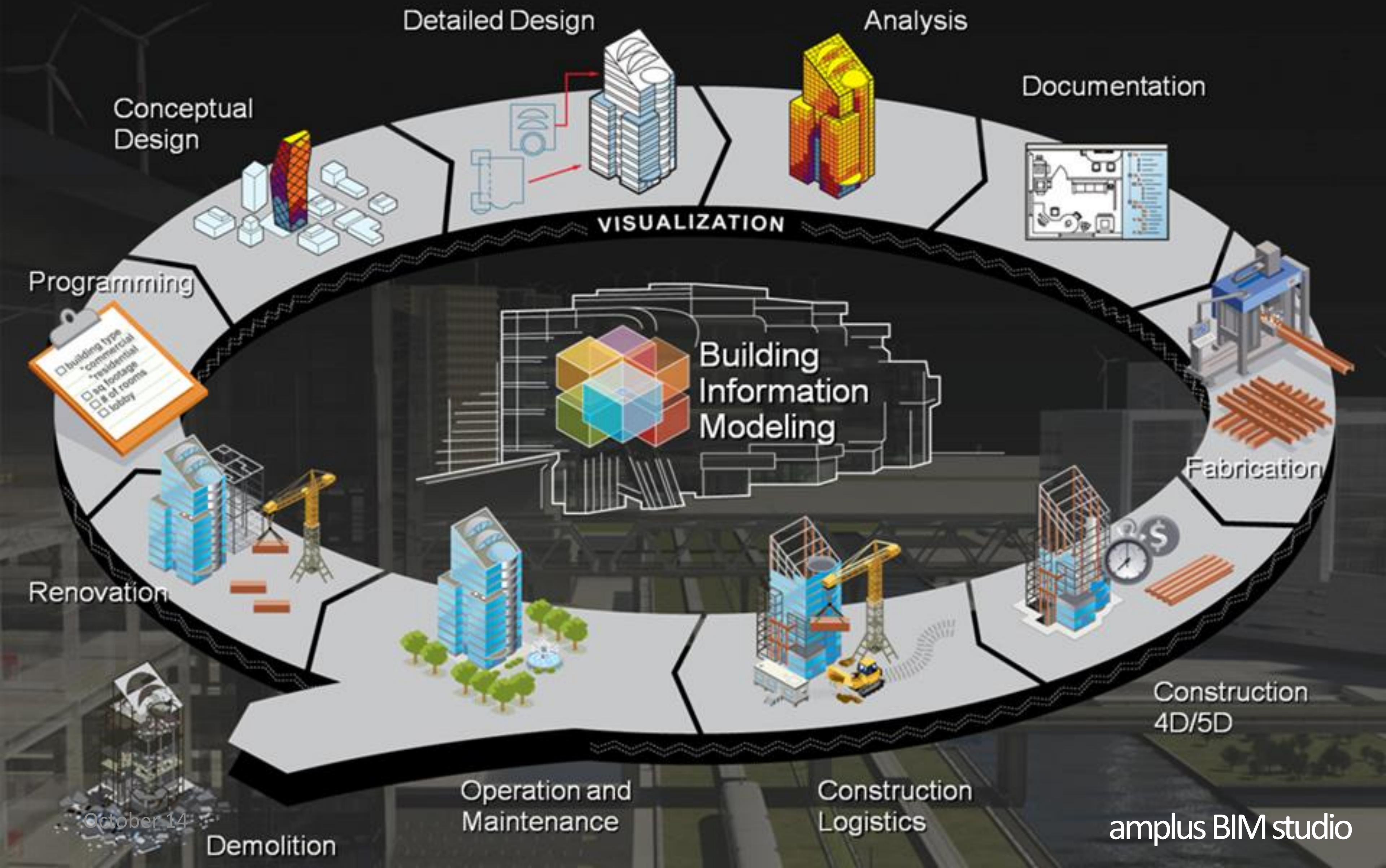


CAD vs BIM

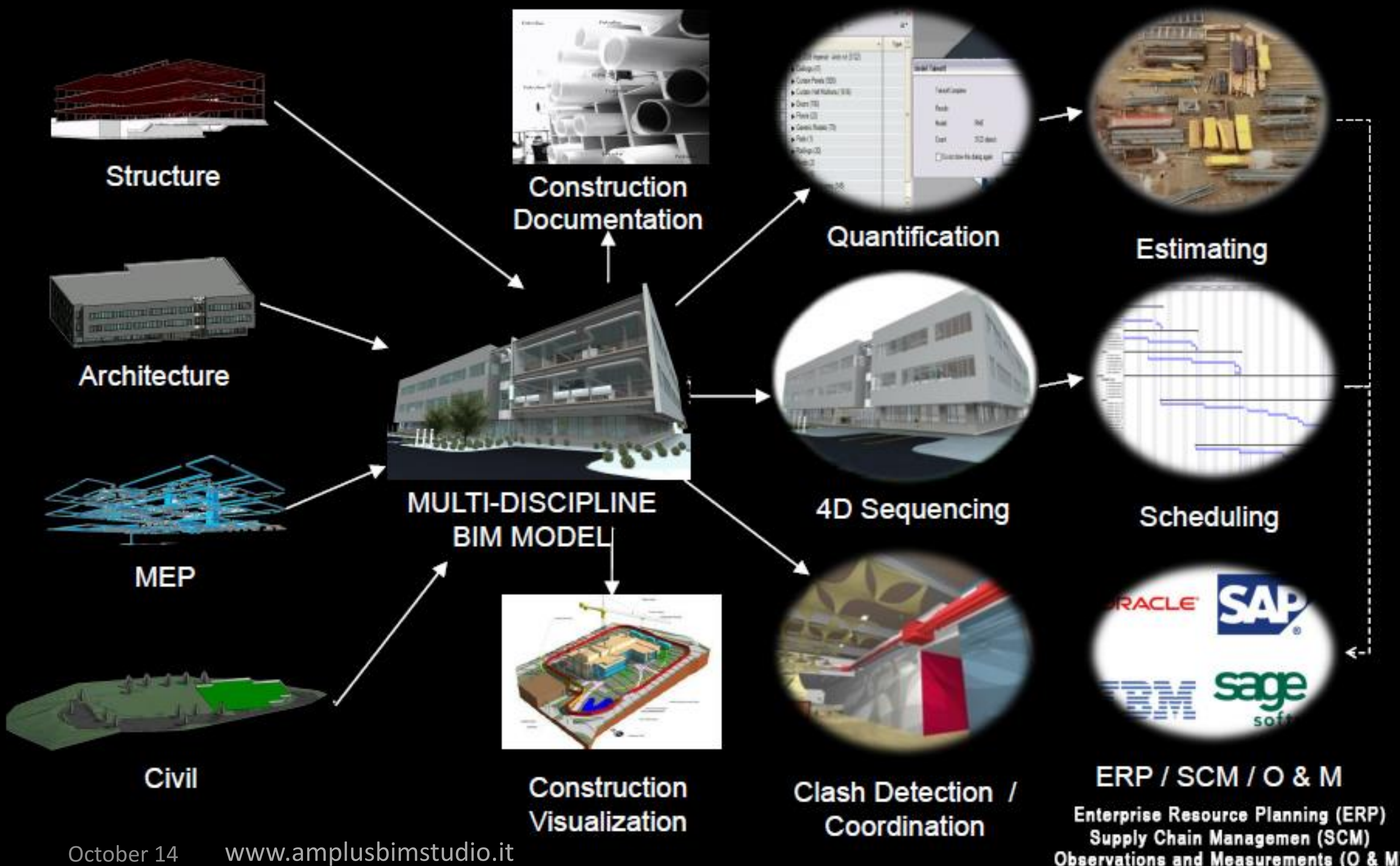
Building Information Modeling

- Software for design support
- The model contains all the information
- Reasoning for construction elements
- Single model in a single file
- Facilitates collaboration
- Facilitates communication
- Facilitates instant review of the work

Building Information Modeling - Workflow



Building Information Modeling - Workflow



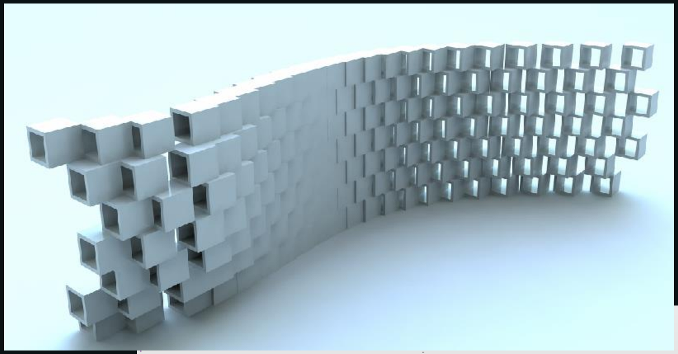
BIM for Construction

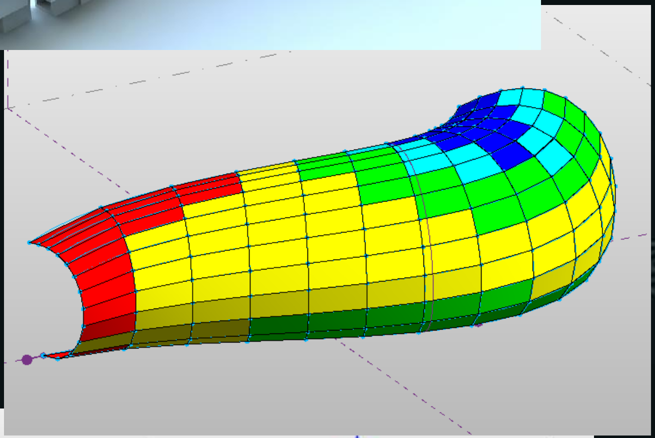
potential of BIM

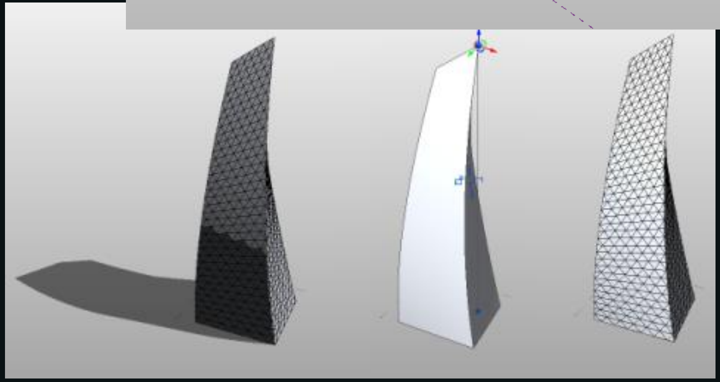
What can you do?

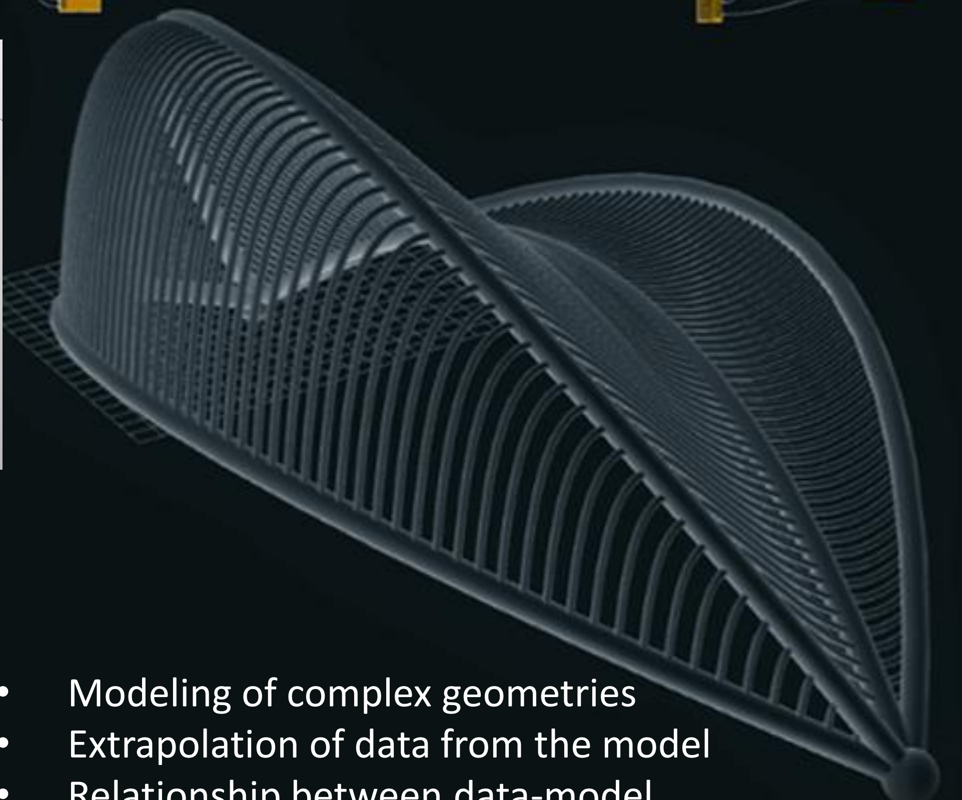
- Parametric modeling
- Energy analysis and audits
- Architectural design
- Structural design
- MEP design
- Infrastructure design
- Constructive models
- Checking interference
- Management of the site
- Facility management

Parametric modeling



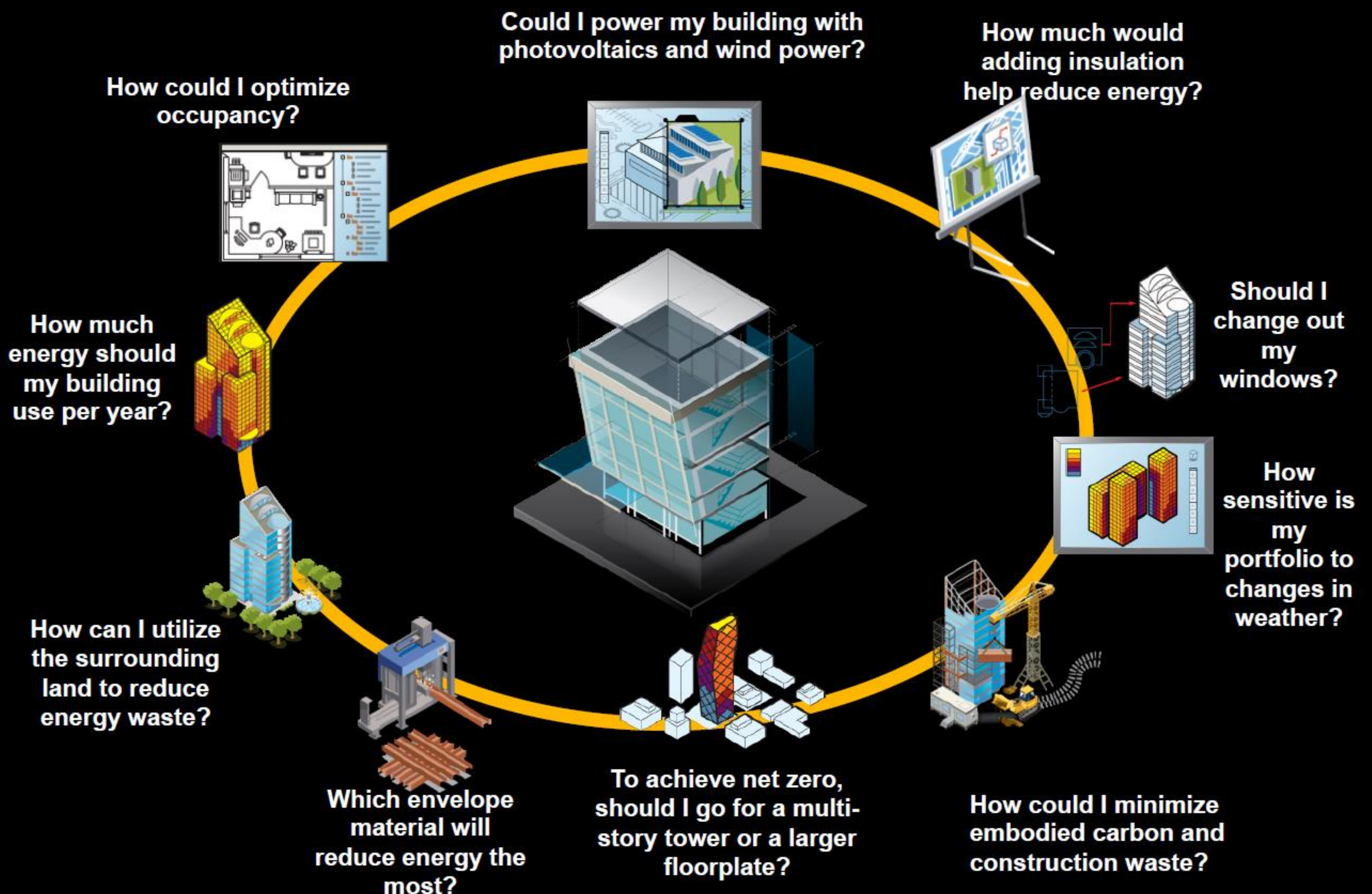






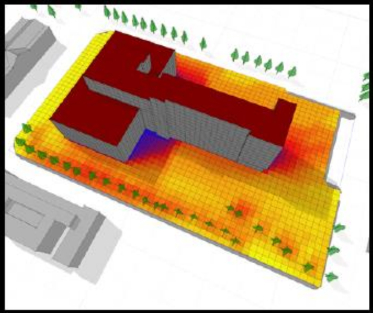
- Modeling of complex geometries
- Extrapolation of data from the model
- Relationship between data-model

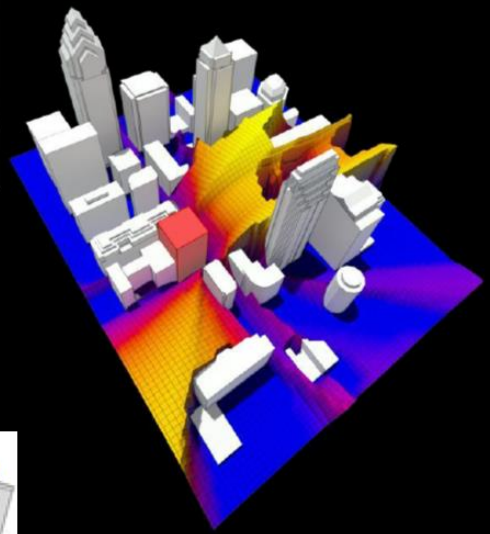
Energy analysis and audits

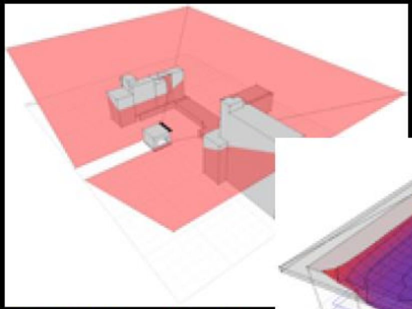


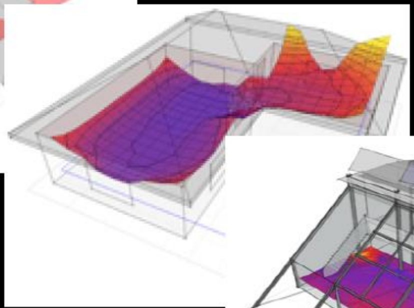
Energy analysis and audits

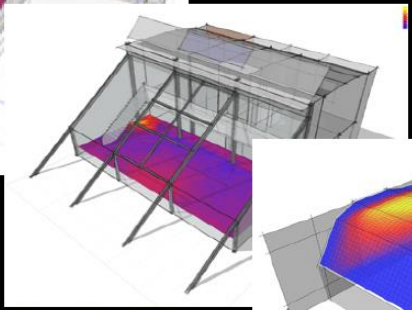
- Conceptual early analysis solution
- Site and Campus analysis
- Whole or partial building analysis
- Environmental Analysis
- Analyze Energy Efficiency
- Powerful visual feedback
- Real-Time interaction with data
- Facilitates LEED compliance

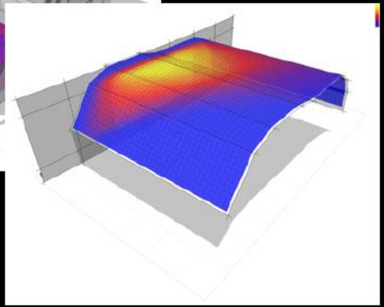

Solar Radiation

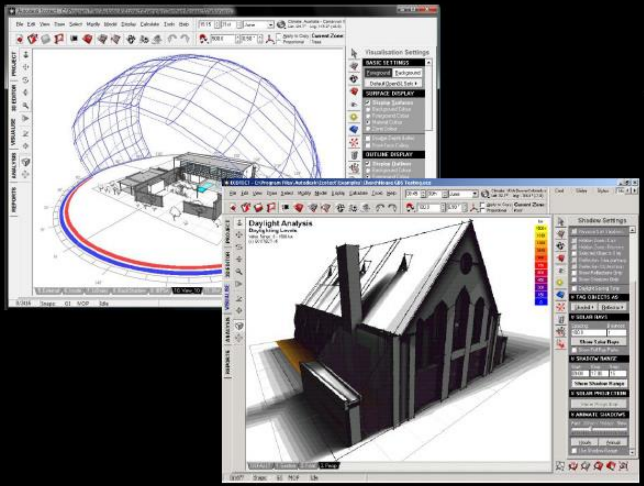



Right to Light

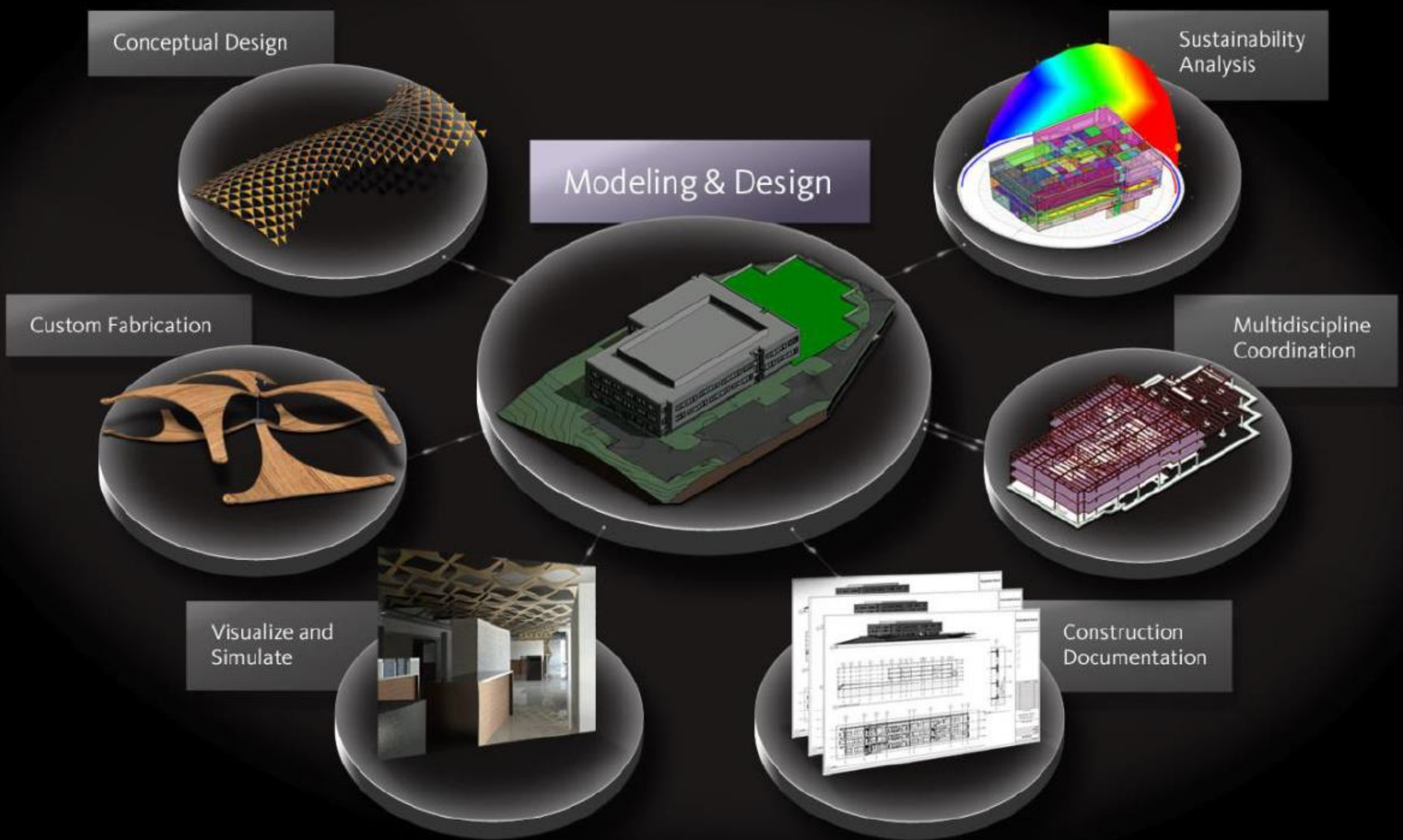

Thermal


Daylighting

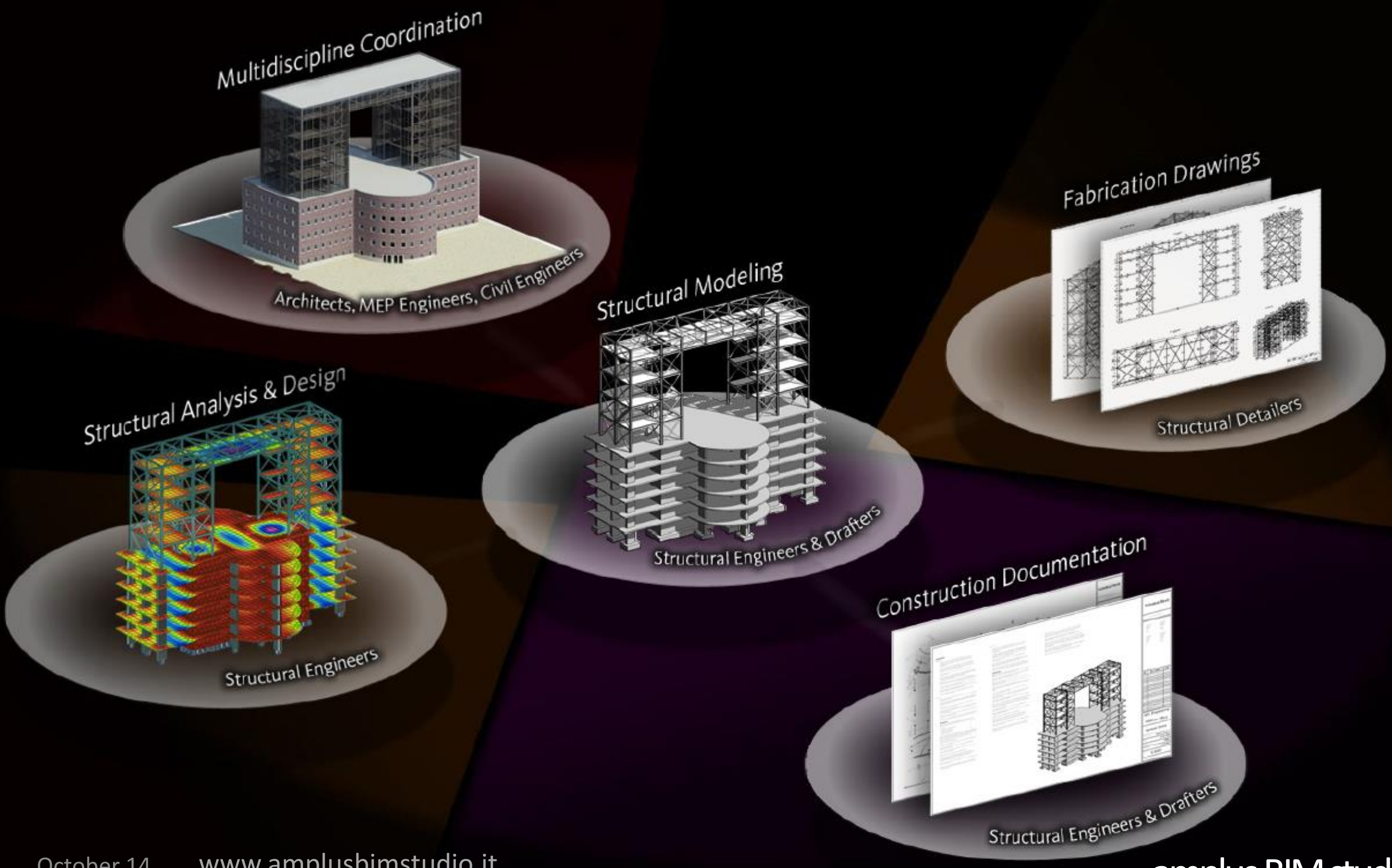

Shading Design


Shadows and Reflections

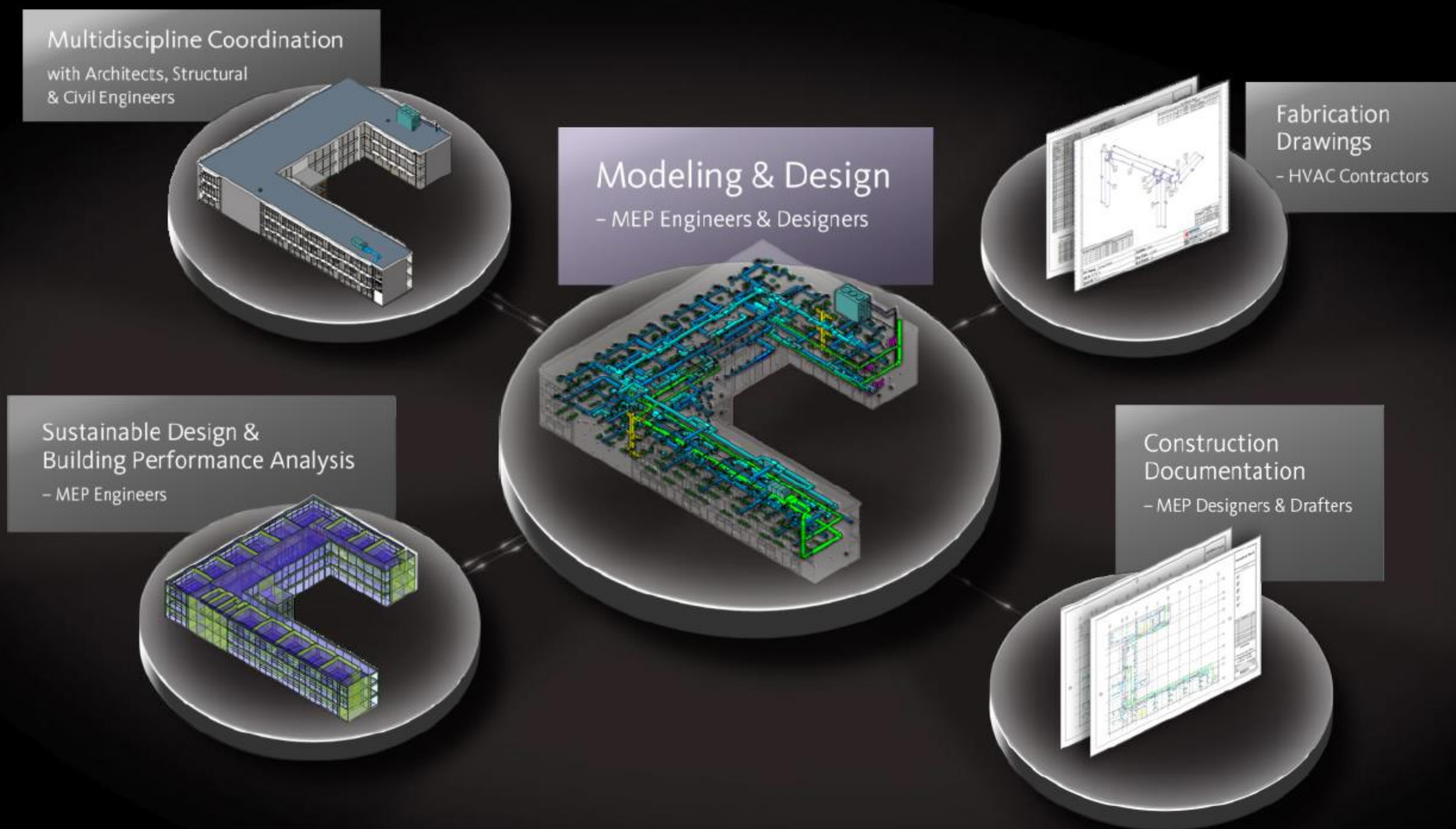
Architectural design



Structural design

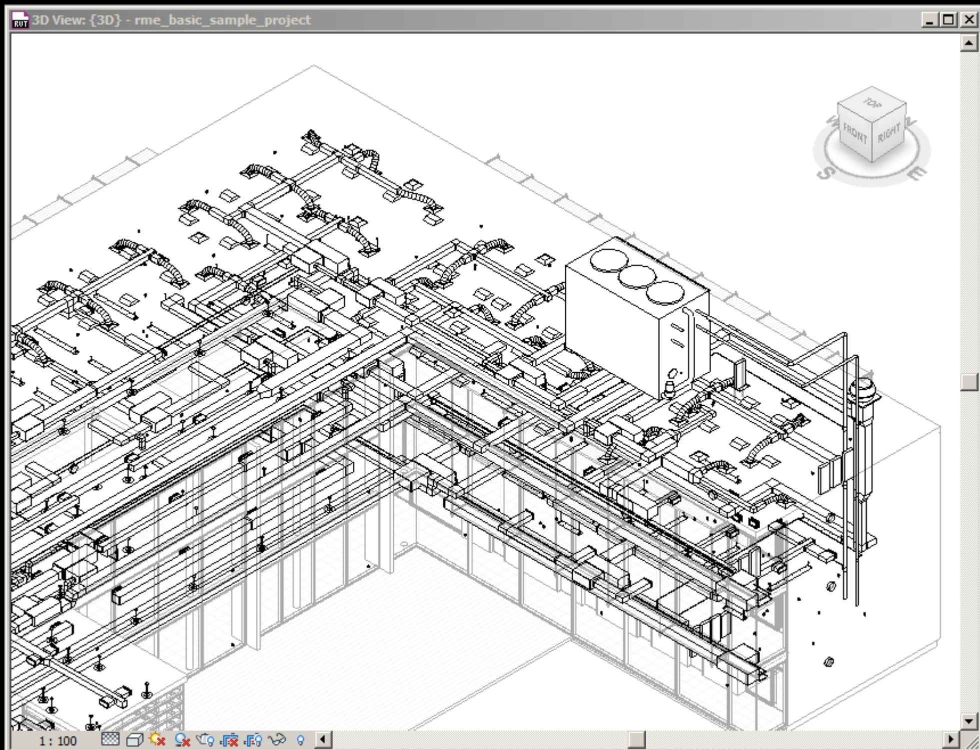


MEP design



Multidiscipline Coordination
with Architects, Structural
& Civil Engineers
Modeling & Design
– MEP Engineers & Designers
Fabrication
Drawings
– HVAC Contractors
Sustainable Design &
Building Performance Analysis
– MEP Engineers
Construction
Documentation
– MEP Designers & Drafters

Relationship between data-model

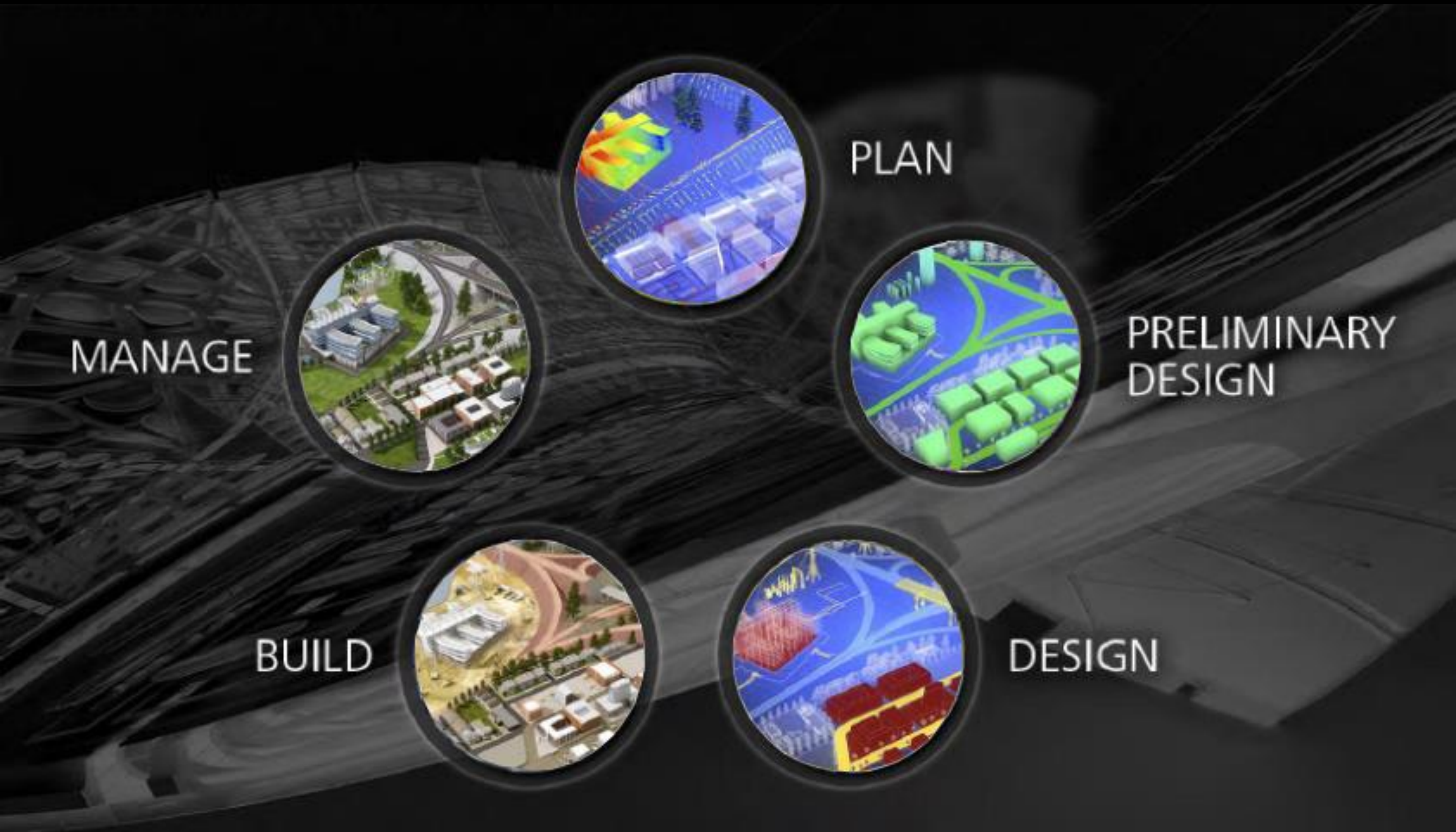


Schedule: Air Terminal Schedule - rme_basic_sample_project

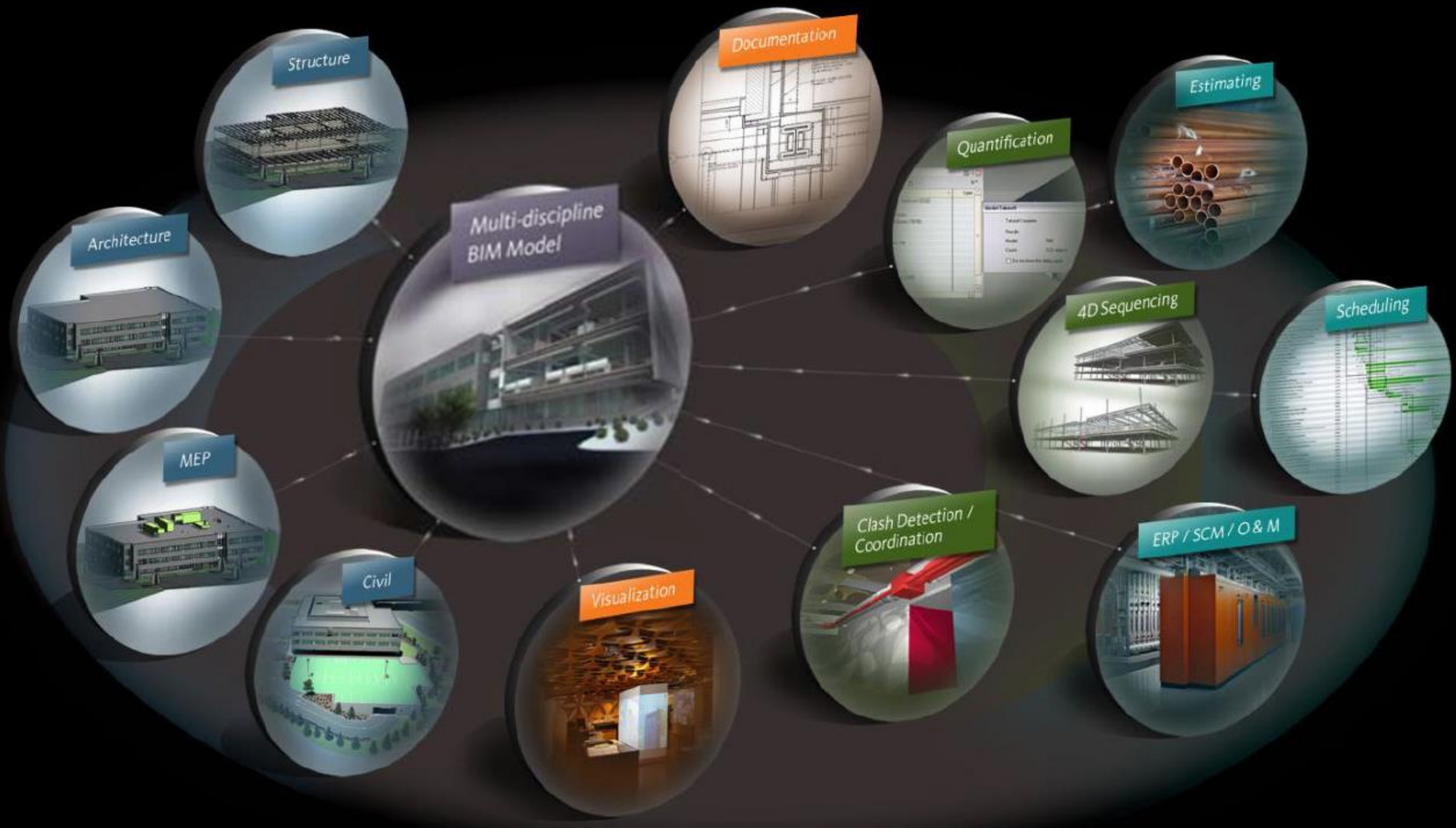
Air Terminal Schedule

Mark	Type	Flow	System Type
326	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
329	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
330	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
331	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
332	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
335	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
336	600 x 600 Face 300 x 300 Connection	180.0 L/s	Return Air
339	600 x 600 Face 300 x 300 Connection	200.0 L/s	Return Air
340	600 x 600 Face 300 x 300 Connection	200.0 L/s	Return Air
362	600 x 600 Face 300 x 300 Connection	235.0 L/s	Return Air
363	600 x 600 Face 300 x 300 Connection	235.0 L/s	Return Air
Return Air: 92			
5	600x600 - 250 Neck	110.0 L/s	Supply Air
6	450 x 200	75.0 L/s	Supply Air
7	450 x 200	100.0 L/s	Supply Air
8	450 x 200	100.0 L/s	Supply Air
9	450 x 200	75.0 L/s	Supply Air
10	450 x 200	100.0 L/s	Supply Air
11	450 x 200	100.0 L/s	Supply Air
14	450 x 200	100.0 L/s	Supply Air
15	450 x 200	50.0 L/s	Supply Air
16	450 x 200	125.0 L/s	Supply Air
17	450 x 200	125.0 L/s	Supply Air
18	450 x 200	125.0 L/s	Supply Air
19	450 x 200	125.0 L/s	Supply Air
20	450 x 200	125.0 L/s	Supply Air
21	450 x 200	125.0 L/s	Supply Air
22	450 x 200	125.0 L/s	Supply Air
23	450 x 200	75.0 L/s	Supply Air
24	450 x 200	75.0 L/s	Supply Air
25	450 x 200	75.0 L/s	Supply Air
26	450 x 200	150.0 L/s	Supply Air
27	450 x 200	150.0 L/s	Supply Air
28	450 x 200	150.0 L/s	Supply Air
29	450 x 200	150.0 L/s	Supply Air
30	450 x 200	150.0 L/s	Supply Air
31	450 x 200	150.0 L/s	Supply Air

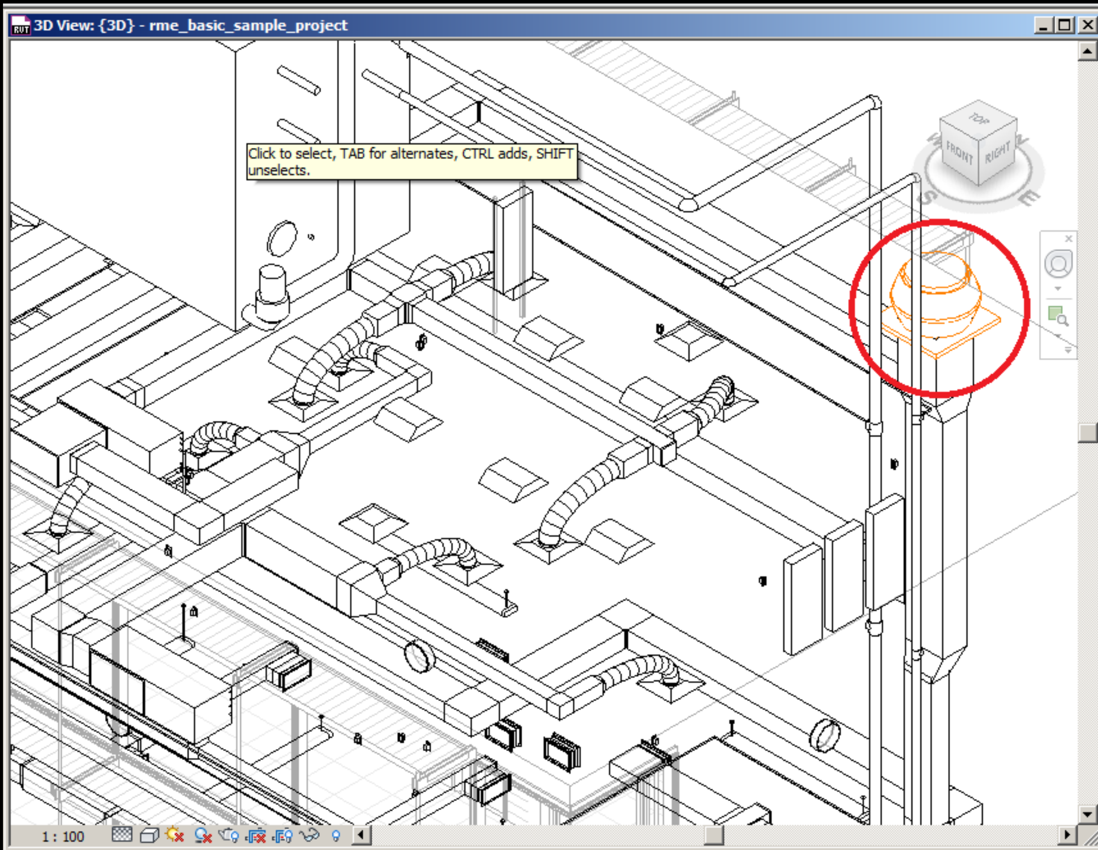
Infrastructure design

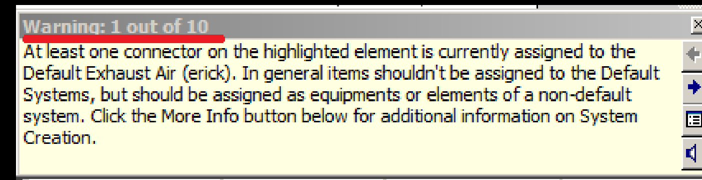


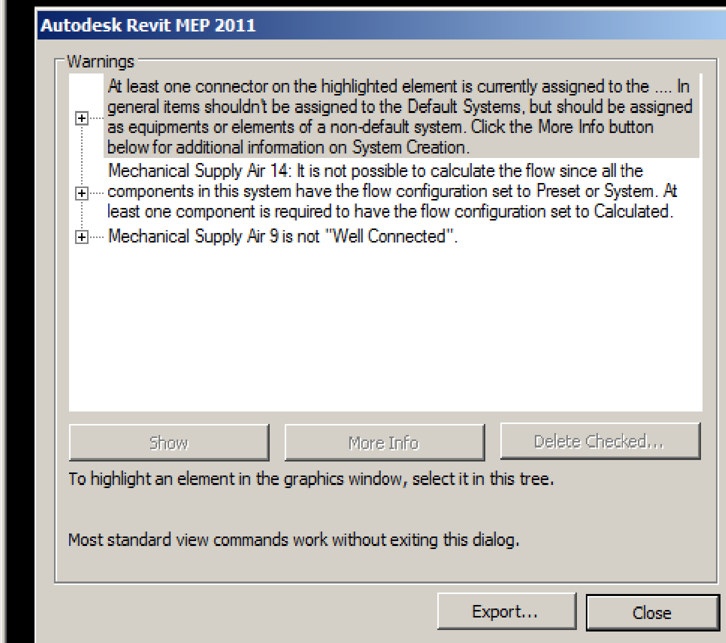
Constructive models



Checking interference

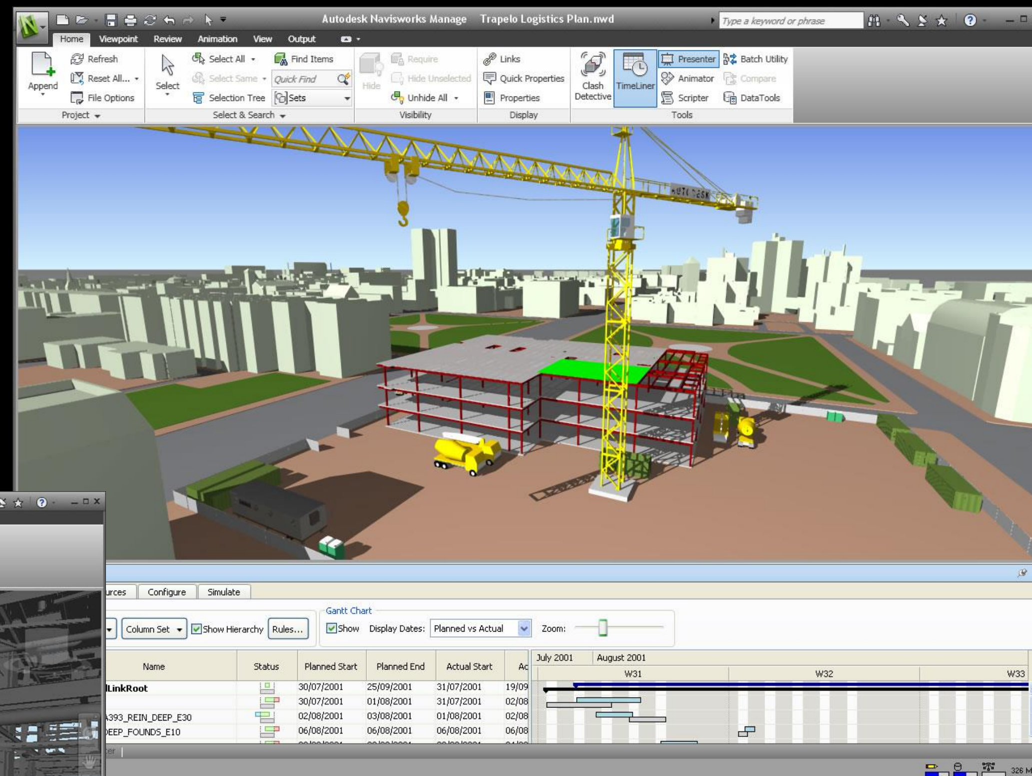


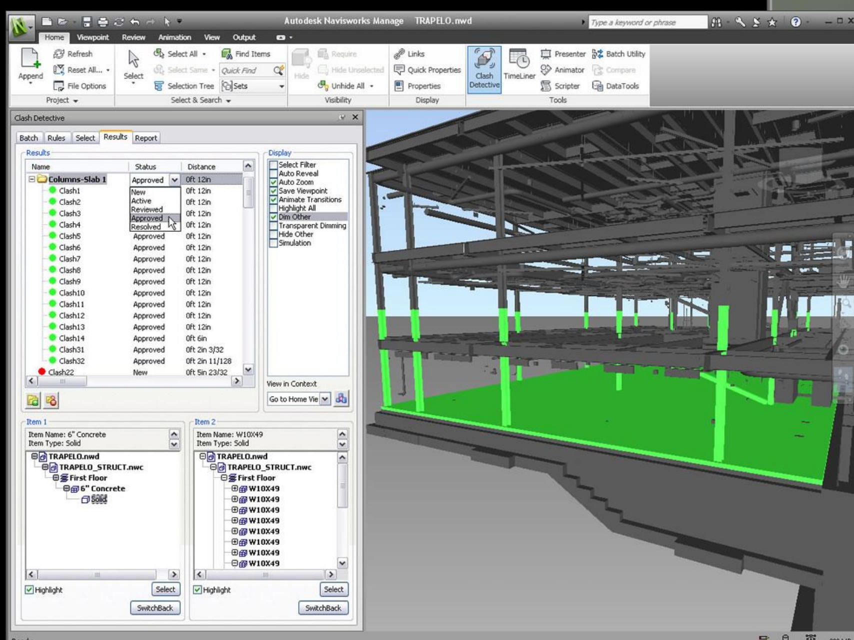




Management of the site

- Timing simulations
- Checking and correcting interference
- Time schedule from the model





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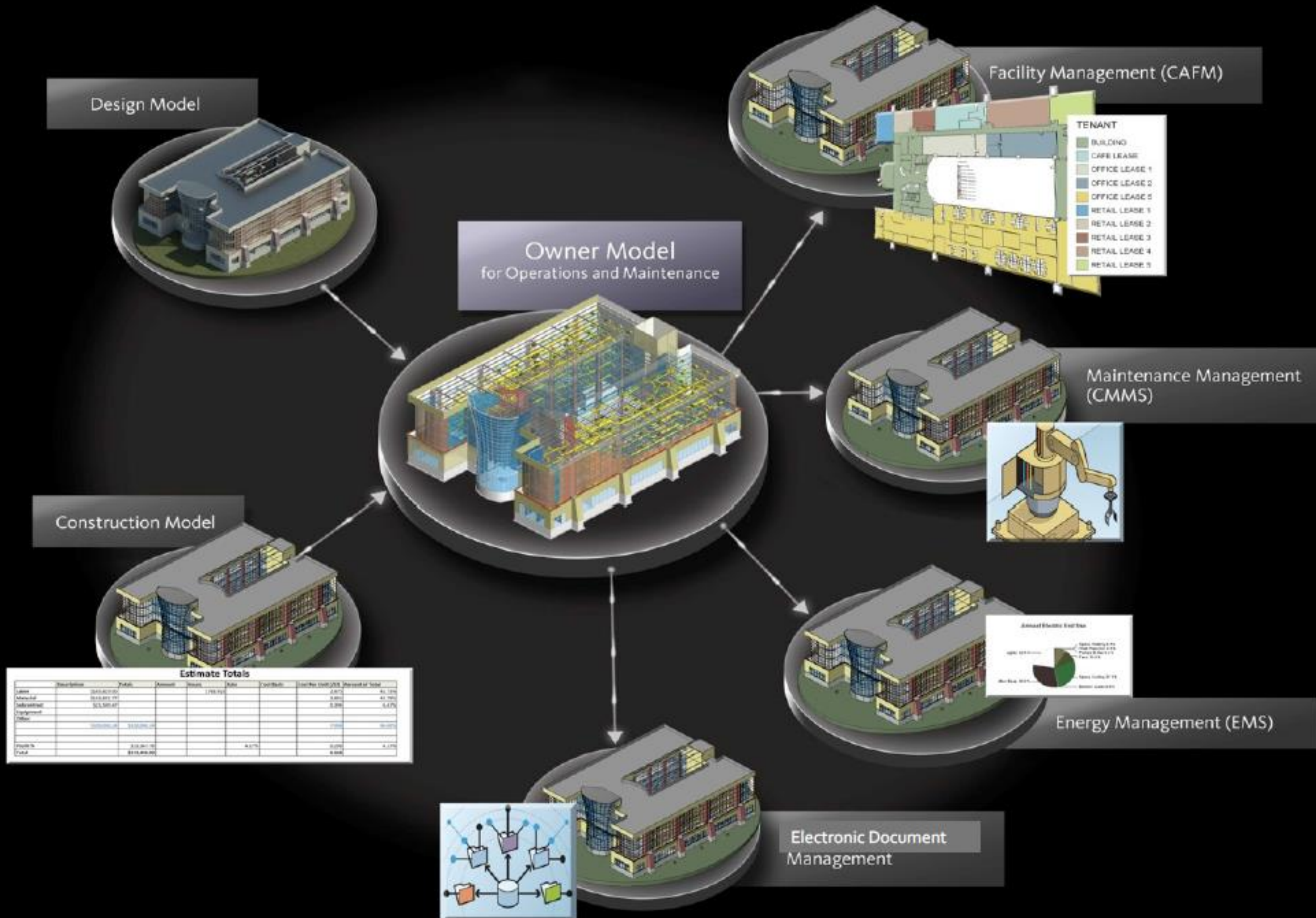
Facility Management



Transformation 2030

Design Competition

2013-2014

Presented by:

AUTODESK

AIAS

architecture 2030

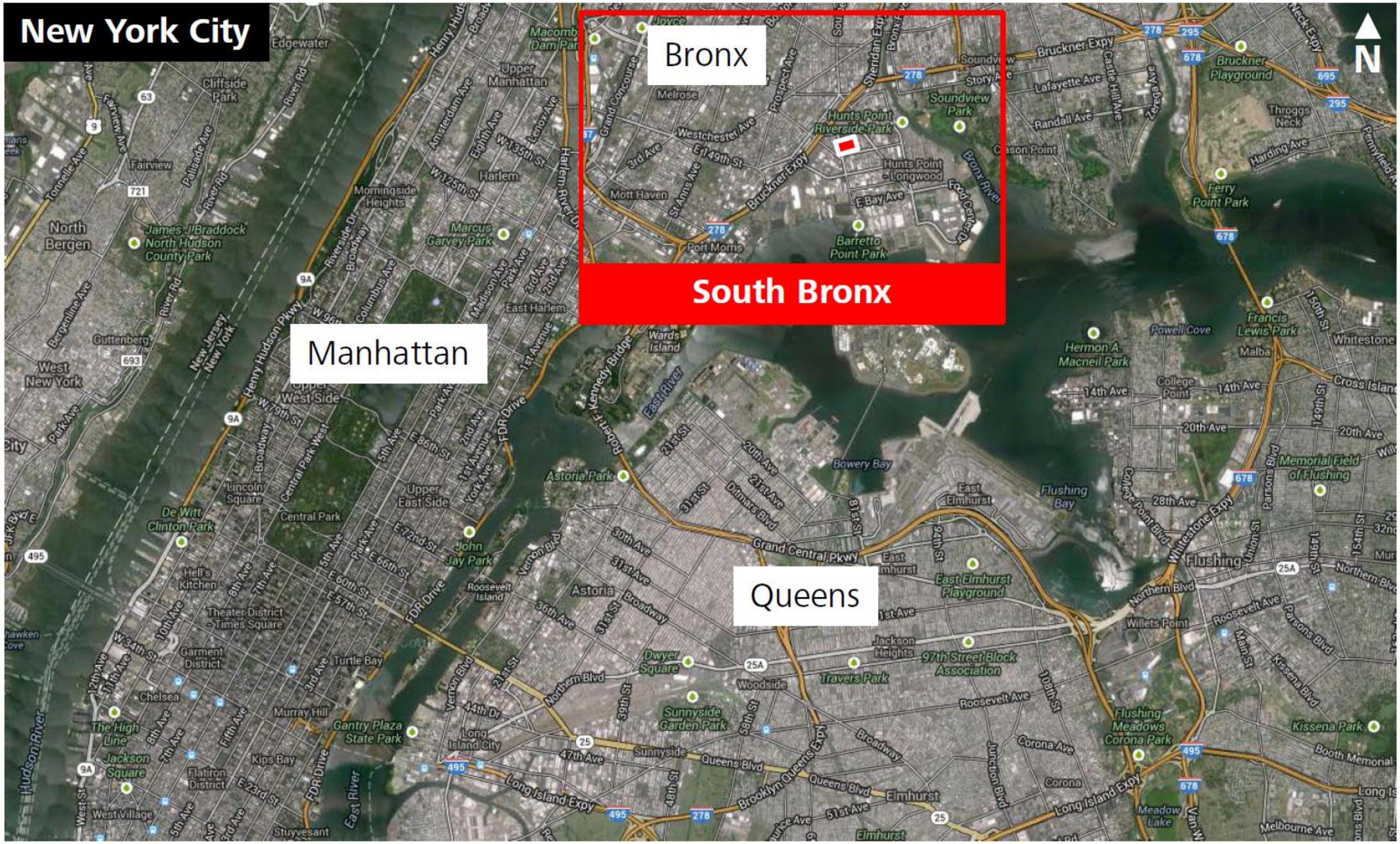
MAJORA CARTER GROUP Certified B Corporation

Perkins Eastman

Transformation 2030
site information

The Site

New York City's South Bronx

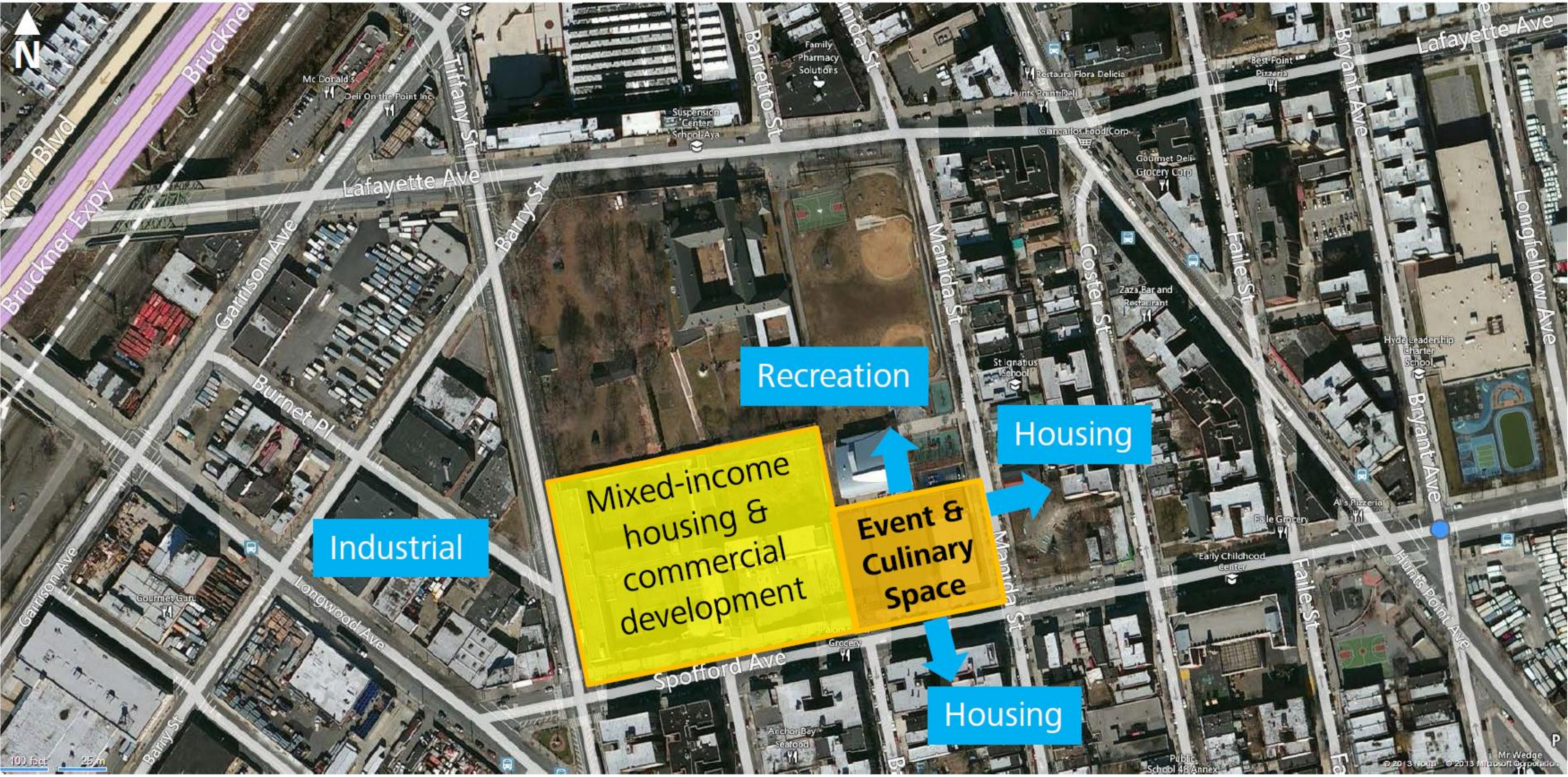


The Site

Full site for re-development (Part 1)

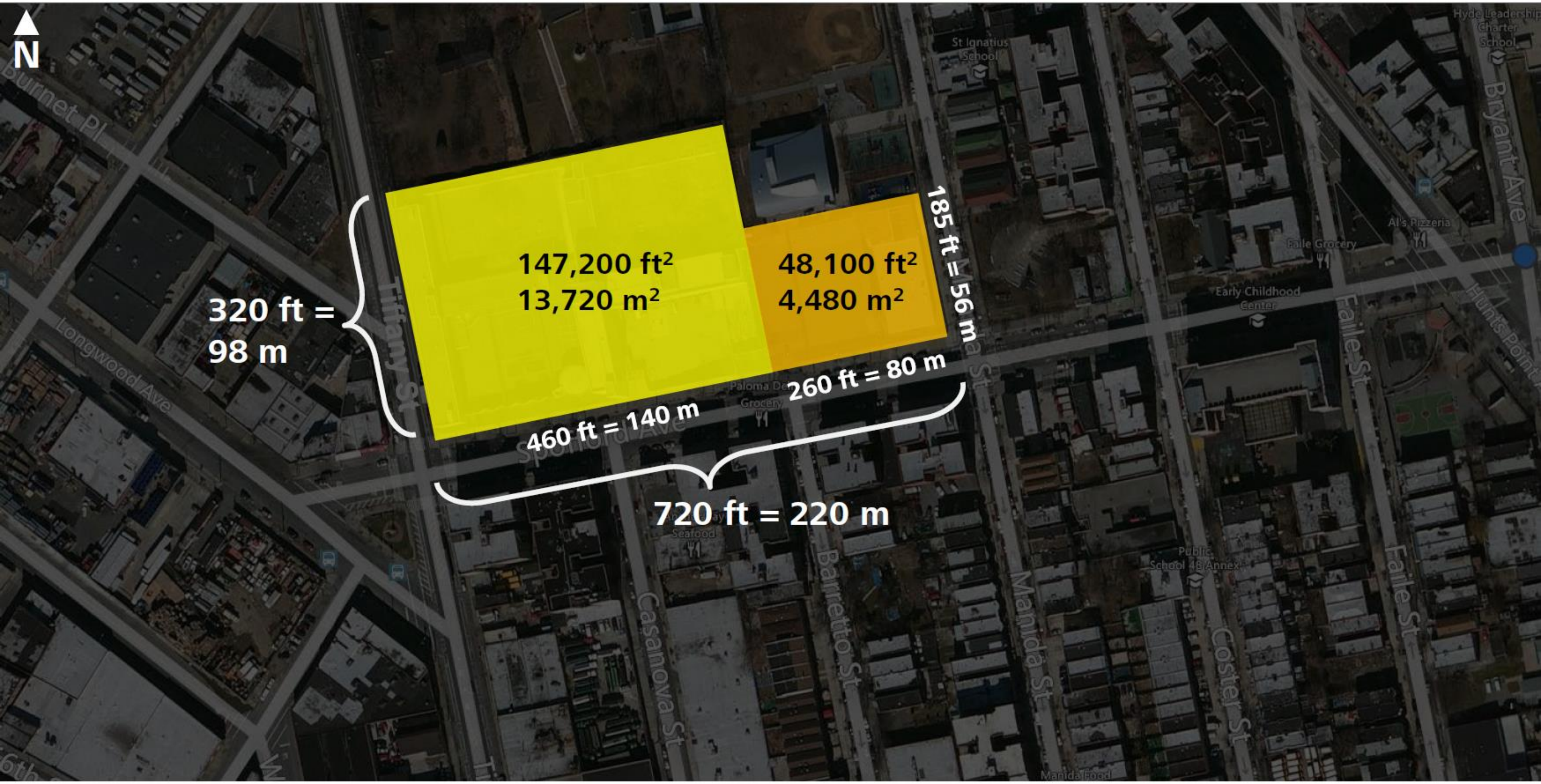
The Site

Event and culinary space on SE corner (Part 2)

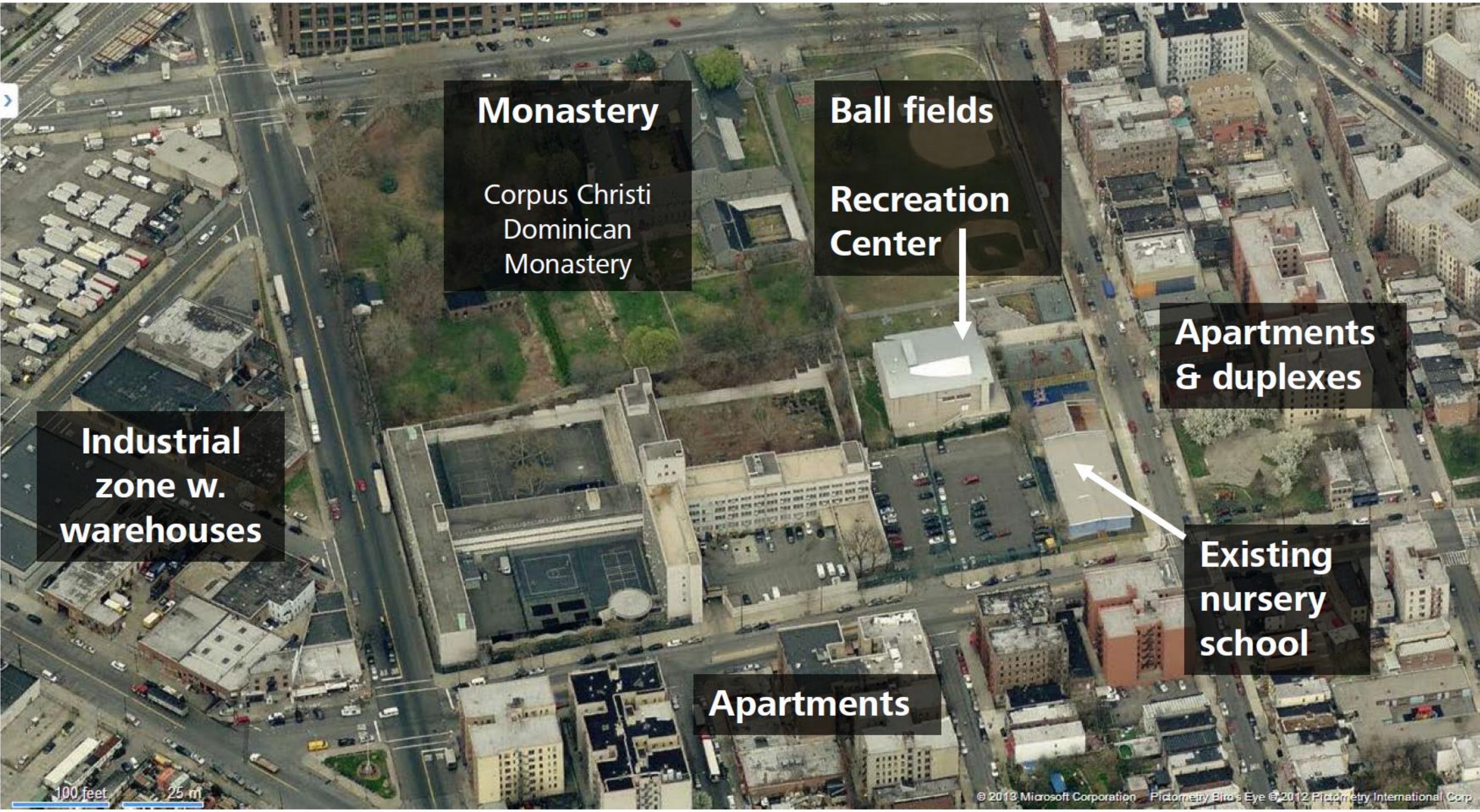


The Site

Site Dimensions and Area



The Site
Neighbors



Site Photo 1:

The corner of Spofford Ave & Tiffany St

Site Photo 2:

The Juvenile Detention Center from Spofford Ave

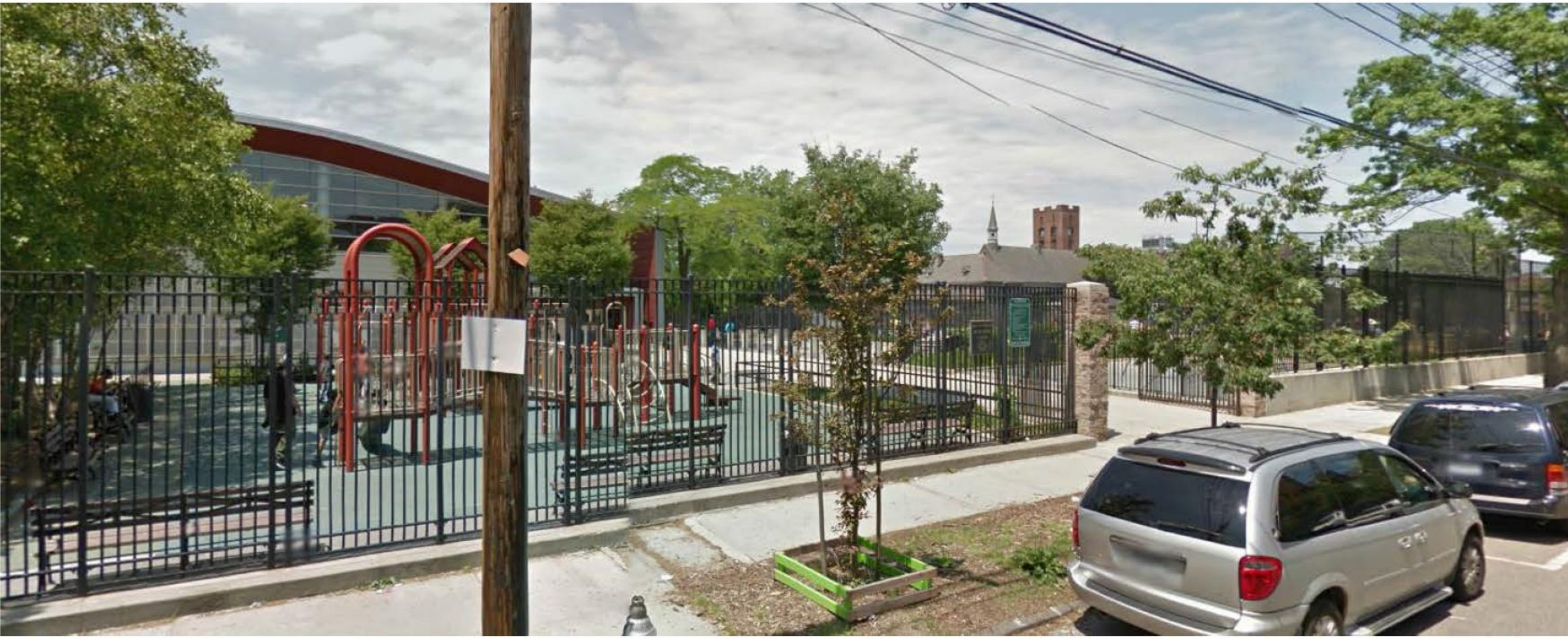
Site Photo 3:

The corner of Spofford Ave and Manida St

The blue building is the existing nursery school

Site Photo 4:

The Recreation Facility from Manida St.



Transformation 2030

concept

part 1) full site development

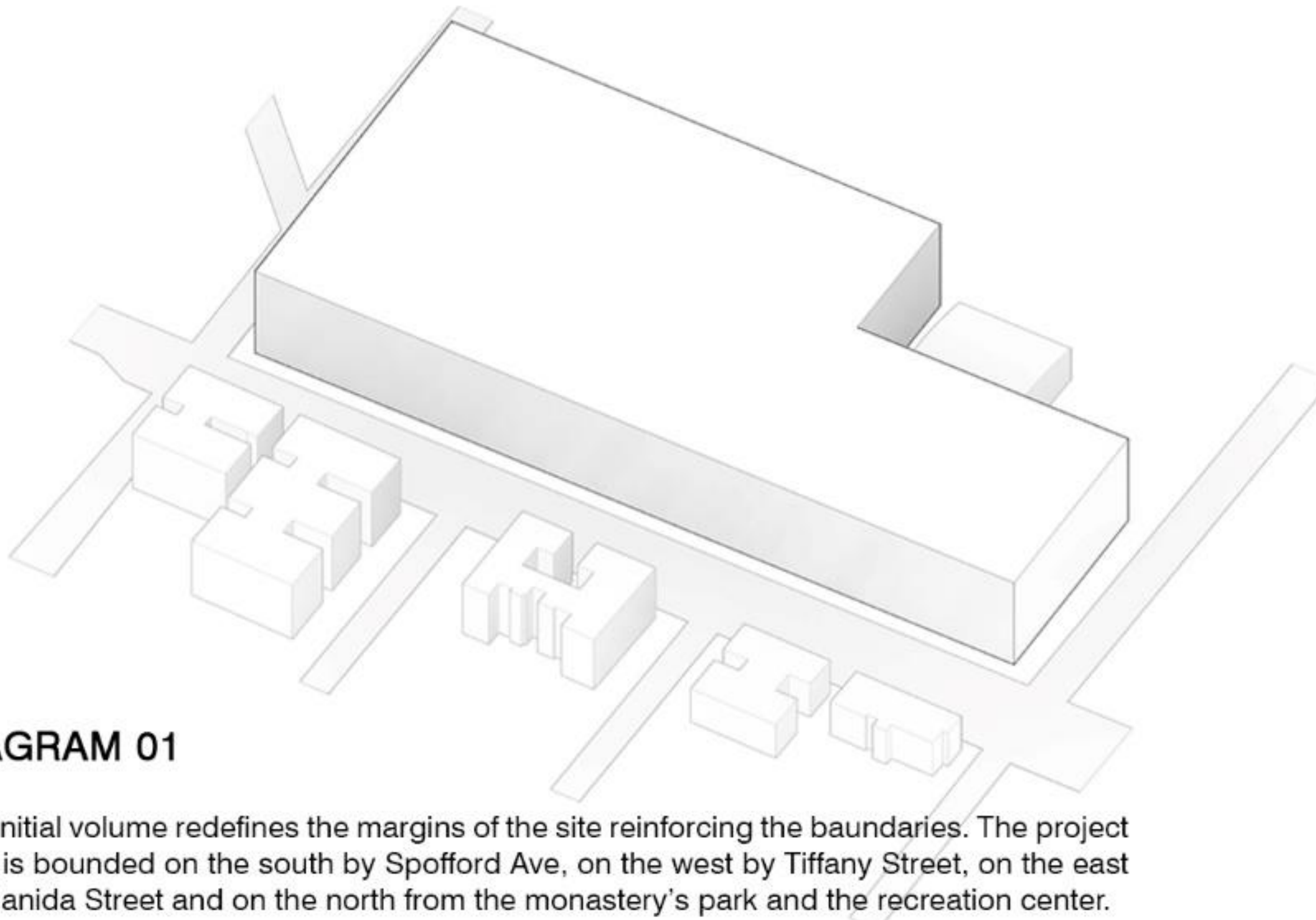


DIAGRAM 01

The initial volume redefines the margins of the site reinforcing the baundaries. The project area is bounded on the south by Spofford Ave, on the west by Tiffany Street, on the east by Manida Street and on the north from the monastery's park and the recreation center.

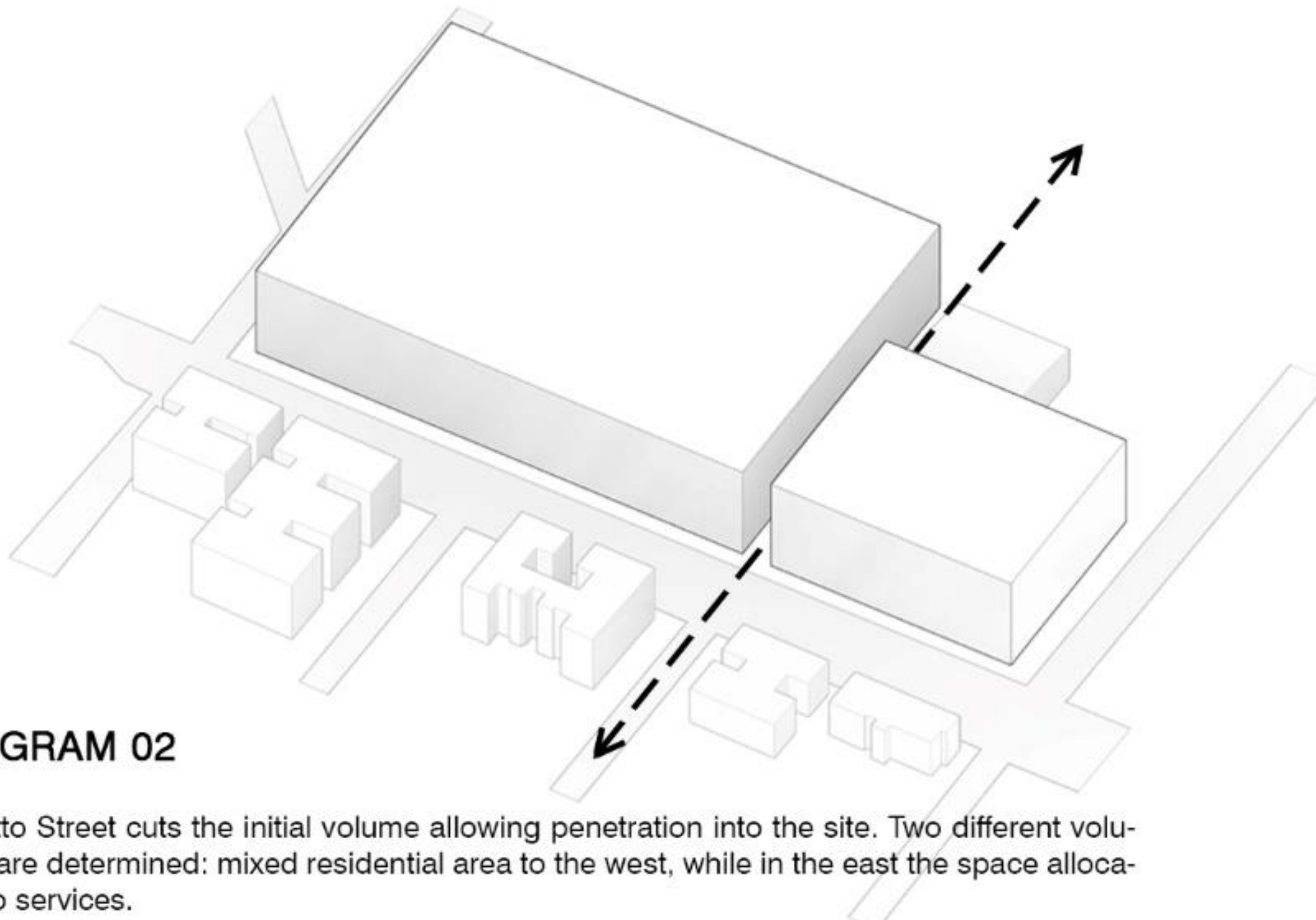


DIAGRAM 02

Baretto Street cuts the initial volume allowing penetration into the site. Two different volumes are determined: mixed residential area to the west, while in the east the space allocated to services.

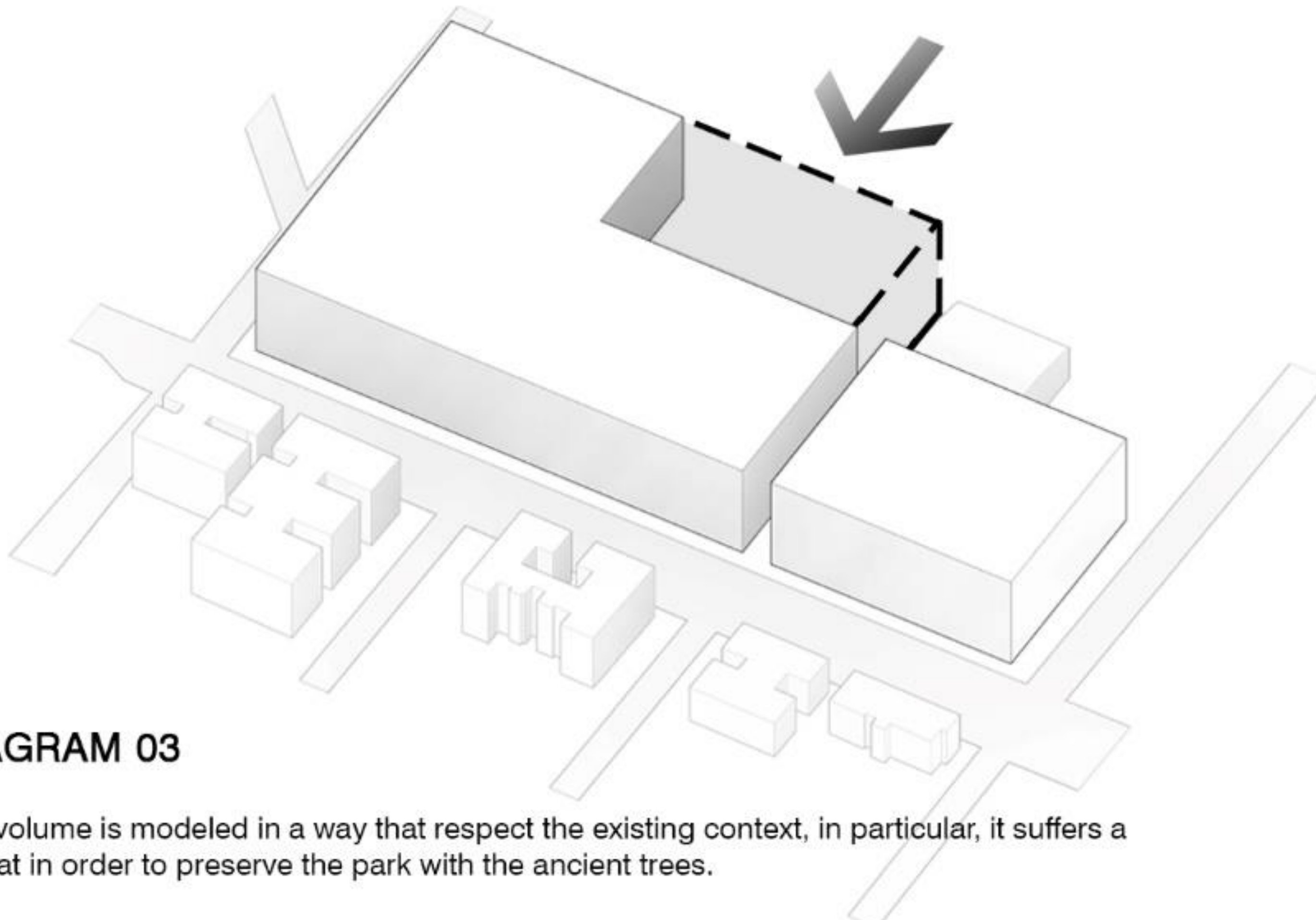


DIAGRAM 03

The volume is modeled in a way that respect the existing context, in particular, it suffers a retreat in order to preserve the park with the ancient trees.

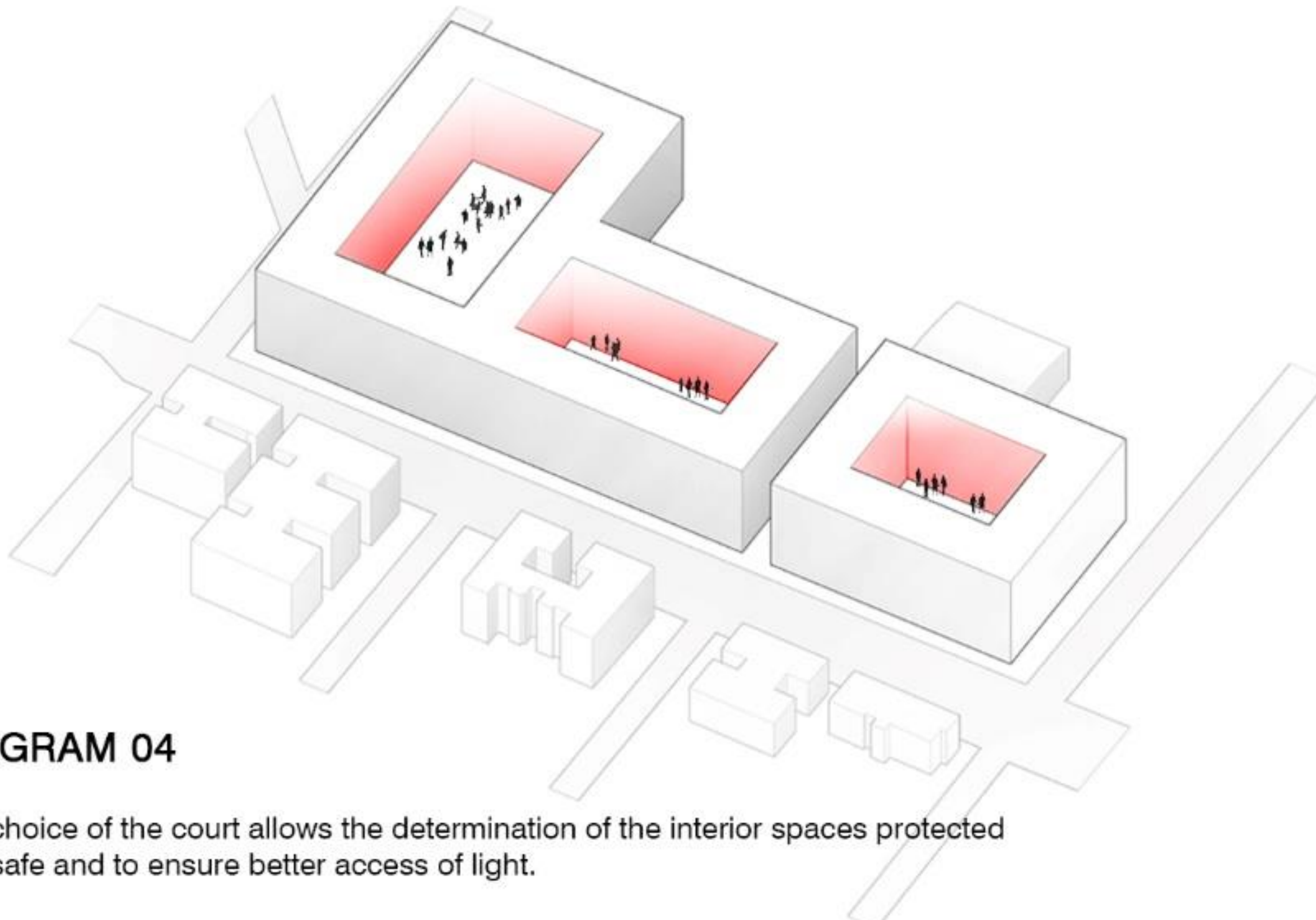


DIAGRAM 04

The choice of the court allows the determination of the interior spaces protected and safe and to ensure better access of light.

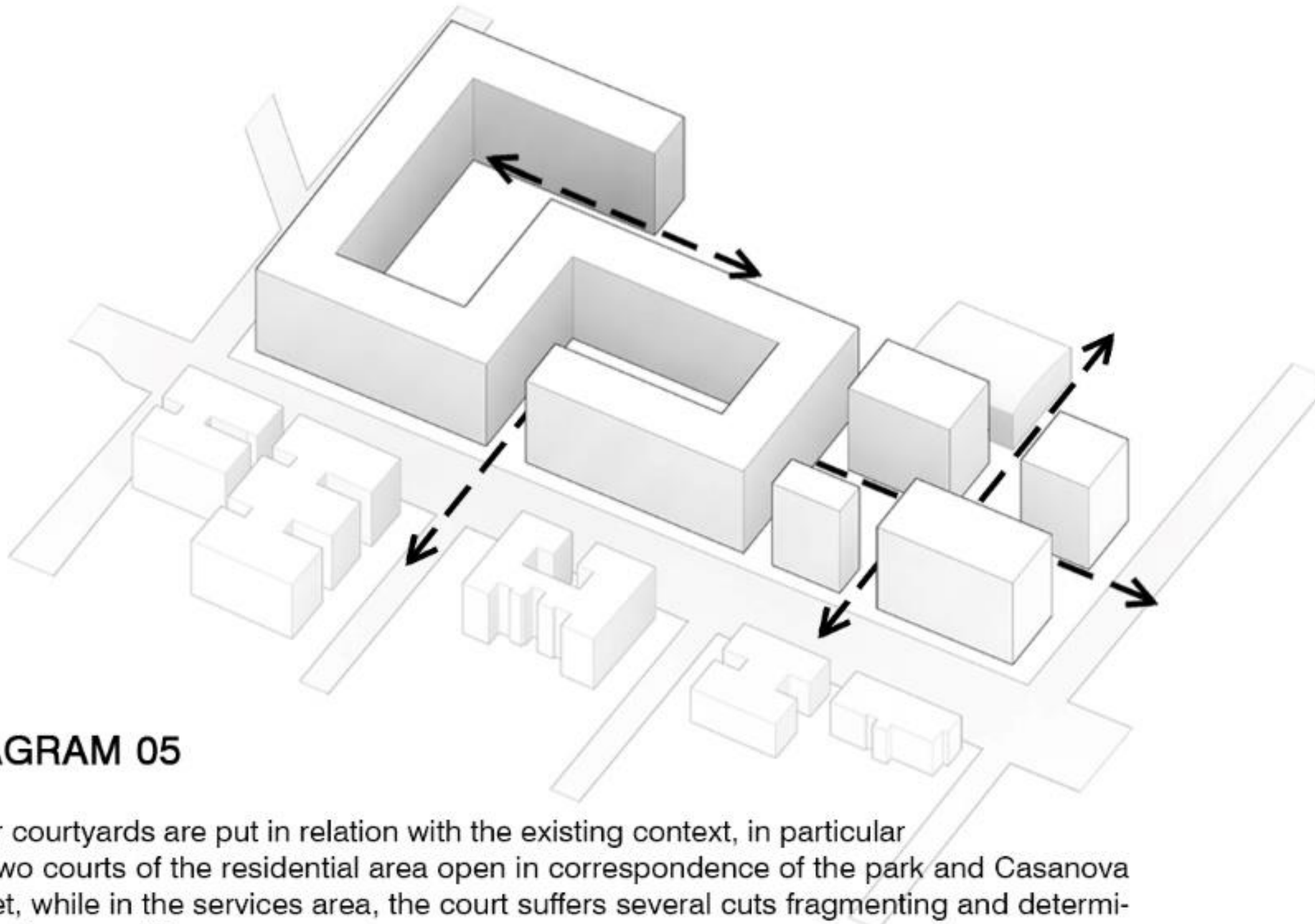


DIAGRAM 05

Inner courtyards are put in relation with the existing context, in particular the two courts of the residential area open in correspondence of the park and Casanova Street, while in the services area, the court suffers several cuts fragmenting and determi-ning a large public square.

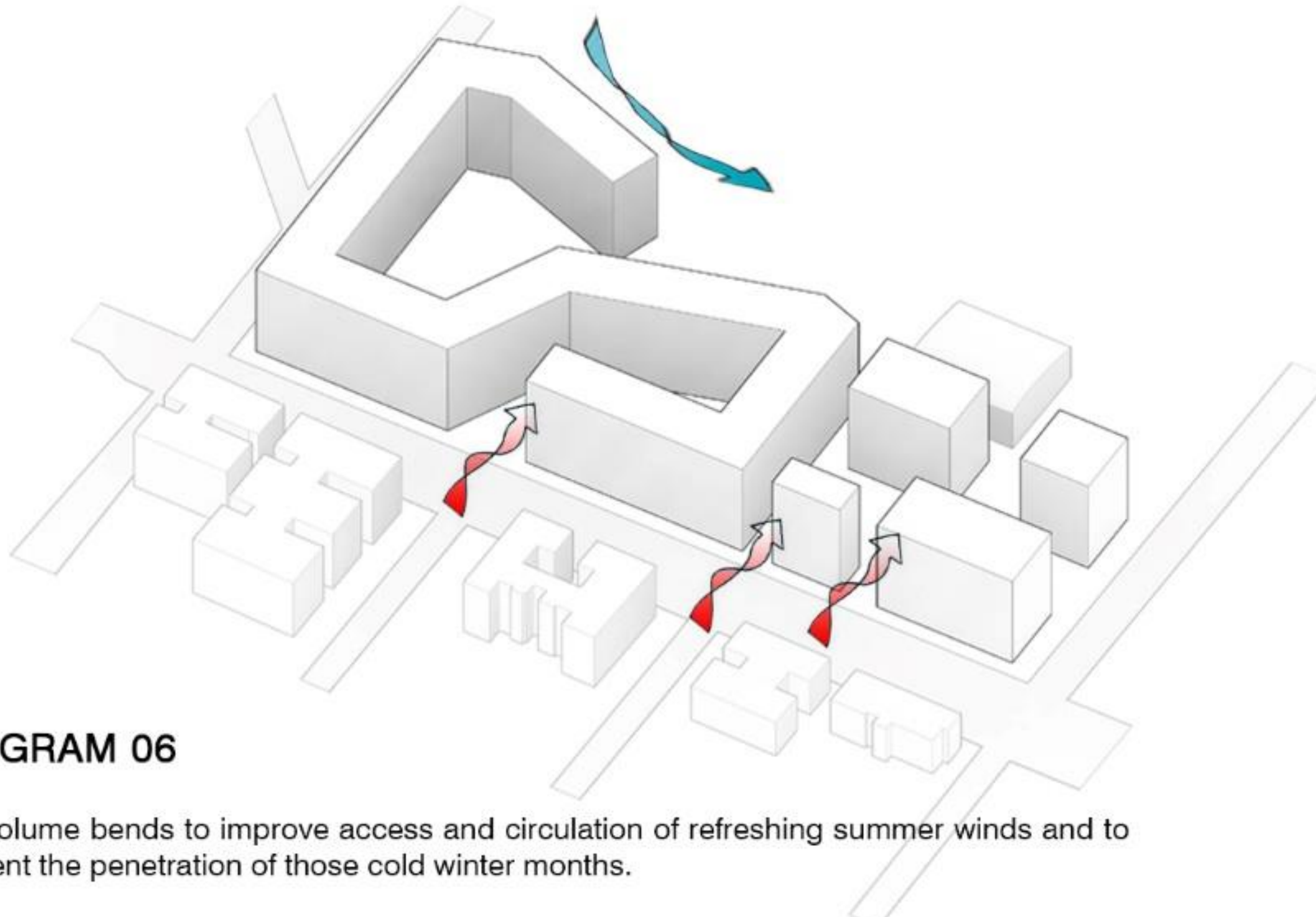


DIAGRAM 06

the volume bends to improve access and circulation of refreshing summer winds and to prevent the penetration of those cold winter months.

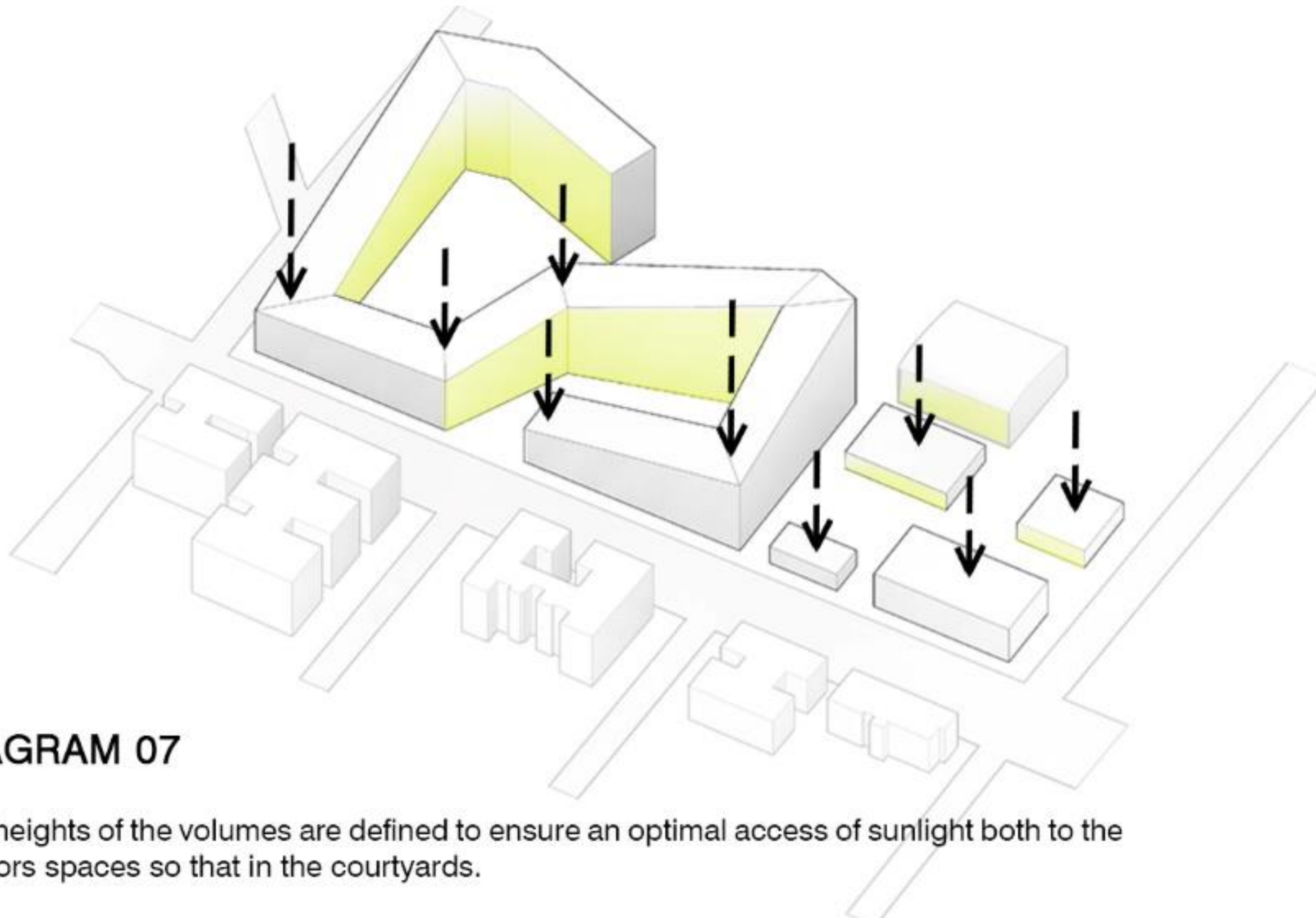


DIAGRAM 07

The heights of the volumes are defined to ensure an optimal access of sunlight both to the indoors spaces so that in the courtyards.

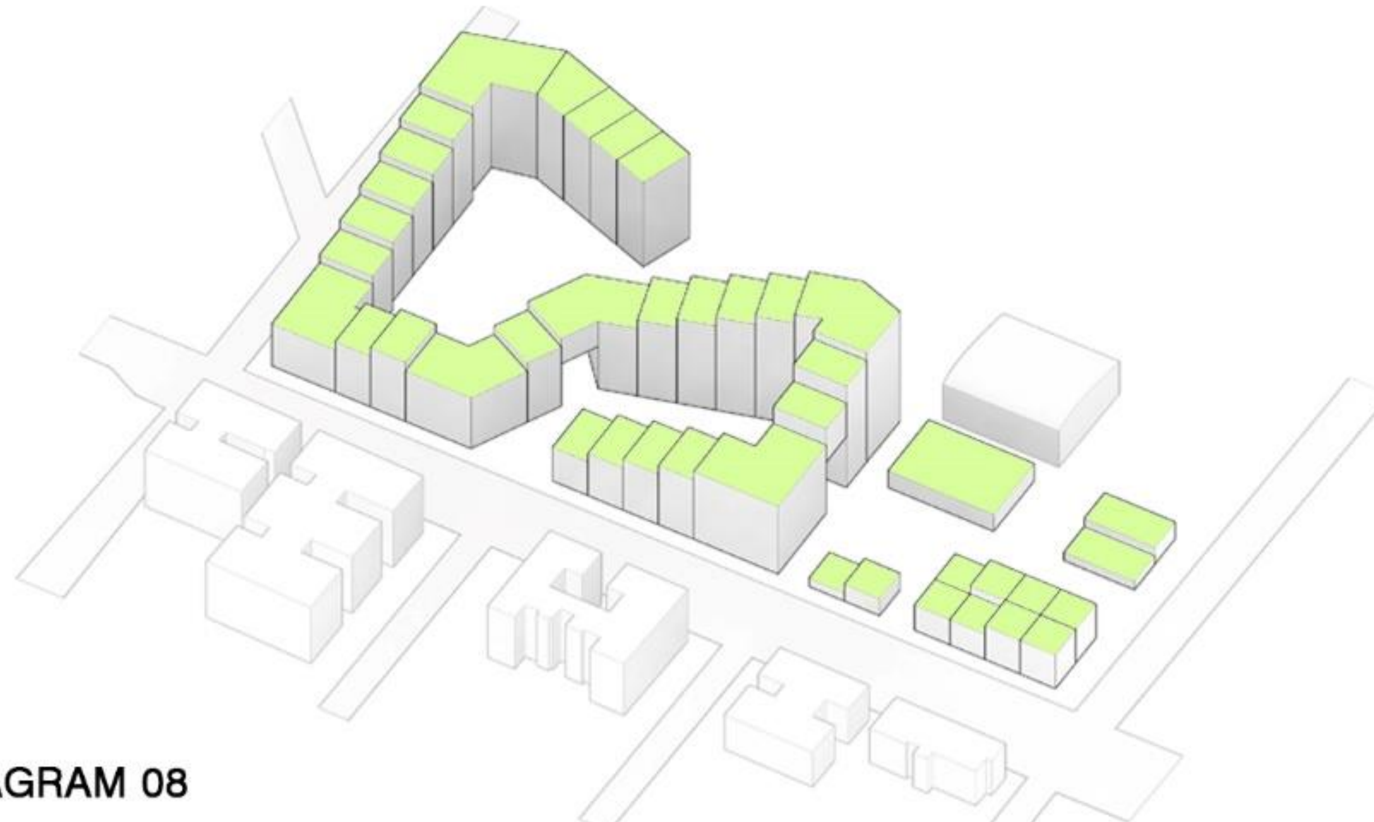
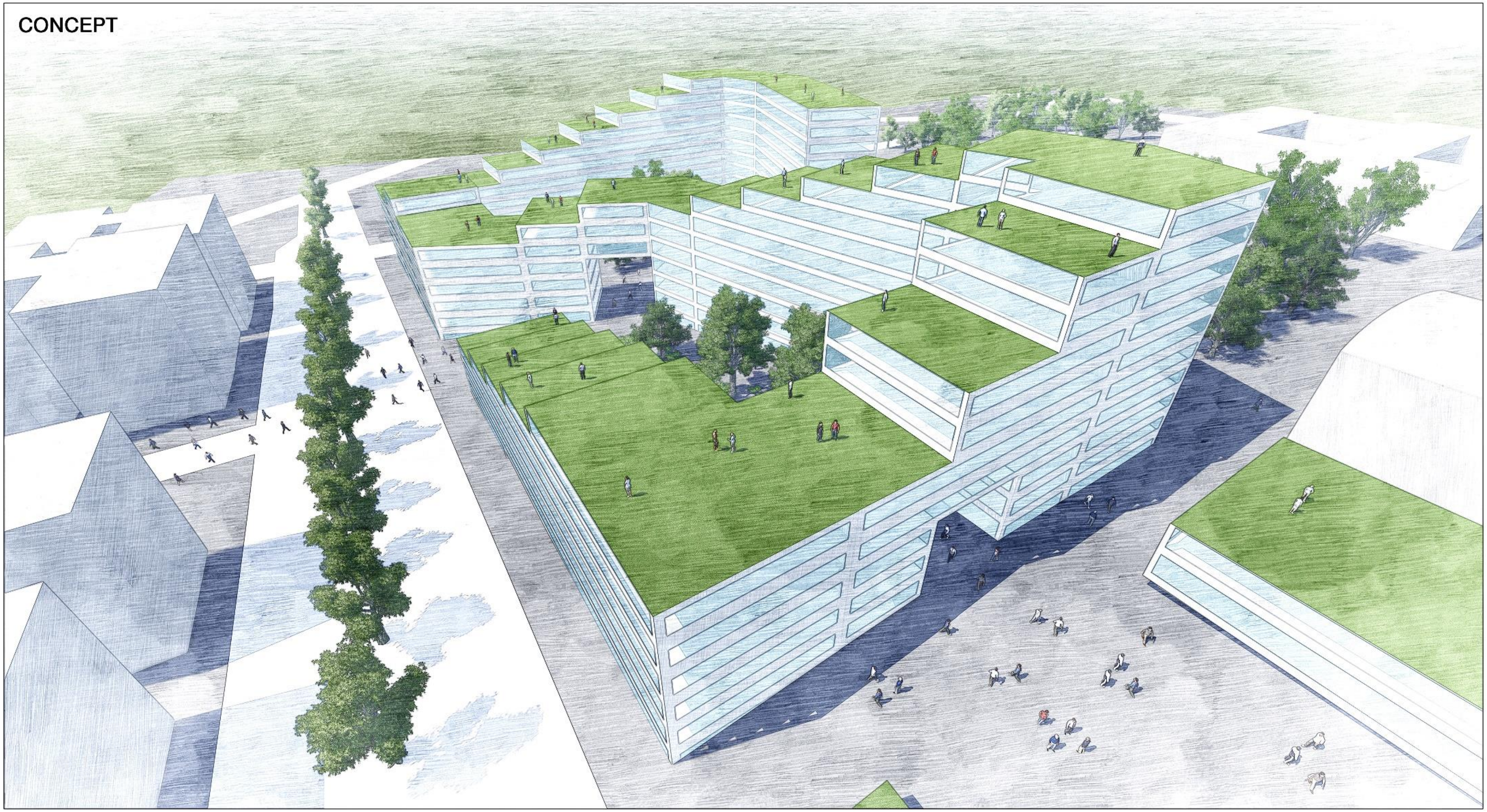


DIAGRAM 08

The final shape of the building has different terraces facing south to maximize the solar radiation. Some constructed wetland (urban gardens) on the green roofs, determine a series of shared spaces in maximum security that will improve the residents life quality.


CONCEPT

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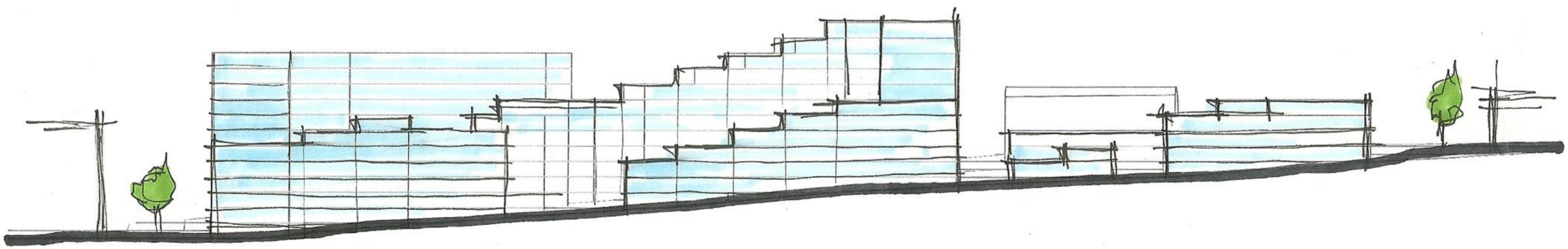


Transformation 2030
sustainable design strategies

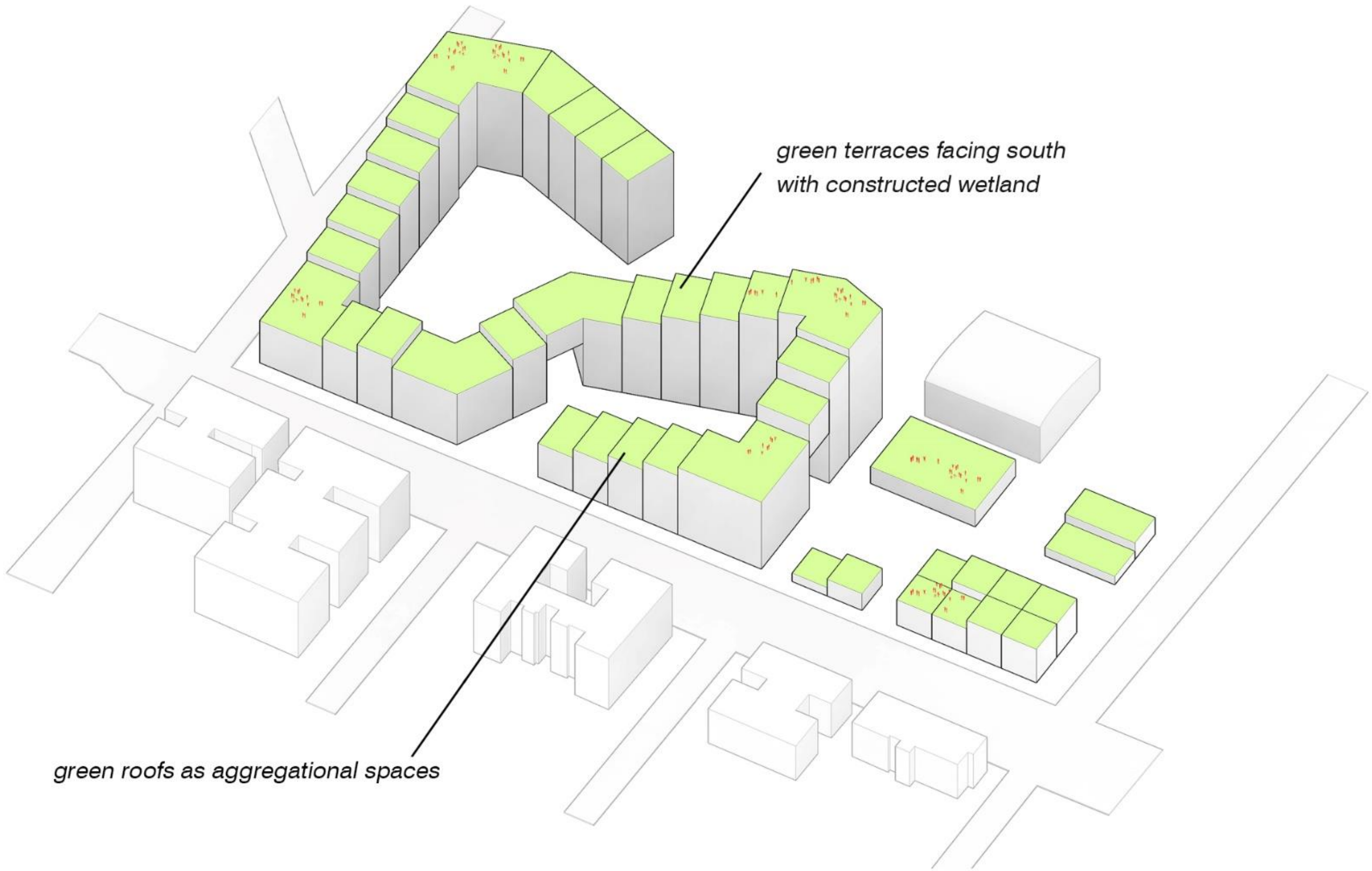
part 1) full site development

SITE - <u>GREEN ROOF</u>

We choose to adopt the “green roof” strategy because it’ll provide water retention, green space, and improved water and air quality to the site, while reducing energy consumption.

To create the green surfaces, we planned to use extensive and semi-intensive roofs. The buildings will have several green spaces and terraces, all facing south or south-west, where occupant could stay.

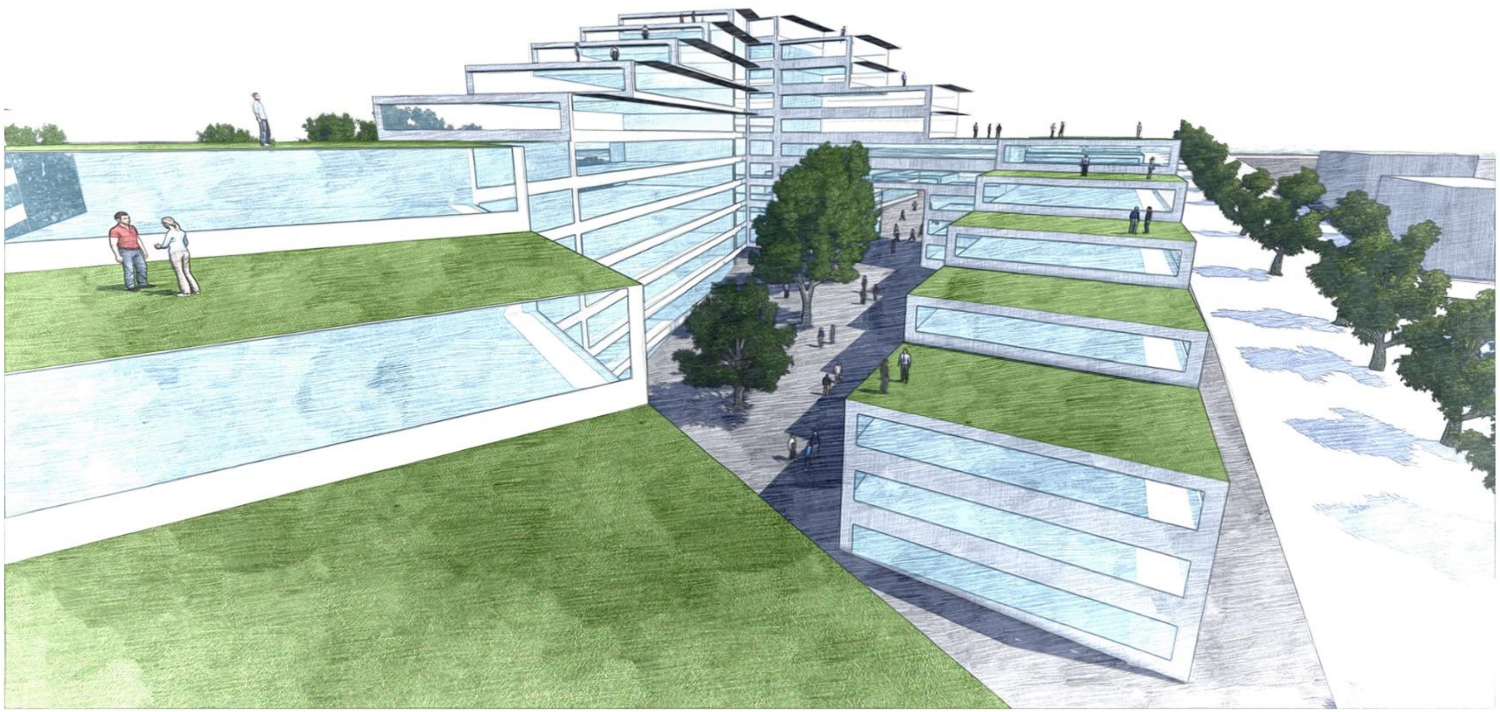
The green roof strategy, working with the parks strategy, helps to retain rainfall. It also increase roof insulation, reducing ambient air temperatures and building energy consumption.



Guidelines from the 2030 Palette:

Green roofs categories:

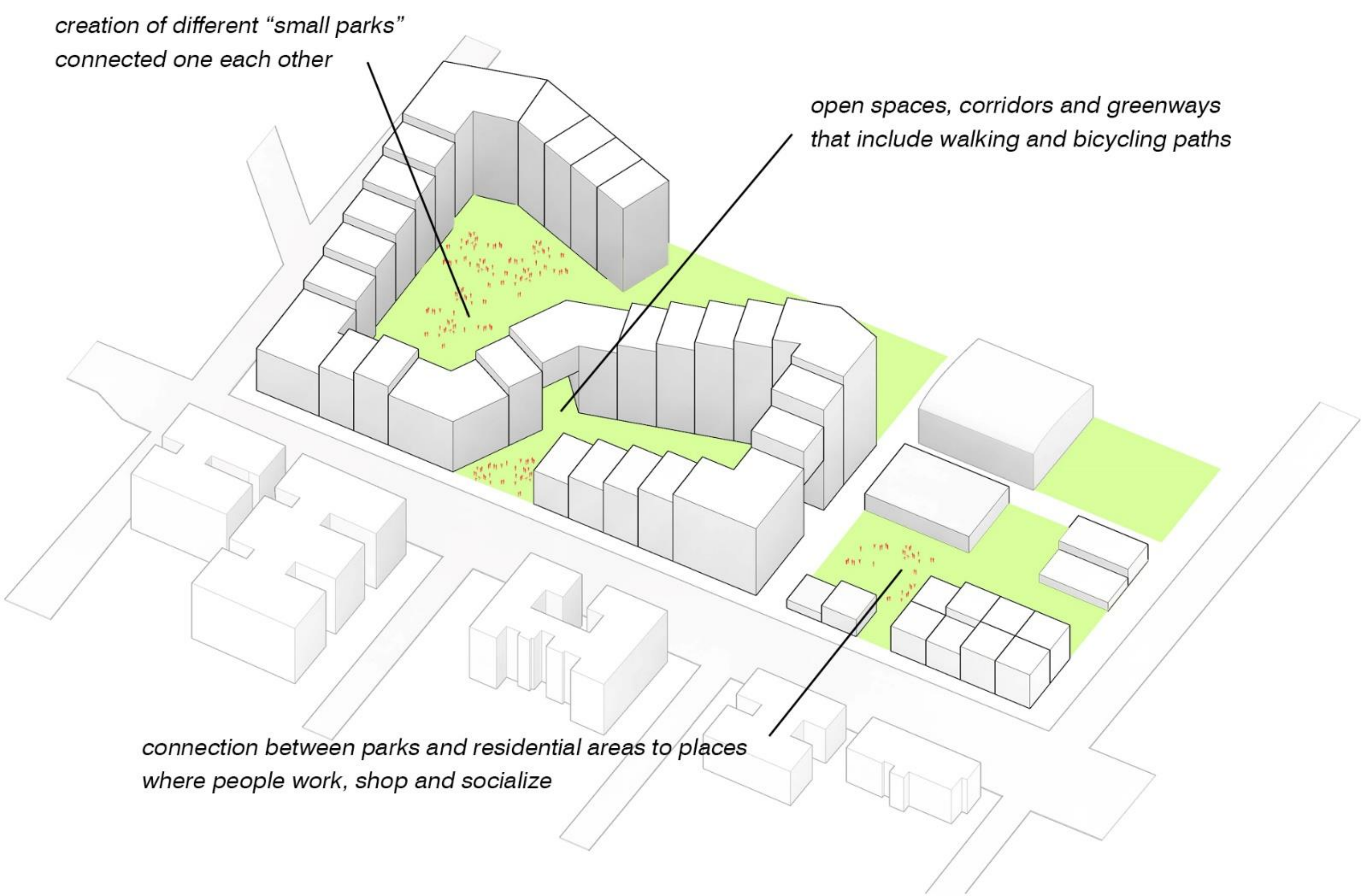
Extensive: 60-200 mm thickness (2½-8 inches) – green protection layer for roofs with little load-bearing capacity. Shallow soil suitable for less demanding plants (low maintenance).
Semi-intensive: 120-250 mm (4½-10 inches) – green roof with deeper soils, planted with grasses and shrubs (higher maintenance).
Intensive: 150-1,000 mm (6-39 inches) – roof garden with permanent irrigation and deep soils, suitable for lawns, shrubs, and trees, walkways, and even playgrounds and pools (highest maintenance).



CITY / TOWN - PARKS

The city/town strategy of "parks" has been chosen because it will provide social, physical and recreational opportunities for the Hunt's Point community. They will also offer habitat for wildlife and biodiversity.

This strategy works togheter with the solar access and natural ventilation strategies. Creating different court spaces that allow natural light and ventilation to reach all the spaces of the buildings, the parks strategy helps to reduce the electrical and fuel consuption of the buildings.

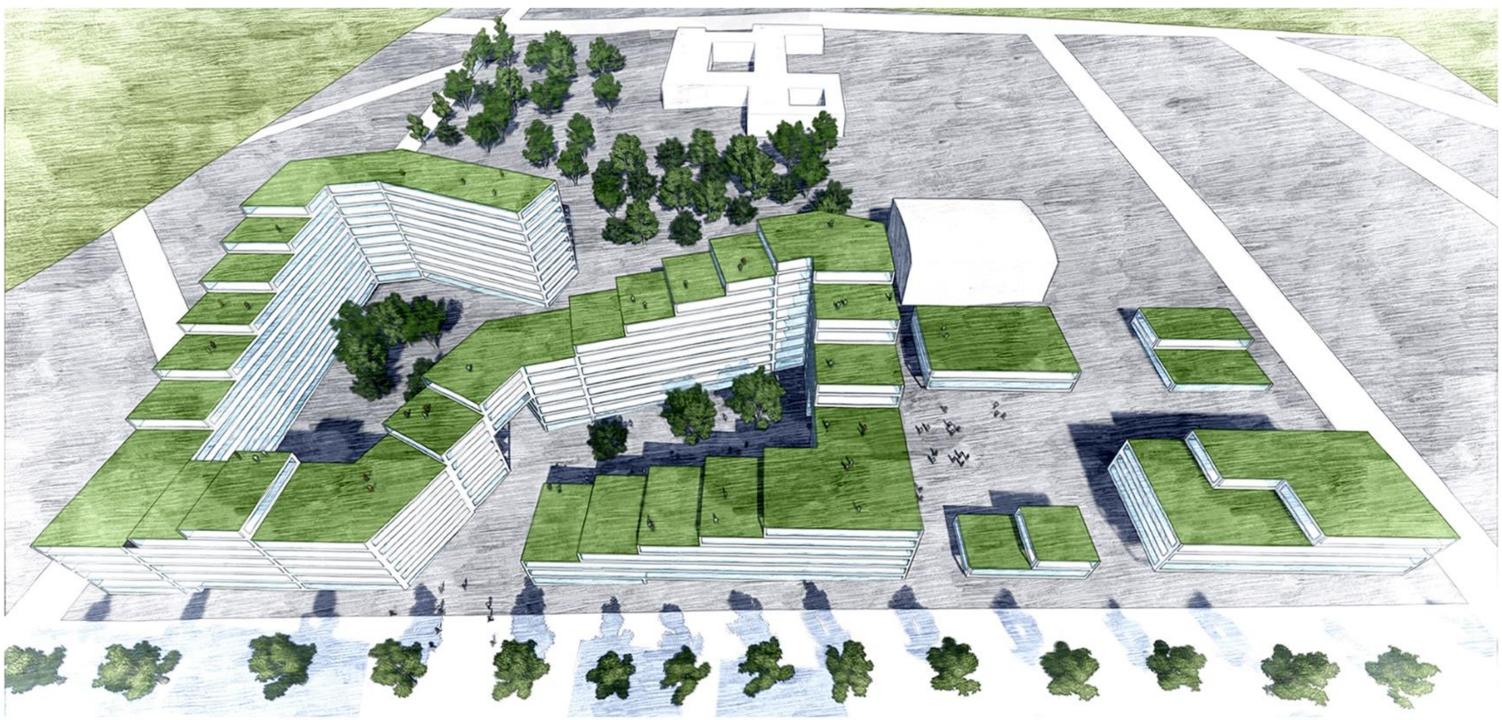


Guidelines from the 2030 Palette:

Locate smaller parks within short walking distances of the residences they serve. Larger parks serve entire cities, are bounded by public-rights of way and attached to other public uses such as schools and community centers.

Small Parks – 250 sm to 4,000 sm (2,500 sf to one acre) within 400 meters (¼ mile) of housing

Create open space corridors and greenways that include walking, jogging, and bicycling paths connecting parks and residential areas to places where people work, shop or socialize.

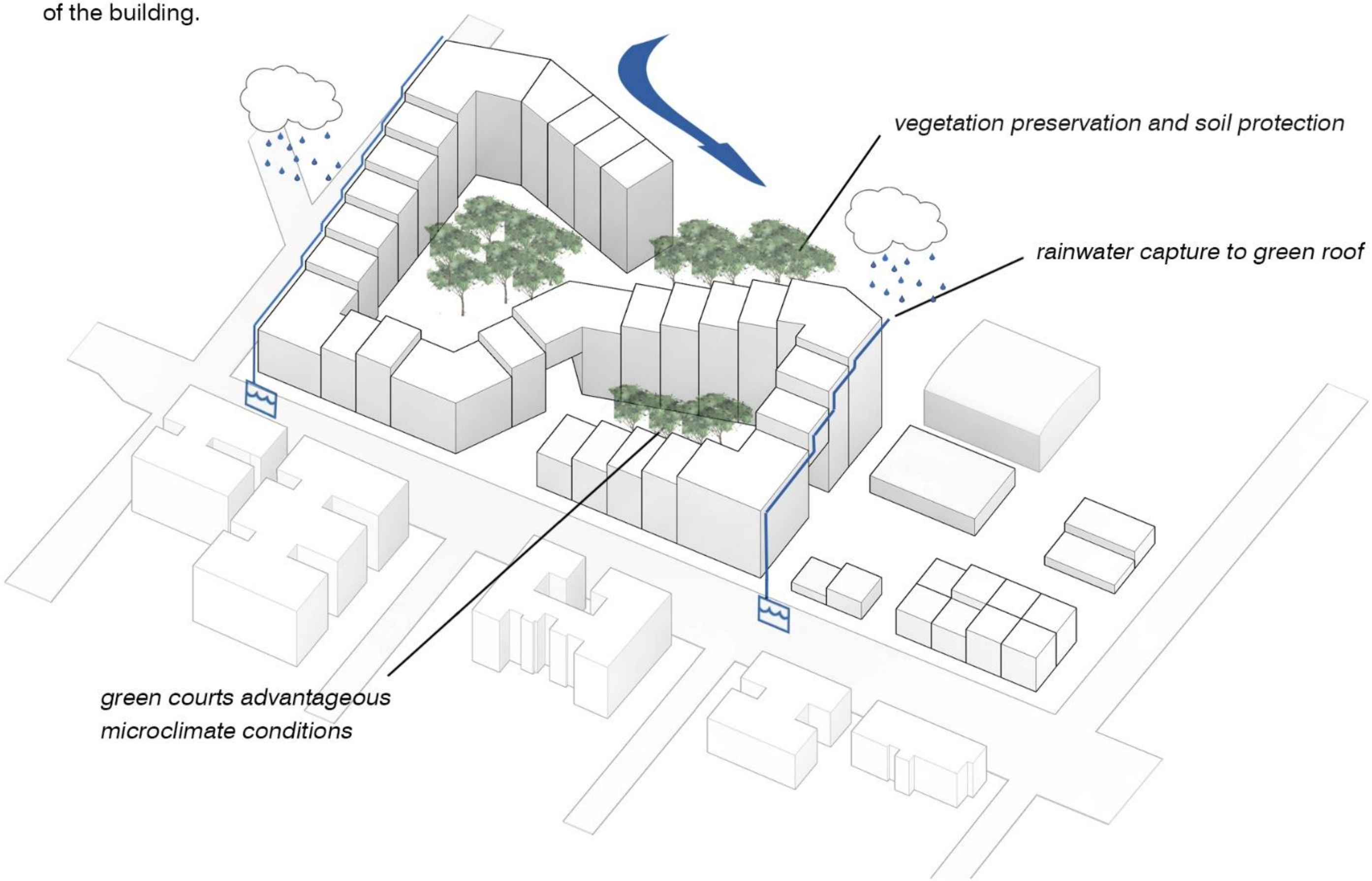


SITE - SUSTAINABLE SITES

Sustainable sites maintain and regenerate soils and vegetation, manage and filter stormwater, and create advantageous microclimate conditions.

This strategy has been applicated following three main considerations: water capture, soil protection and vegetation preservation. We created different parks as courts, green roofs and wetlands to capture, slow and treat stormwater. We preserved the esistent park with trees up to 150 years old, preserve the vegetation and protecting the soil.

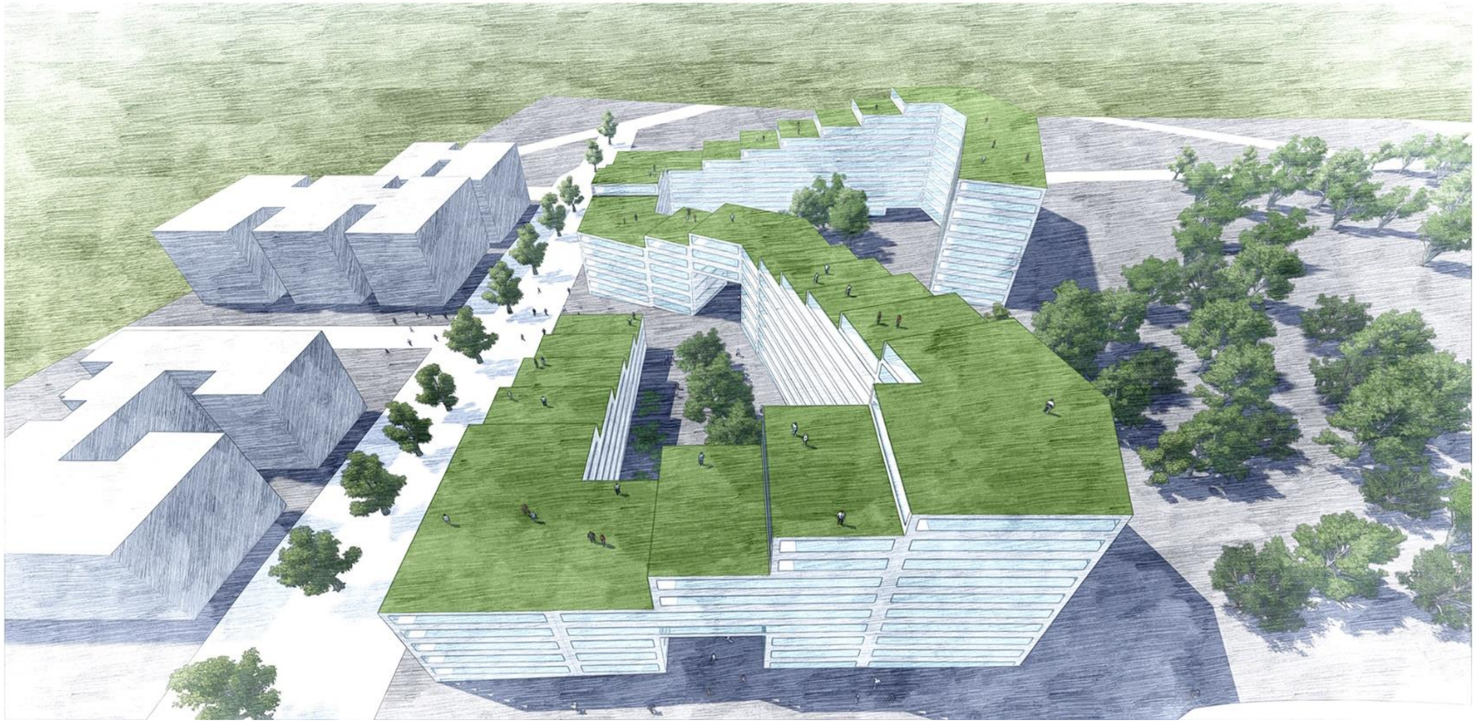
This strategy works togheter with the parks, green roof and wind strategies, helping to reduce water and general consuption of the building.



Guidelines from the 2030 Palette:

Sustainable sites maintain and/or regenerate soils and vegetation, filter stormwater and create advantageous microclimate conditions.

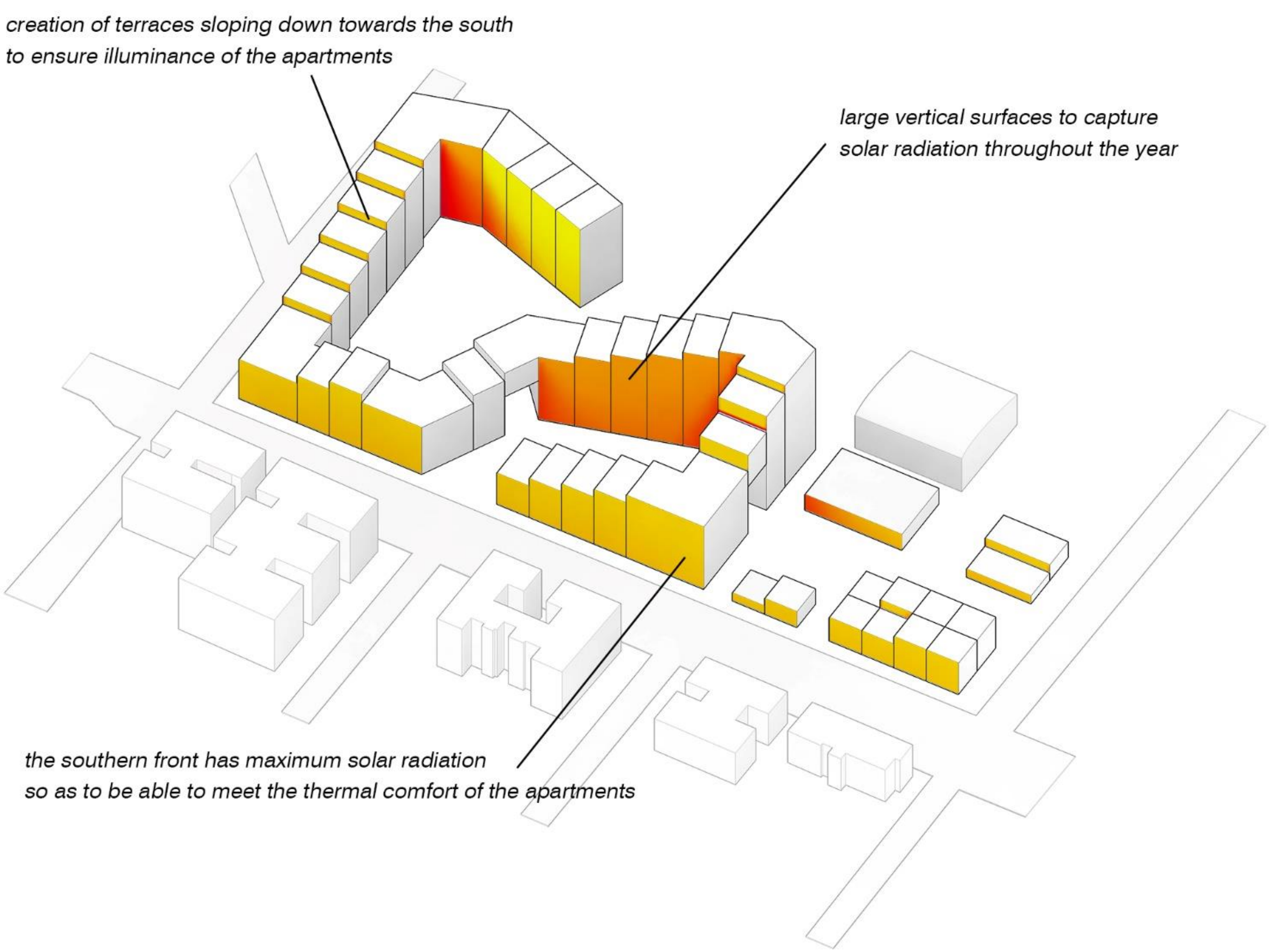
Water – capture and treat stormwater by reducing impervious surfaces, creating rain gardens, green roofs, bioswales, and wetlands.
Soils – protect and preserve healthy soils by minimizing grading, soil compaction and native vegetation removal.
Vegetation – preserve and restore trees together with climate-adaptive, non-invasive native vegetation.
Locate and manage vegetation to mitigate potential fire hazards, block winter winds, and shade walls, walkways, and hard surfaces during warm periods.



BUILDING - FORM FOR HEATING

The "Form for heating" strategy was chosen to ensure the best quantitative of direct solar gain during the winter period. Due to this, we were able to achieve the thermal and visual comfort for the buildings.

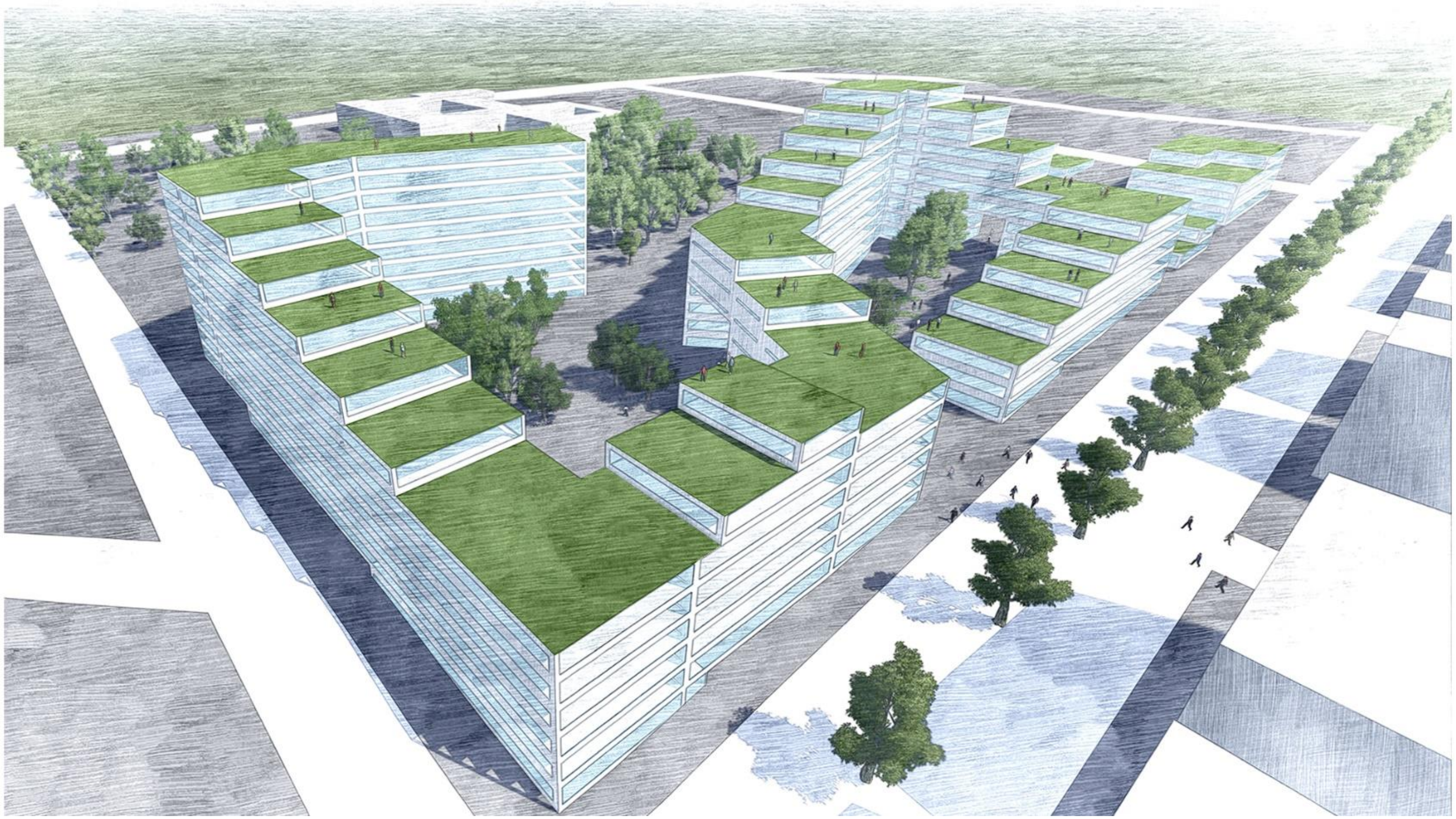
This strategy works togheter with the other strategies for thermal and visual comfort, such us such as the solar access and solar shading strategies, paying particular attention to catch su lower winter sun while avoid the summer one.



Guidelines from the 2030 Palette:

To maximize the solar exposure of a building:

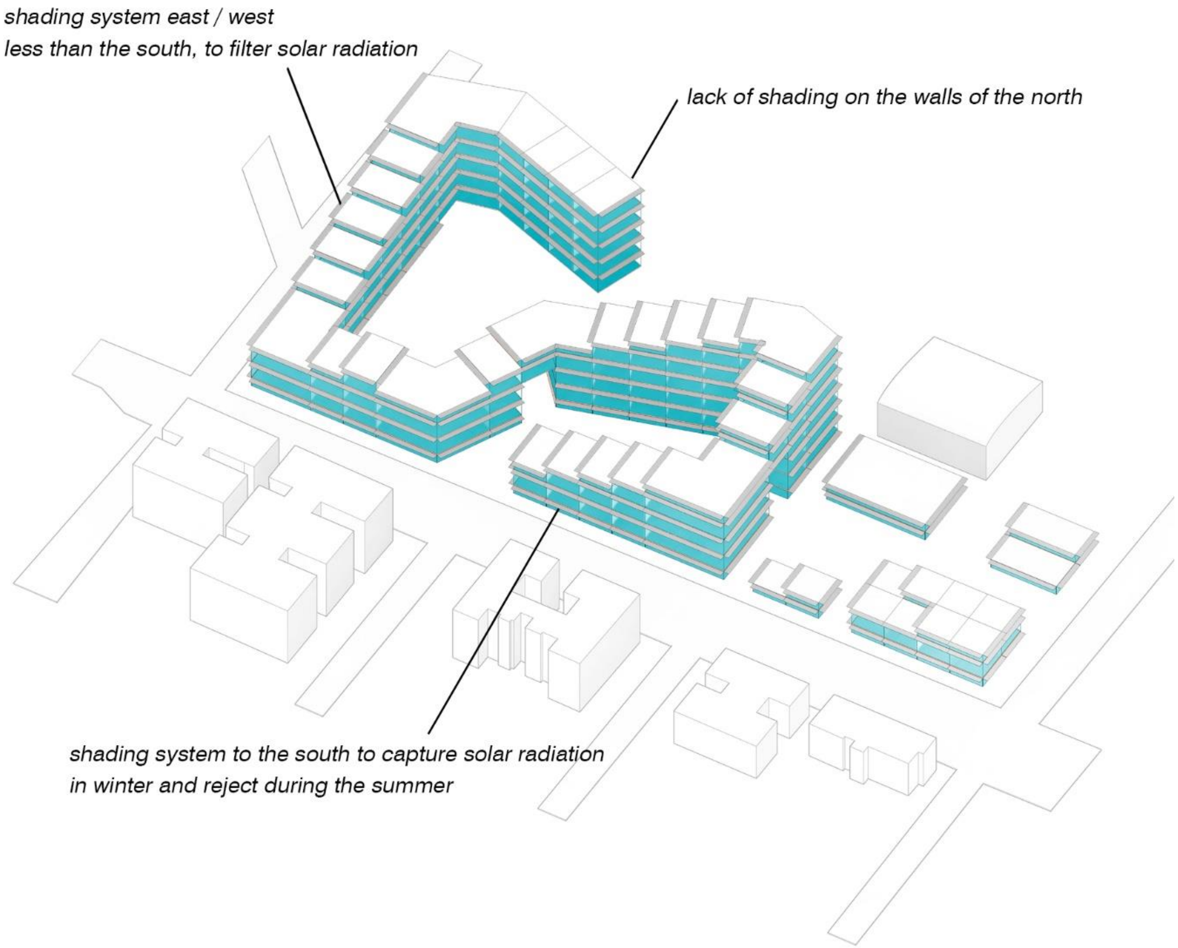
- **Elongate** a building along the east-west axis to maximize the surface area exposed to direct winter sunlight.
- **Locate** occupied spaces along the solar side of the building.
- **Stagger, step, align** indoor spaces and building forms to ensure they have adequate wall surface areas facing the equator.



BUILDING - <u>SOLAR SHADING</u>

We adopted the “solar shading” strategy in order to protect the facades facing south by an excess solar radiation and glare.
The shading systems were designed to capture solar radiation in winter and reject it during the summer.

During warm summer months, overhangs block unwanted direct sunlight from solar glazing, reducing cooling loads.



Guidelines from the 2030 Palette:

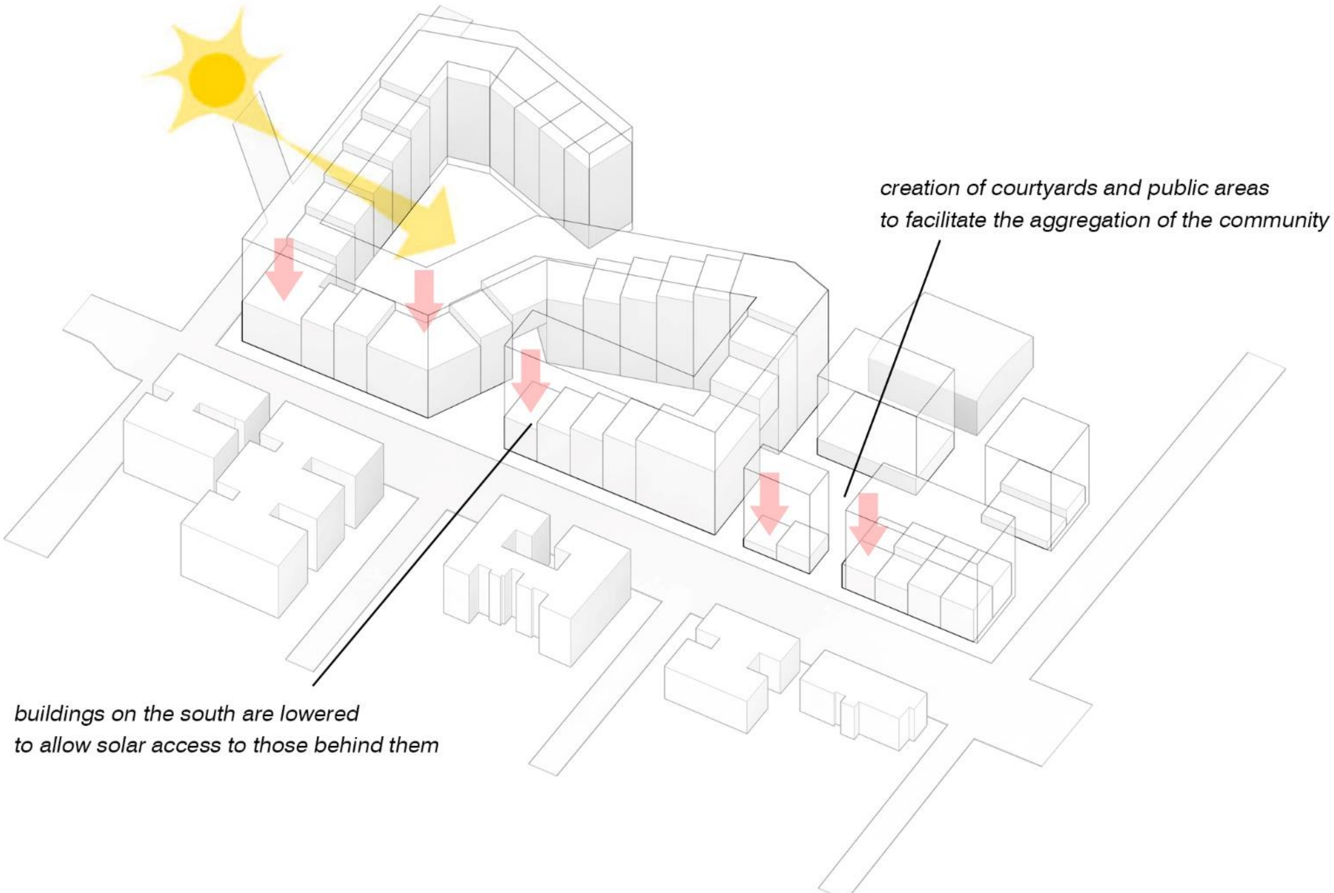
Passive heating strategies call for major glazed areas (solar glazing) in a building to be oriented towards the equator.
However, large solar glazing areas, sized to admit sunlight for heating in winter, will also admit sunlight during warm periods when it is not wanted. To control direct sunlight from entering a building, it is important to incorporate shading strategies as part of design.

Extend the overhang projection approximately:
- **1/4 the height** of the opening at 28° to 32° - **1/3 the height** of the opening at 36° to 40° - 1/**2 the height** of the opening at 44° to 56°

SITE - SOLAR ACCESS

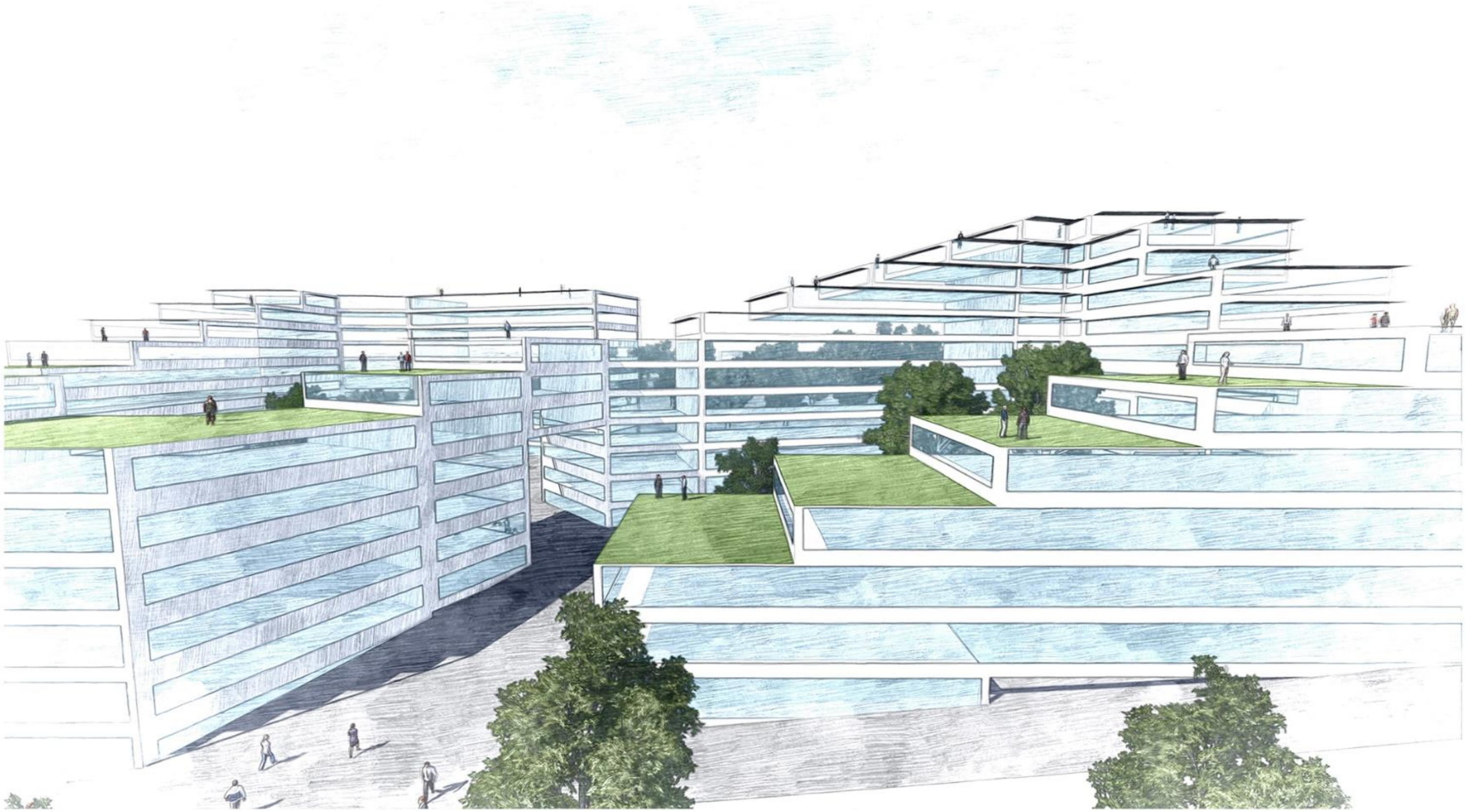
The “Solar access” strategy allow us to integrate passive heating and energy generation systems; sunny parks and outdoor spaces are better utilized. This strategy has been very usefull understanding the main problems of the inizial volumes and helped us to find the best way to solve them.

We started from the initial volume and then we move forward modifying it in order to ensure the solar access to the buildings, creating inner courts and public space where people could stay and live.



Guidelines from the 2030 Palette:

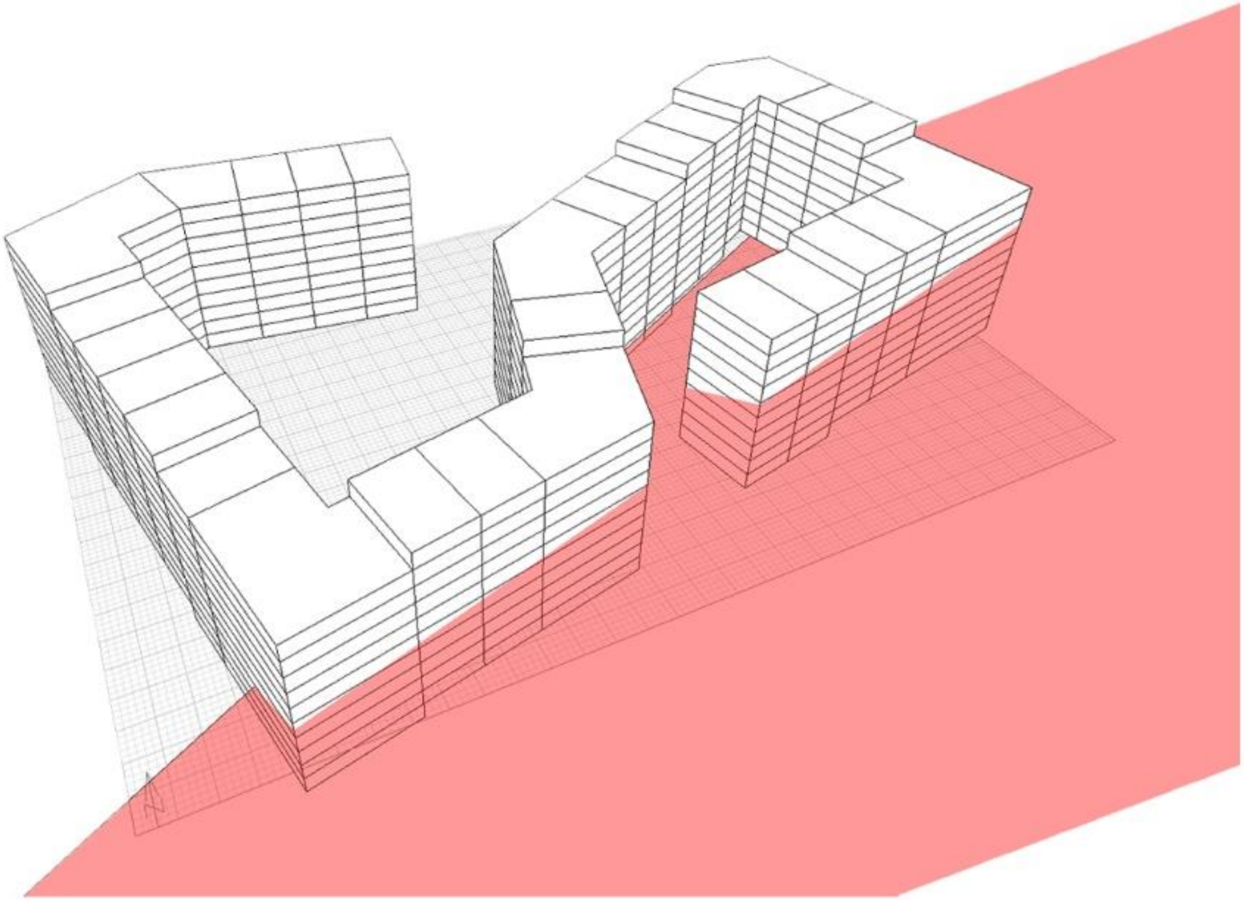
Determine solar access by:
- **Physical modeling** – 3D site/building model used with a heliodon or sunpeg chart.
- **Digital modeling** – 3D simulation of sun and shadows on structures, vegetation and developments.
- **Sun path + skyline** – a sun path diagram and superimposed skyline will determine access to direct sun from a fixed position.



Transformation 2030
building performance analisys

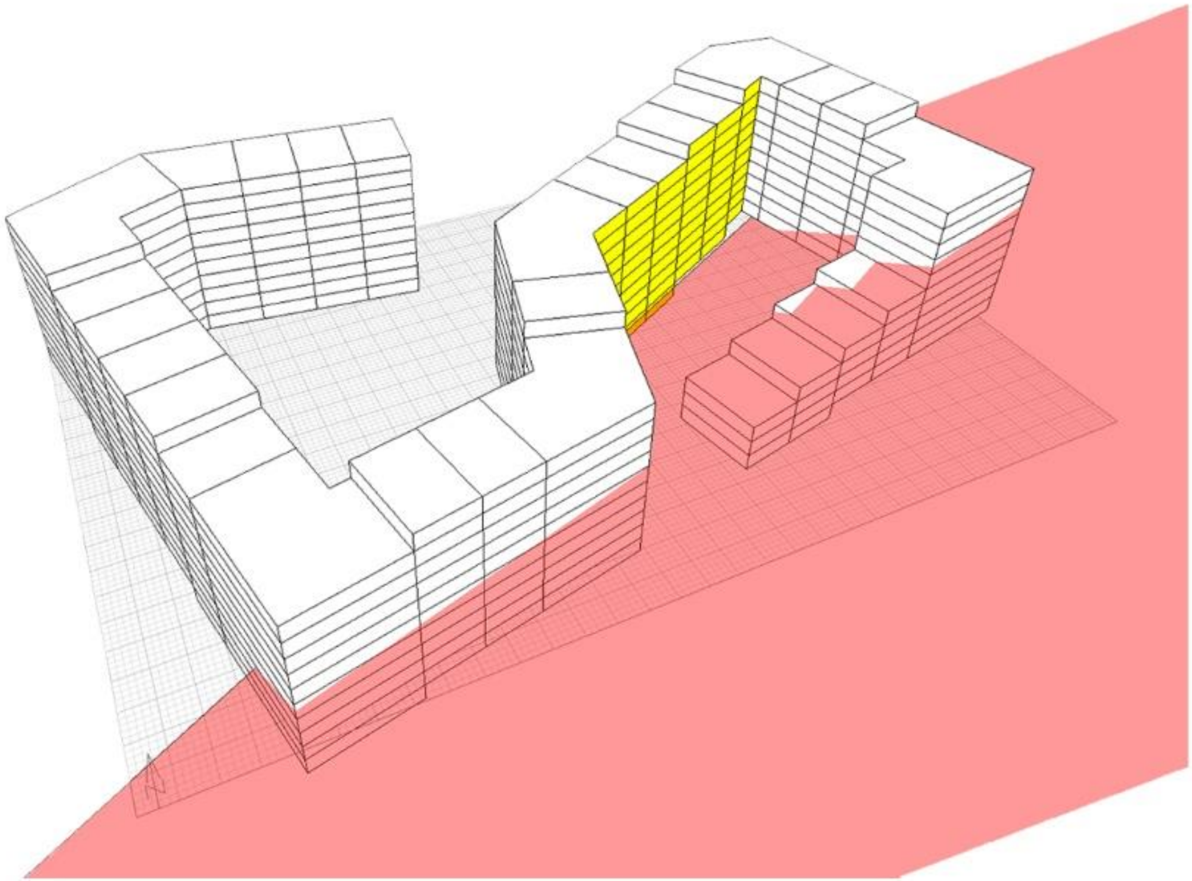
part 1) full site development

RIGHT TO LIGHT ANALISYS



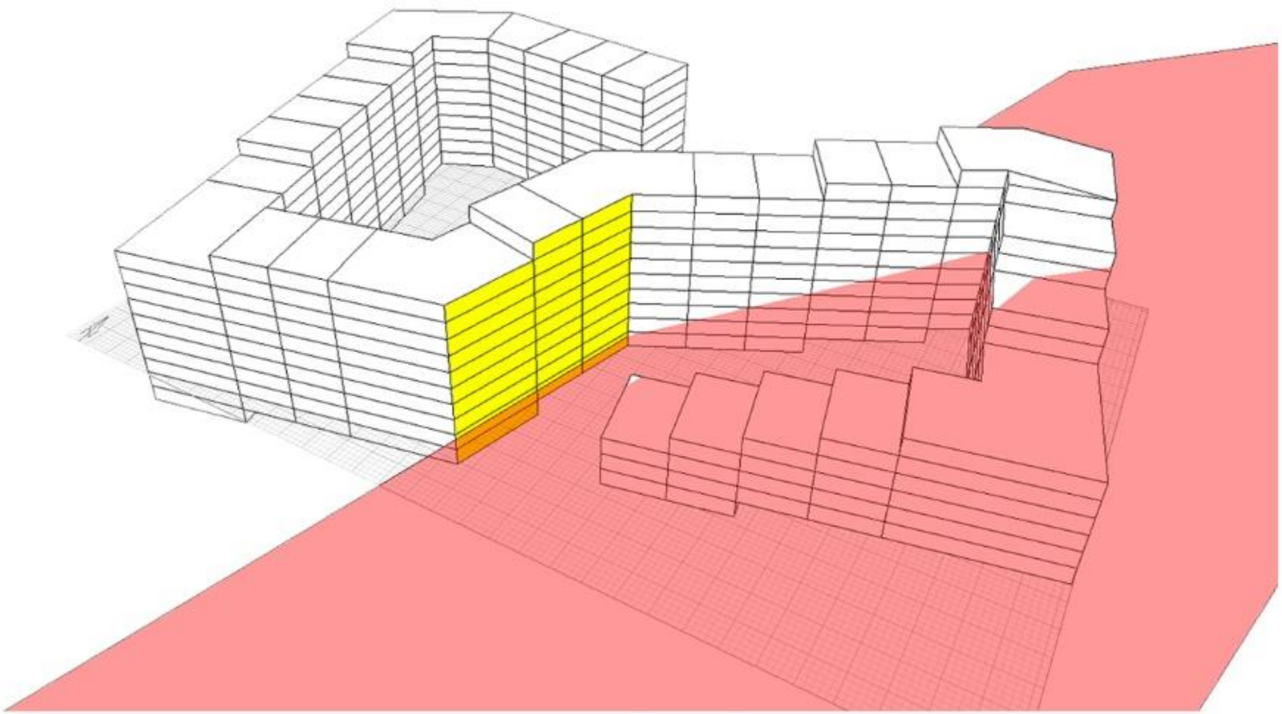
Starting from the max. volume, we modeled it according to the solar radiation.

RIGHT TO LIGHT ANALISYS



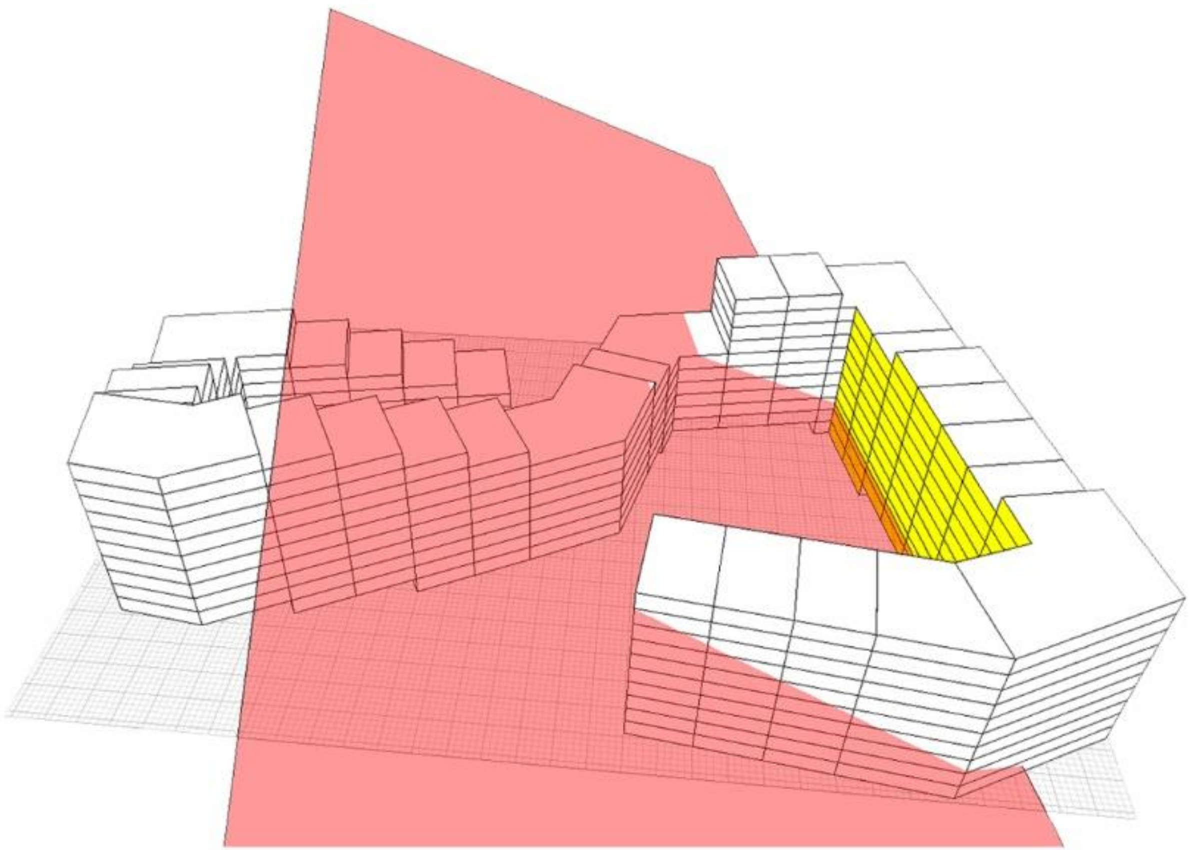
The south front was lowered to allow solar radiation reaching the apartments.

RIGHT TO LIGHT ANALISYS



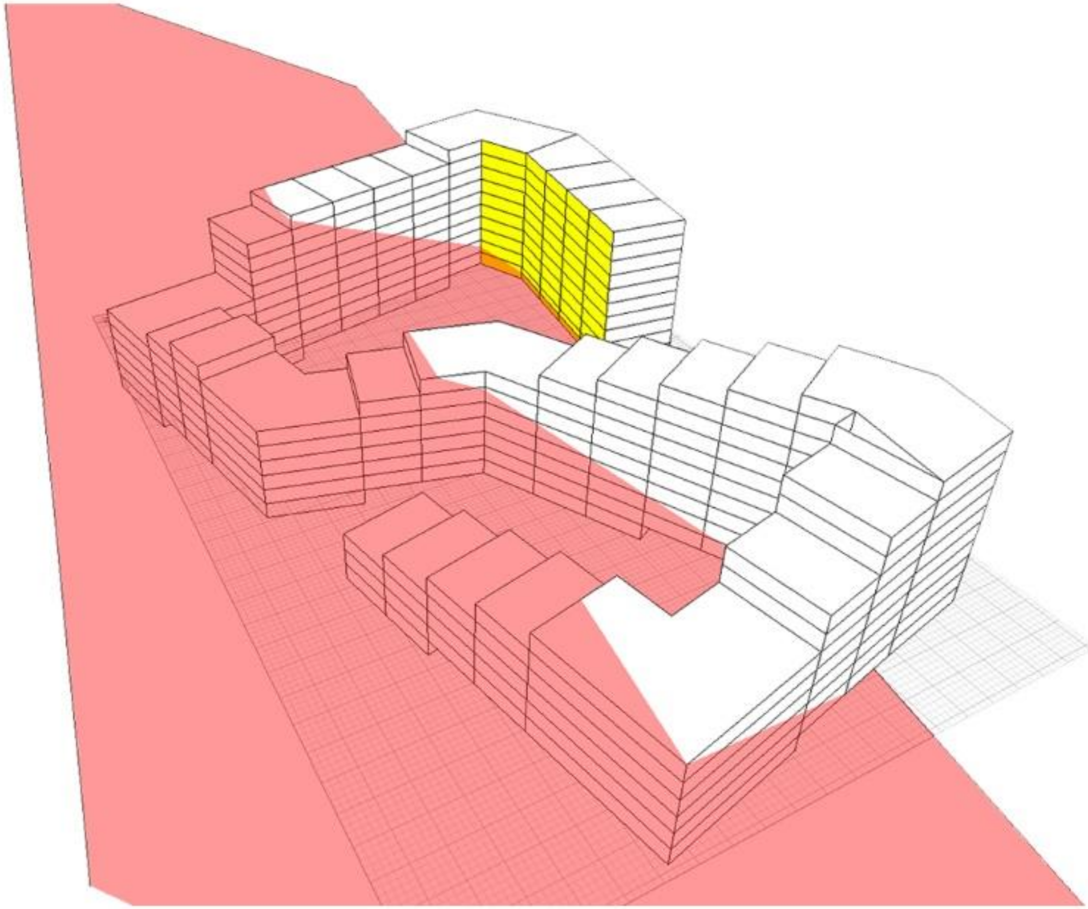
South-east front was jagged lowering the angle to ensure light in the morning.

RIGHT TO LIGHT ANALISYS



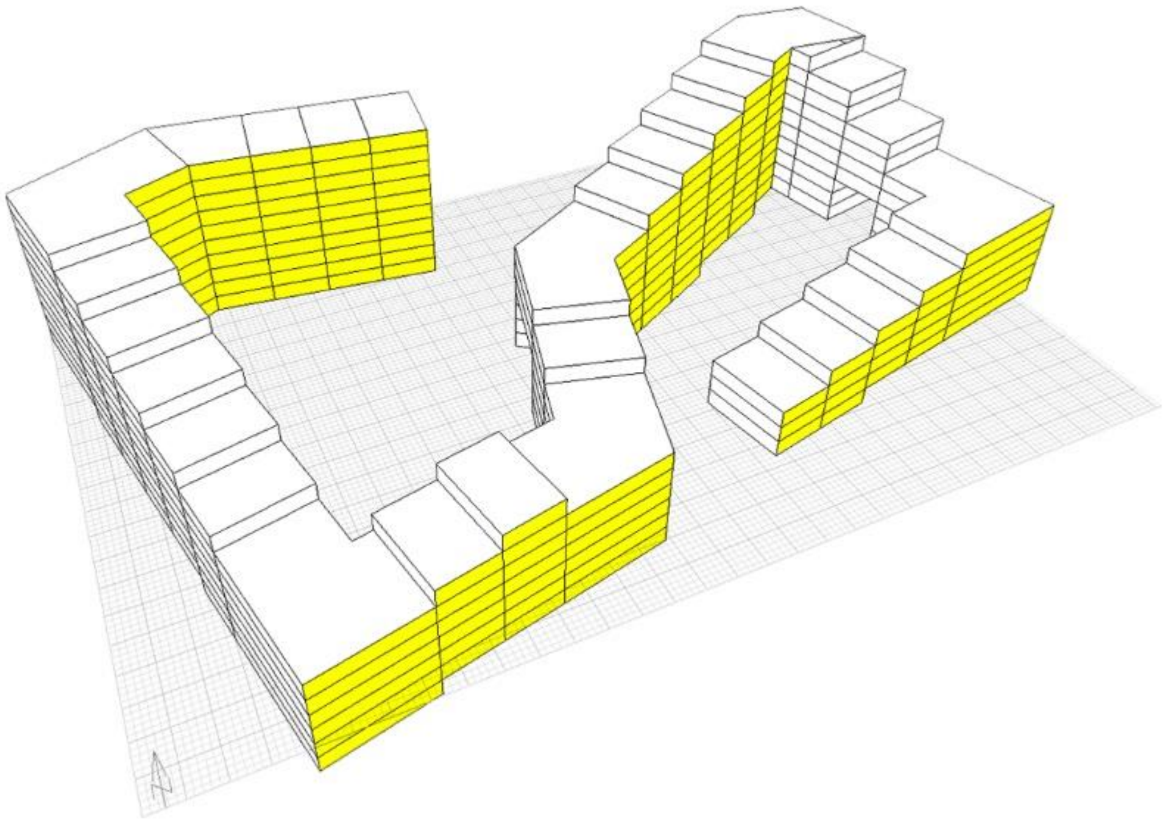
To ensure west front illumination, we reduced building according to the plane.

RIGHT TO LIGHT ANALISYS



The furthest apartments have full access to solar radiation due to the courtyard.

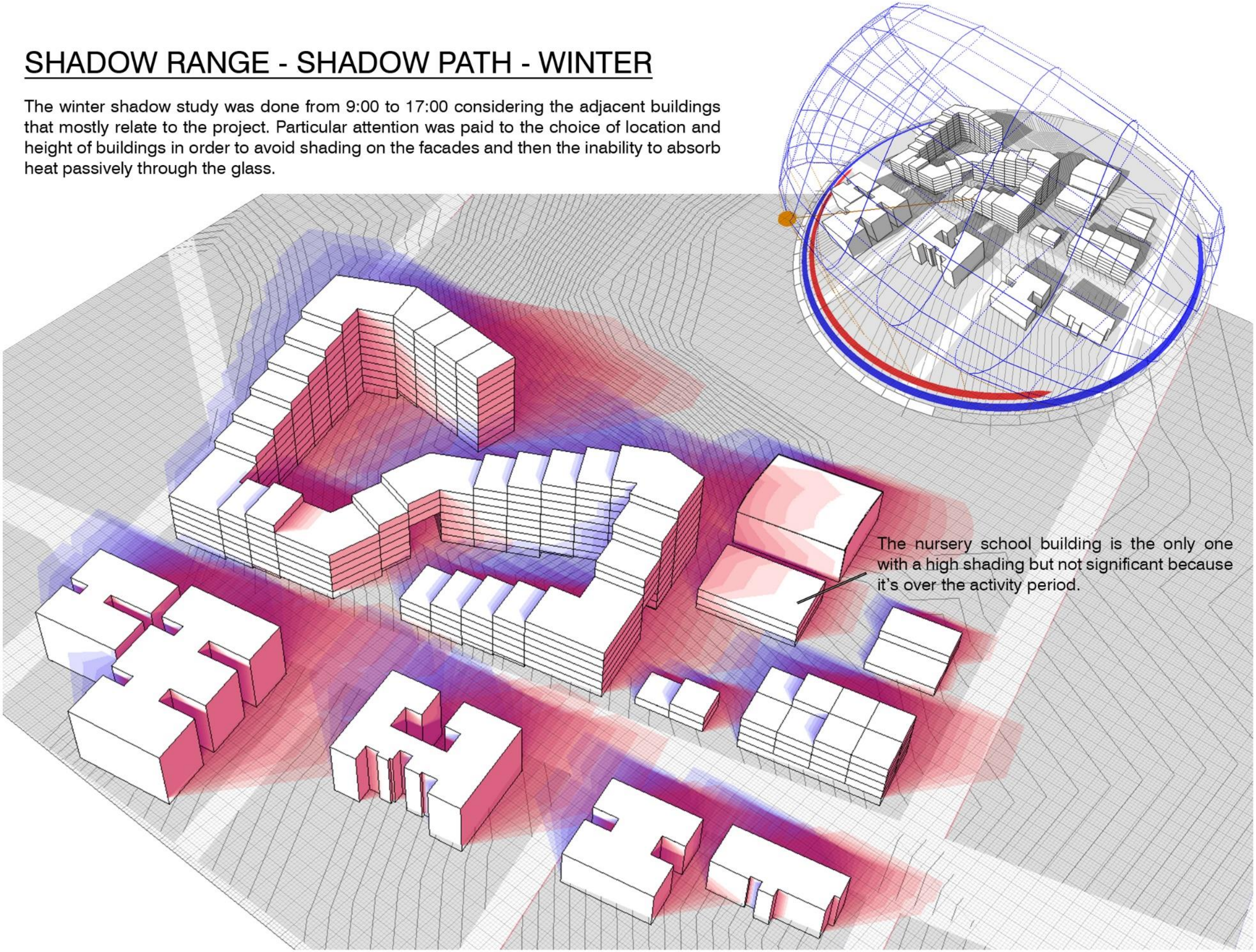
RIGHT TO LIGHT ANALISYS



Using this tool, we were able to ensured the best solar radiation for apartments.

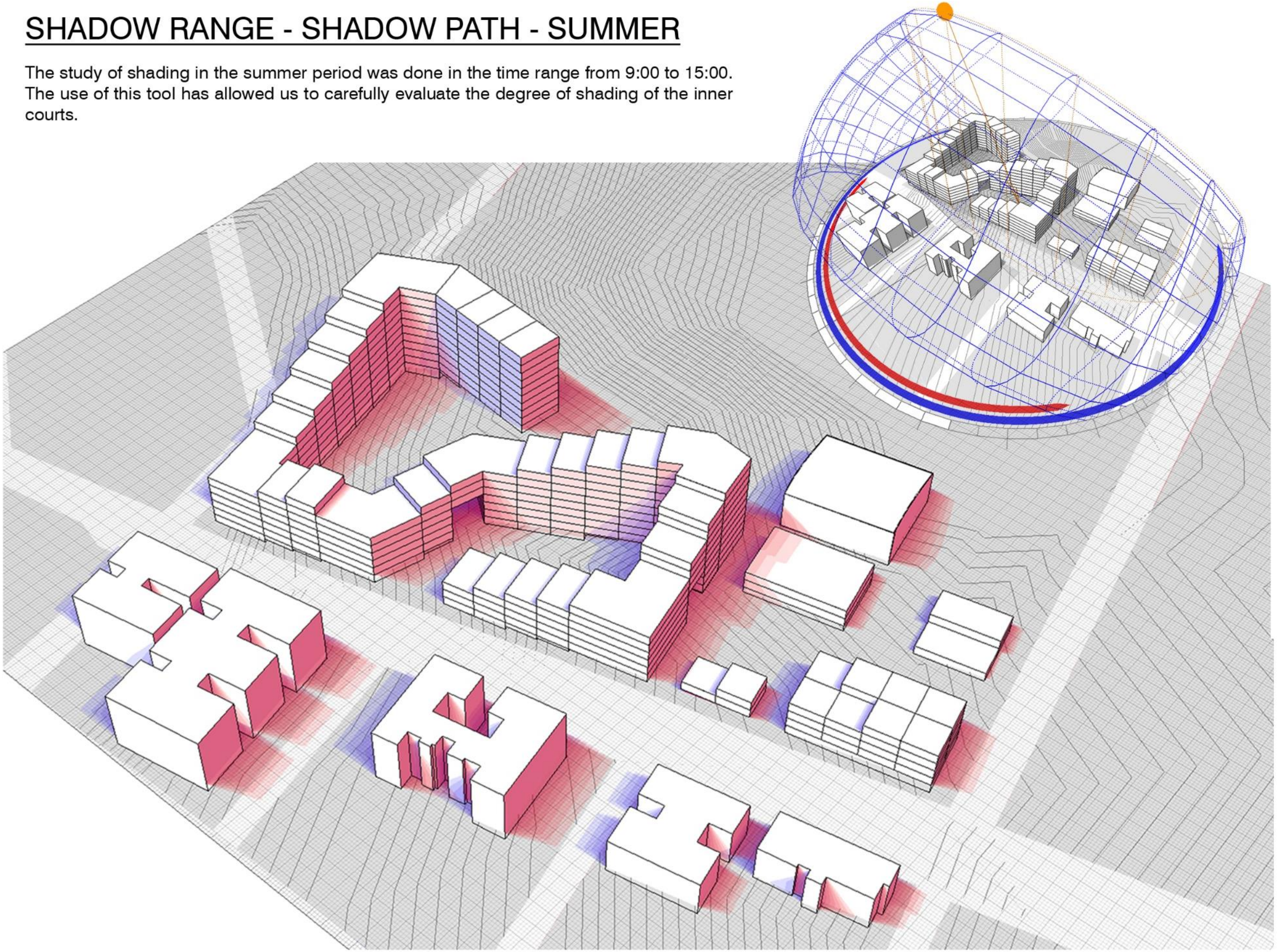
SHADOW RANGE - SHADOW PATH - WINTER

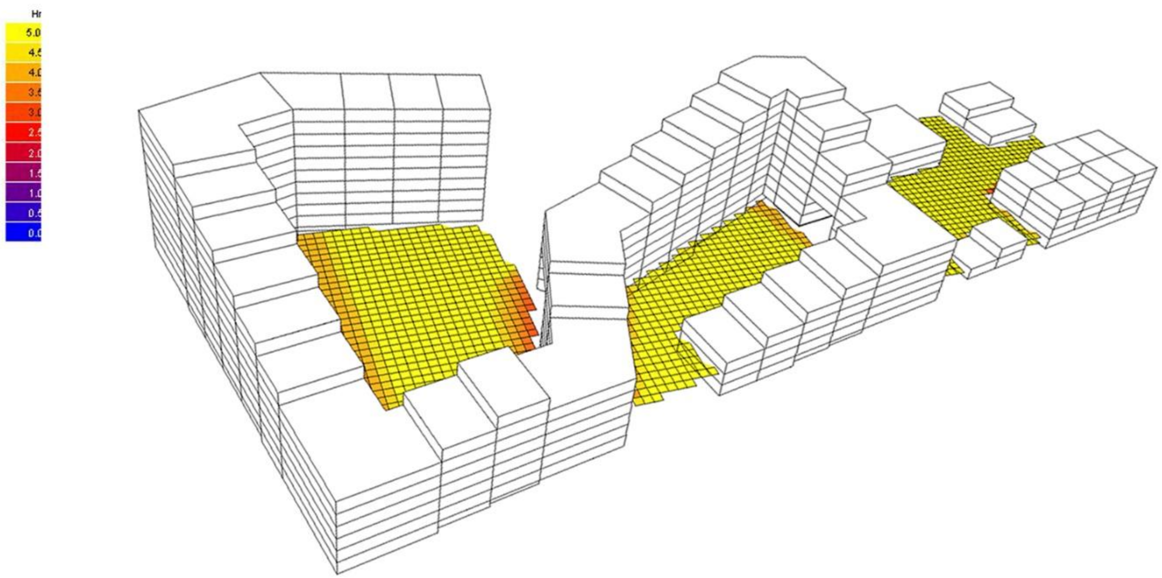
The winter shadow study was done from 9:00 to 17:00 considering the adjacent buildings that mostly relate to the project. Particular attention was paid to the choice of location and height of buildings in order to avoid shading on the facades and then the inability to absorb heat passively through the glass.



SHADOW RANGE - SHADOW PATH - SUMMER

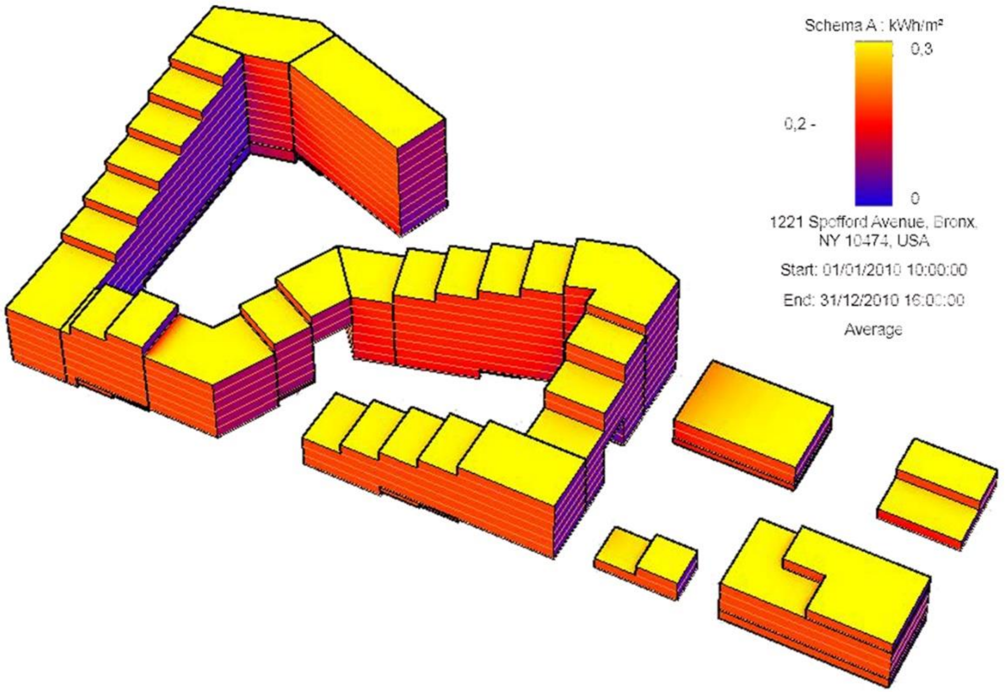
The study of shading in the summer period was done in the time range from 9:00 to 15:00. The use of this tool has allowed us to carefully evaluate the degree of shading of the inner courts.





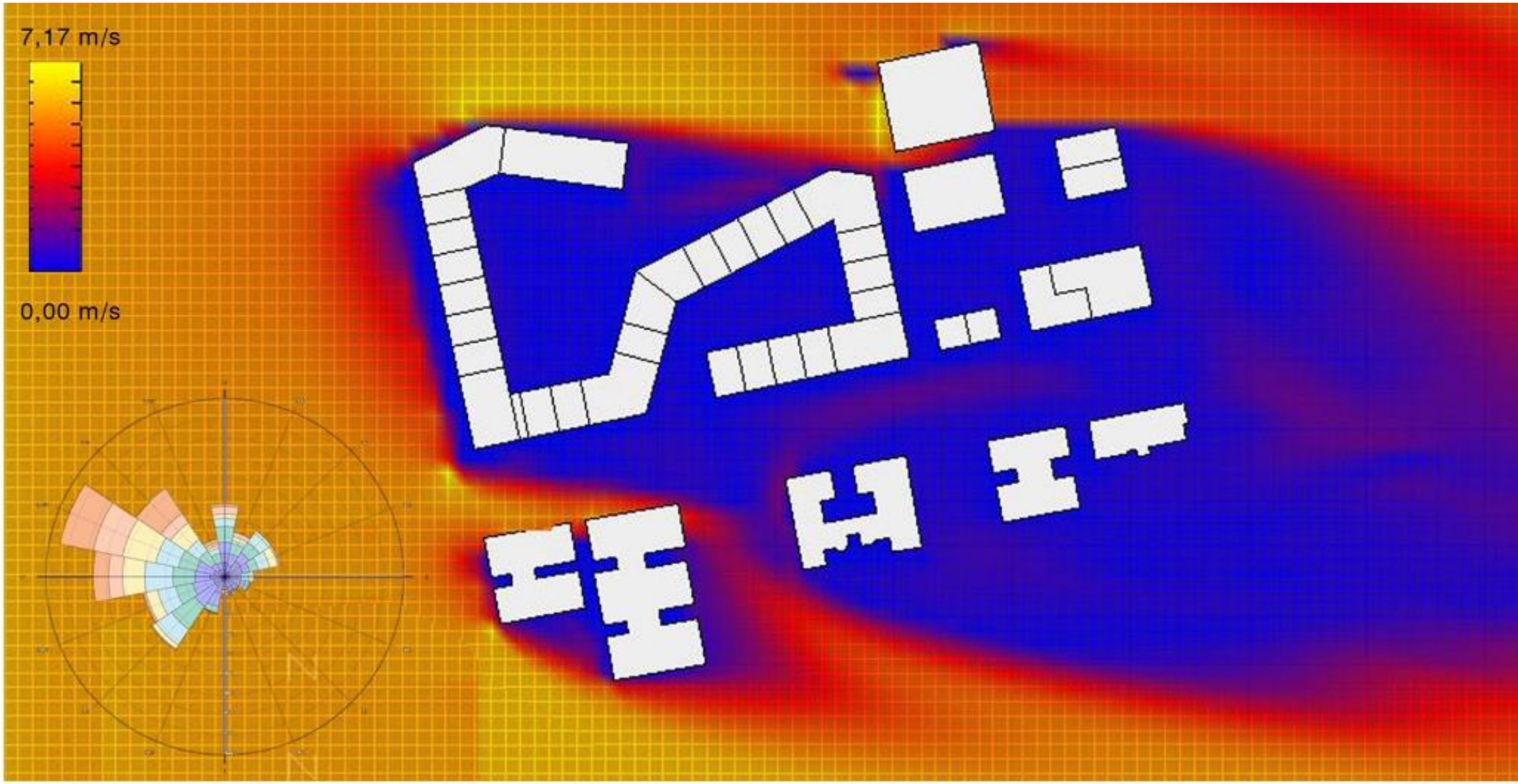
SOLAR ACCESS ANALYSIS

For the best use of the inner courts have placed as a target that these last were hit by a direct radiation of at least five hours in their heyday, the summer. The use of the tool "amount of sunlight hours" has allowed us to evaluate in the design phase the satisfaction of this important energy target.



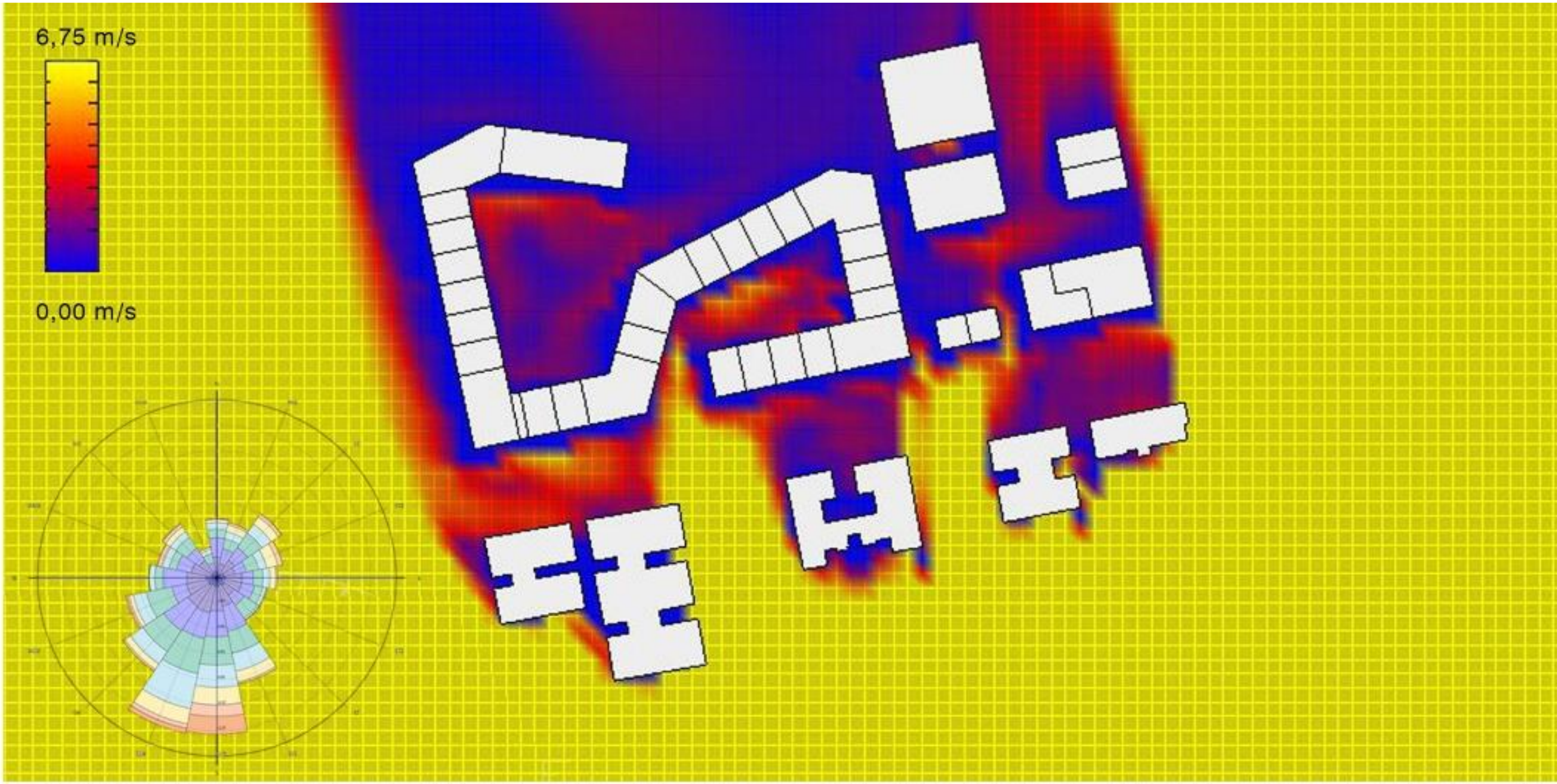
SOLAR RADIATION ANALYSIS

From the analysis of incident solar radiation, we successfully established the heights of our buildings. The project held into particular consideration the desire to have an excellent solar radiation on the south facades and garden terraces. For this reason, the terraces slope down to the south.



WIND TUNNEL ANALYSIS - WINTER

The shape of the buildings is such as to prevent the prevailing winds in the winter cold from the north-west strike perpendicular facedes of our building, causing great loss of heat. In addition, the cold winds do not penetrate into the inner courts.



WIND TUNNEL ANALYSIS - SUMMER

The shape of the buildings is such that, during the summer, the prevailing winds from the south hit the facades of our building so as to ensure a cooling of the interior spaces. We have also planned cuts on the southern front in order to allow to the refreshing winds to penetrate into the courts.

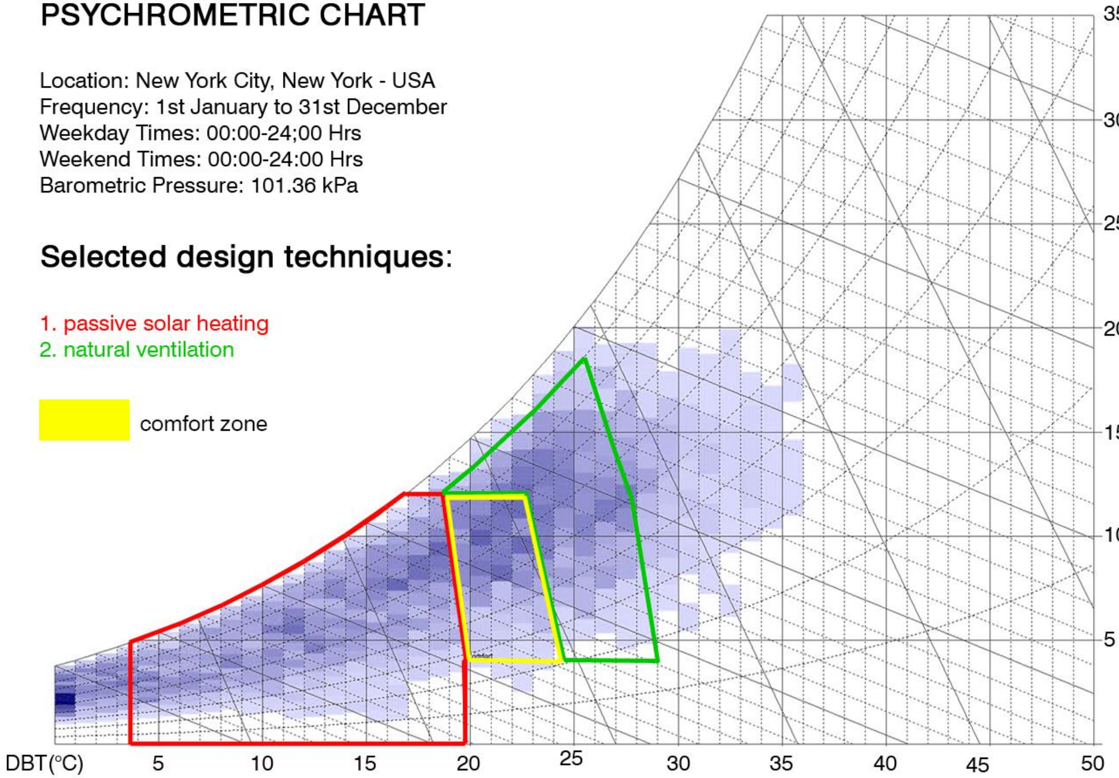
PSYCHROMETRIC CHART

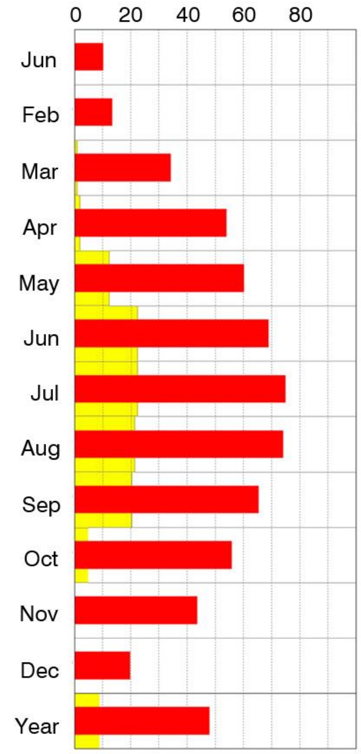
Location: New York City, New York - USA
Frequency: 1st January to 31st December
Weekday Times: 00:00-24;00 Hrs
Weekend Times: 00:00-24:00 Hrs
Barometric Pressure: 101.36 kPa

Selected design techniques:

1. passive solar heating
2. natural ventilation

comfort zone





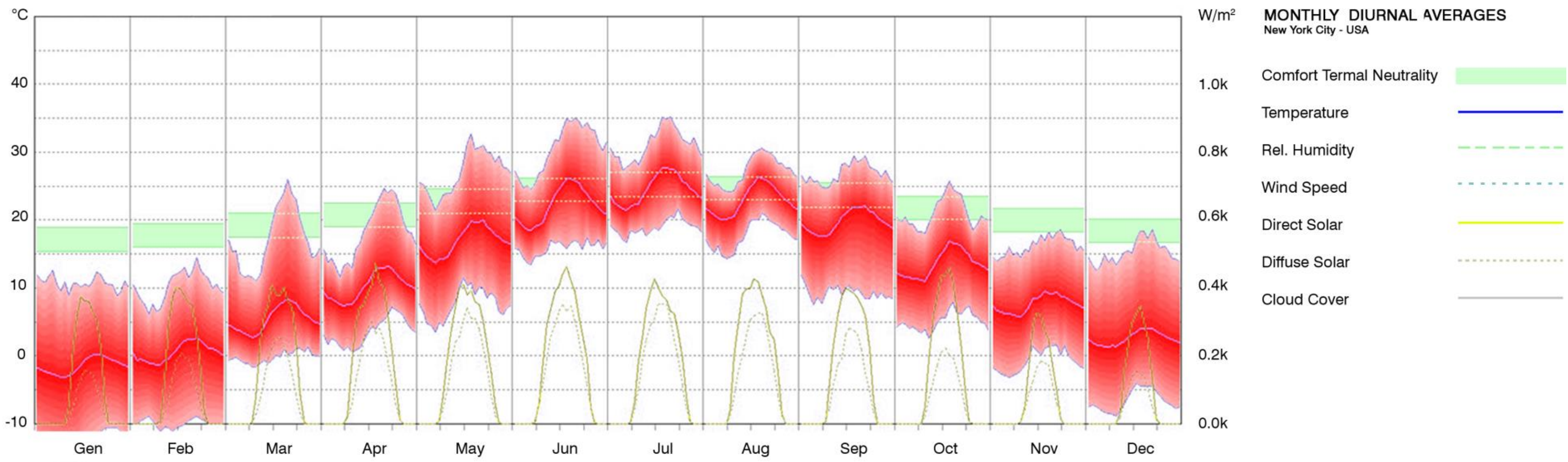
SELECTED DESIGN TECHNIQUES

1. passive solar heating
2. natural ventilation

% COMFORT

Before

After


°C
W/m²
MONTHLY DIURNAL AVERAGES
New York City - USA
Comfort Termal Neutrality
Temperature
Rel. Humidity
Wind Speed
Direct Solar
Diffuse Solar
Cloud Cover
40
30
20
10
0
-10
1.0k
0.8k
0.6k
0.4k
0.2k
0.0k
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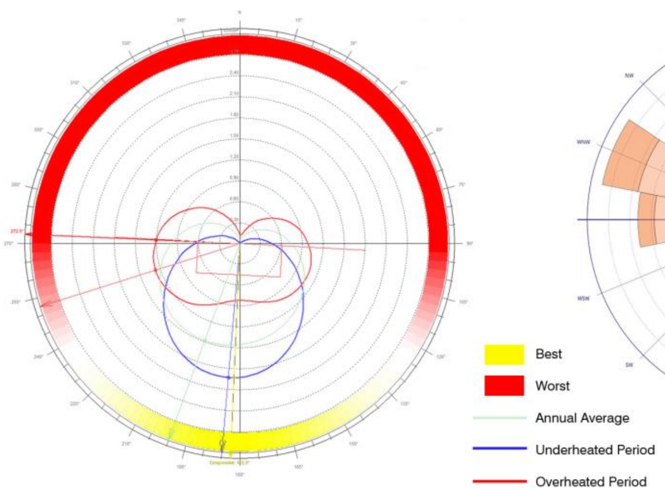
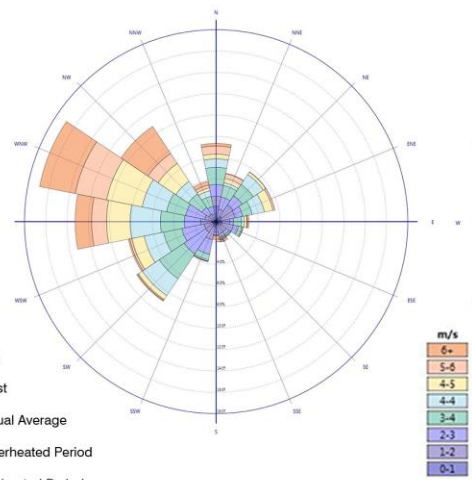
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

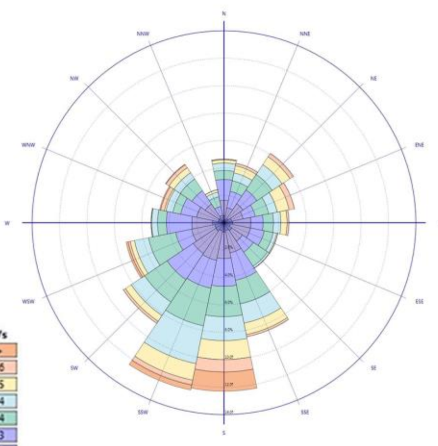
OPTIMUM ORIENTATION



PREVAILING WINDS - WINTER



PREVAILING WINDS - SUMMER



BUILDING FORM AND ORIENTATION

From the Optimum Orientation graph we identified the best orientation for the building in order to achieve the thermal and visual comfort.

Obviously, the best approach appears to be the east/west orientation, with the main facade facing the equator (south-facing).

Studying the prevailing summer and winter winds, allows us to understand the best form and orientation of the building.

In particular, one of the attentions of the design was to protect buildings from cold winter winds from the north-west, and to capture as much as possible the refreshing summer winds from the south.

WHOLE BUILDING ENERGY ANALYSIS

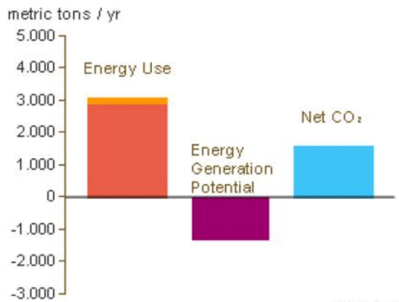
BUILDING PERFORMANCE FACTORS

Location:	NY
Weather Station:	50958
Outdoor Temperature:	Max: 35°C/Min: -18°C
Floor Area:	49,380 m²
Exeterior Wall Area:	23,122 m²
Average Lighting Power:	4.84 W/m²
People:	467 people
Exterior Window Ratio:	0.43
Electrical Cost:	$0.17 / kWh
Fuel Cost:	$1.33 / Therm

Energy Use Intensity

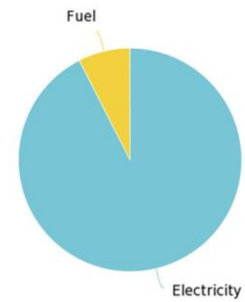
Electricity EUI:	74 kWh/sm/yr
Fuel EUI:	6 kWh/sm/yr
Total EUI:	81 kWh/sm/yr

Annual Carbon Emissions



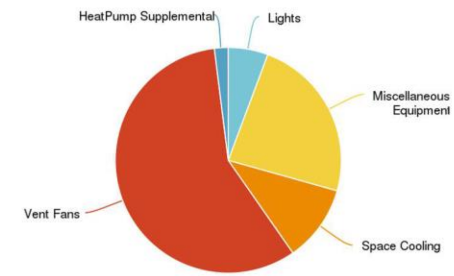
	(metric tons/yr)
Electricity Consumption	2,809
Fuel Consumption	244
Roof PV Potential (High Efficiency)	-1,358
Single 15' Wind Turbine Potential	0
Net CO_2	1695

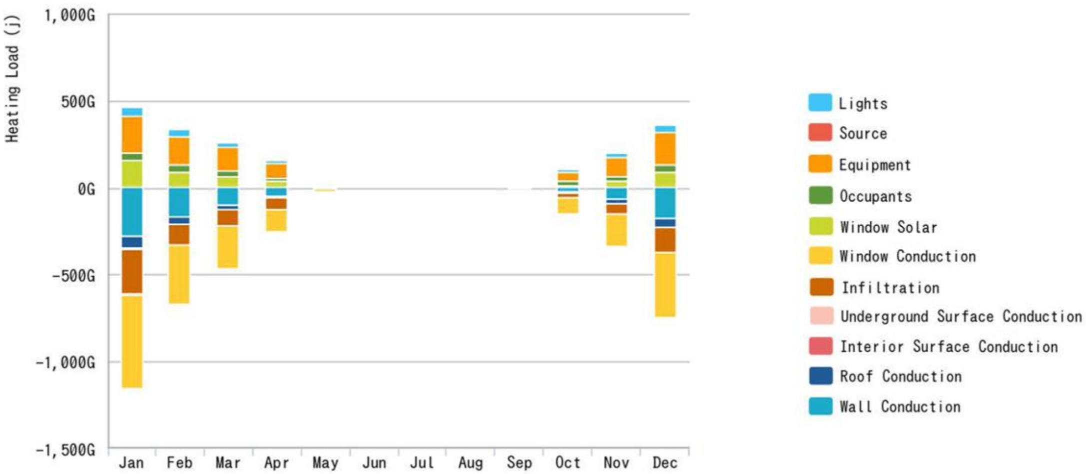
Annual Energy Use/Cost

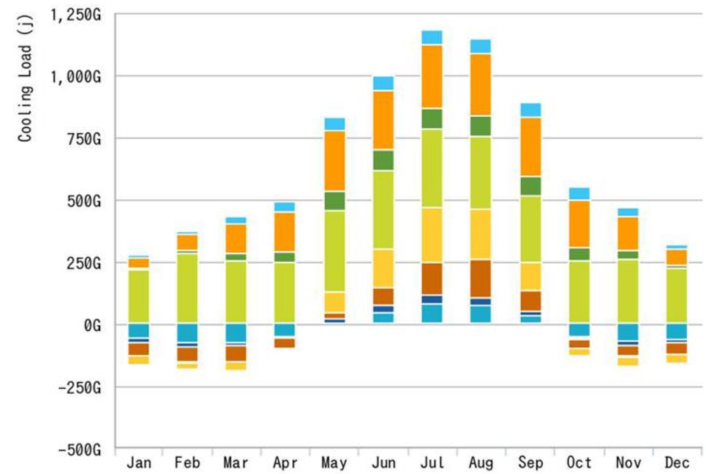


Electricity	92%	$625,030	3,676,649 kWh
Fuel	8%	$24,957	1,074,806 MJ
		$649,987	

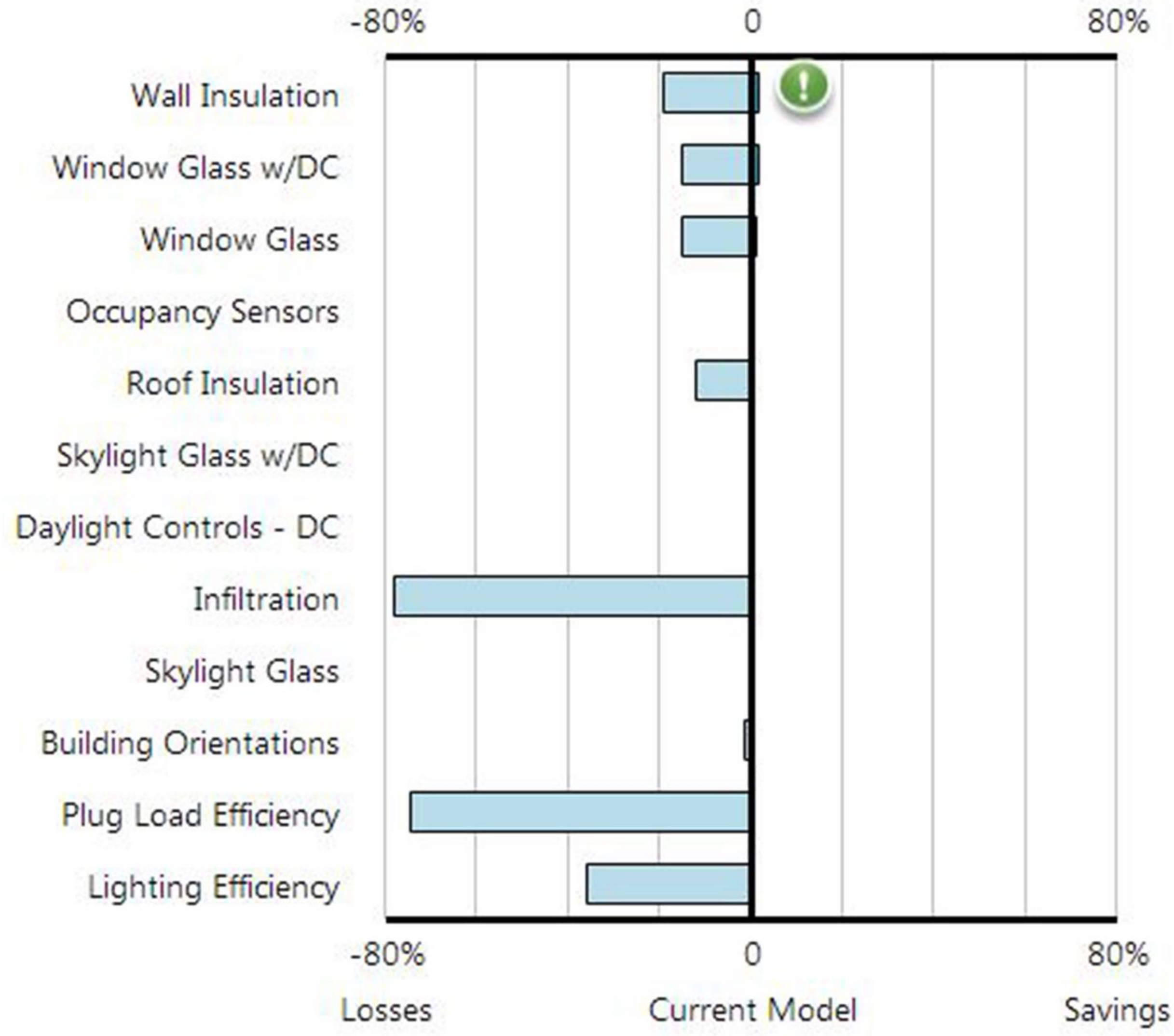
Annual Energy Use: Electricity





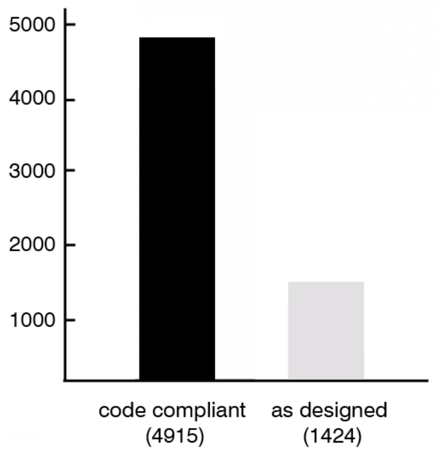


POTENTIAL ENERGY SAVINGS/LOSSES

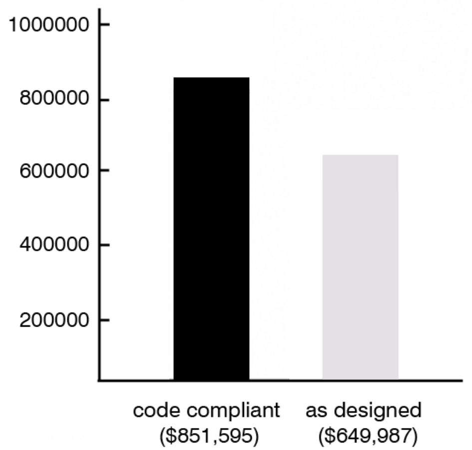


ENERGY REQUIREMENTS AND COSTS

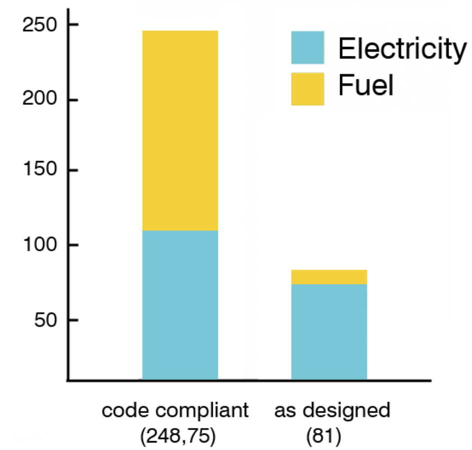
CO_2 lbs/yr



Annual Energy Cost



EUI kWh/m²/yr



CODE COMPLIANCE

This diagrams compares code compliance to the as designed building. In terms of performance, the project set out to achieve code compliance.

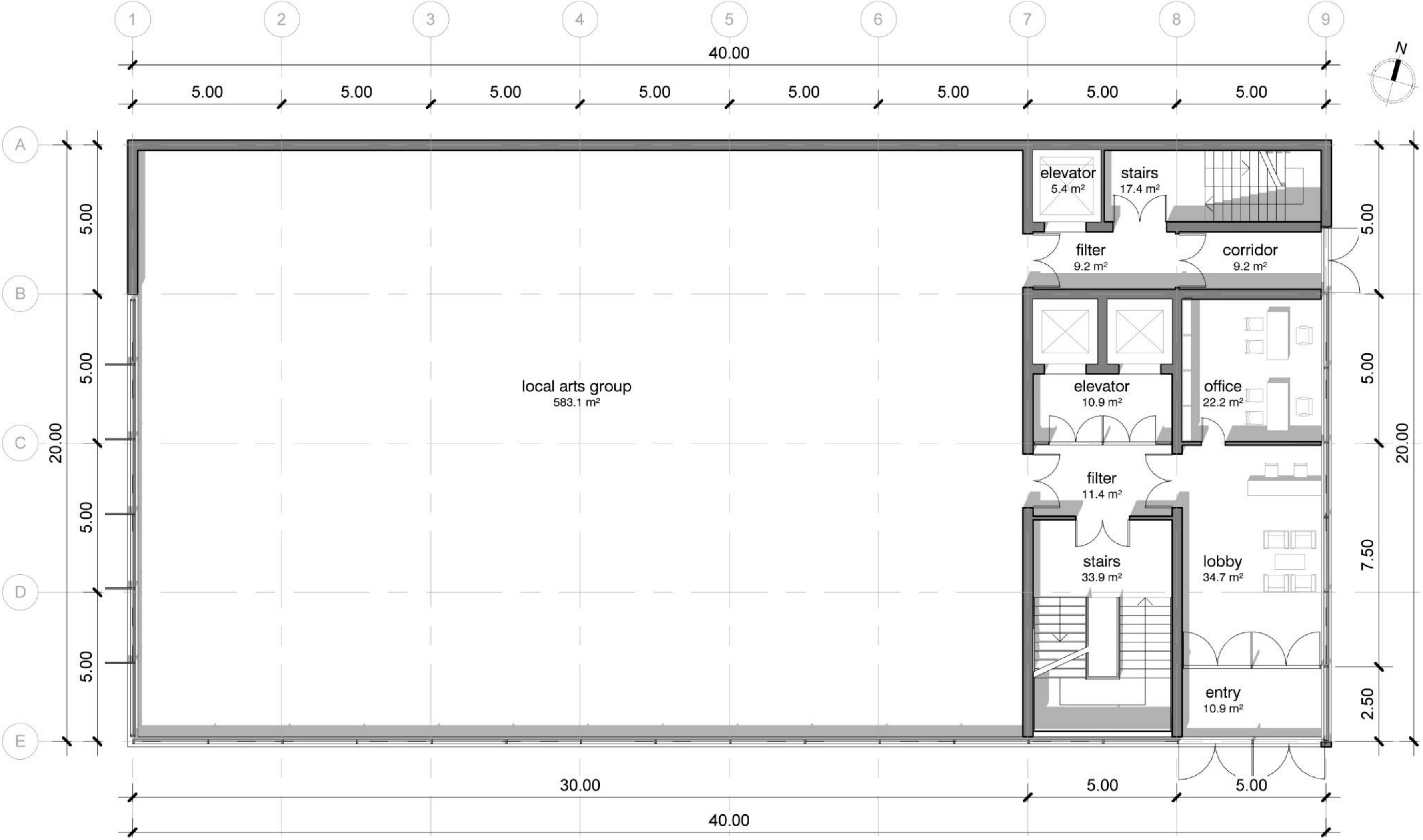
Regarding **CO2 emissions**, we obtained a 72% reduction that meets the targets of the 2030 Challenge for 2015.
We have also achieved a reduction of the **Annual Energy Cost** average equal to 24%.

For what concerns the **EUI**, we were able to achieve a reduction of 67% that meets the 60% energy reduction targets of the 2030 Challenge.

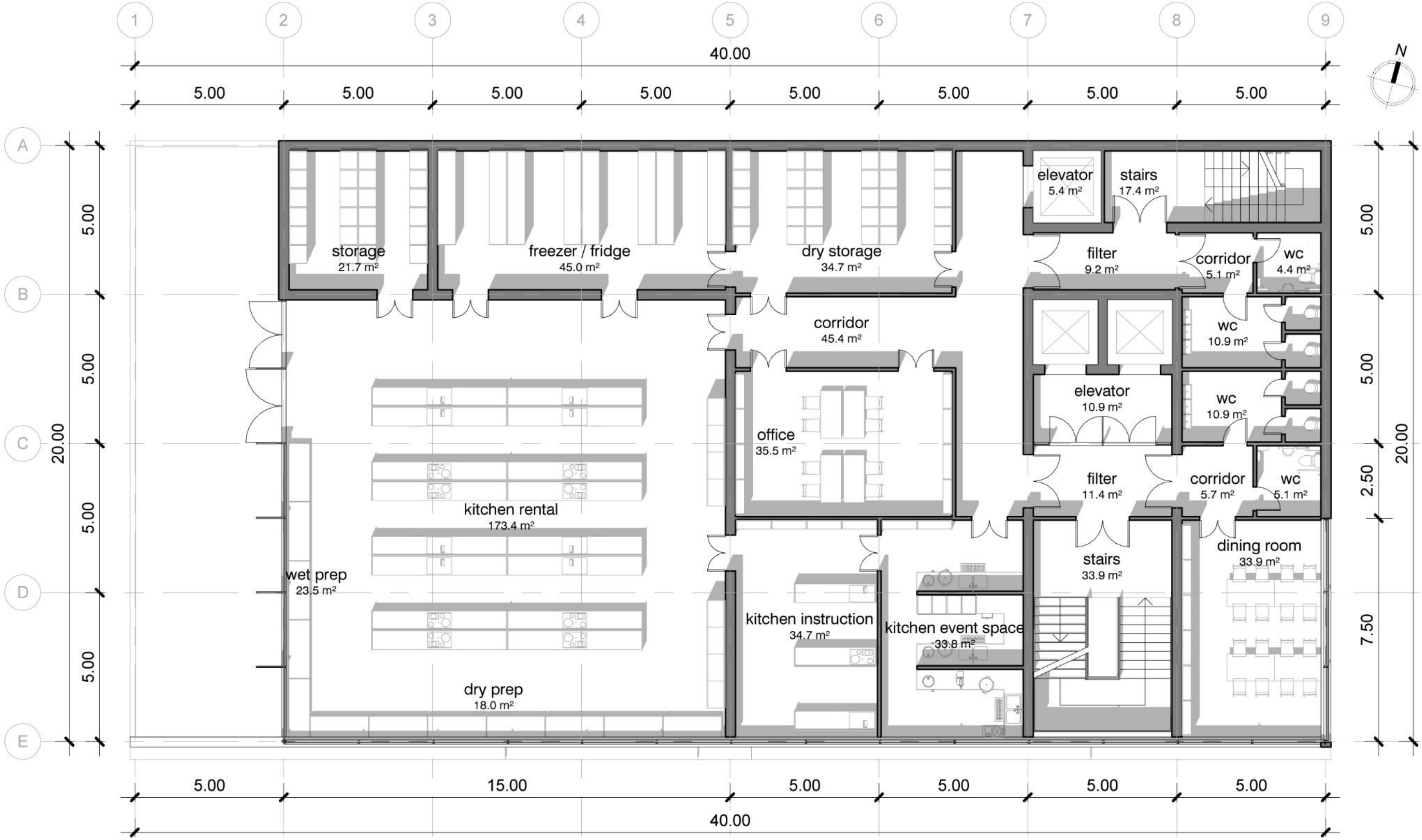
Finally we obtained a **fossil fuel reduction** of 96%, approximating the Carbon-neutral target for 2030 Challenge.

Transformation 2030
concept

part 2) special event and culinary spaces

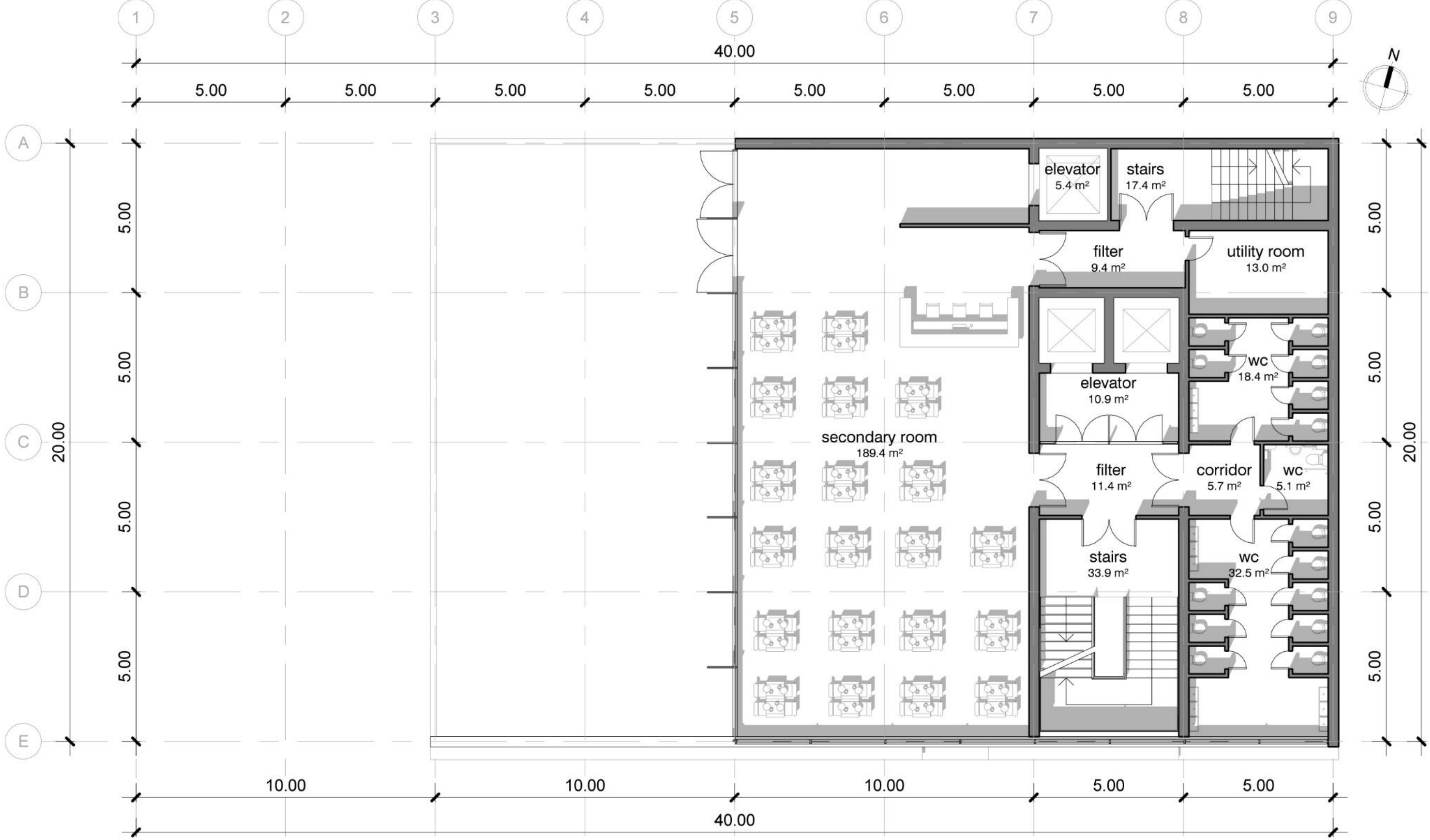


Ground Floor scale 1:200



First Floor scale 1:200

Second Floor scale 1:200



Third Floor scale 1:200

Transformation 2030
sustainable design strategies

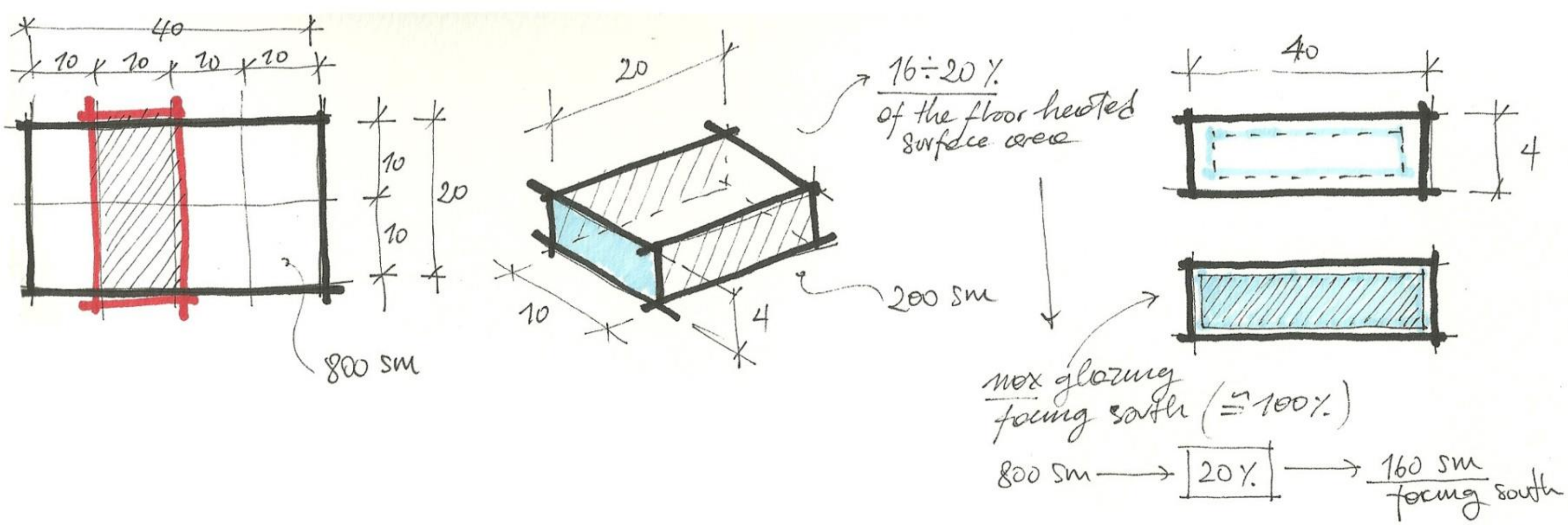
part 2) special event and culinary spaces

BUILDING - DIRECT GAIN: GLAZING

Direct glazing admits direct sunlight into a space for passive heating in winter, we chose this for a better comfort in winter, and reduce heating cost.

Direct gain glazing (facing the equator) is sized to admit enough sunlight on an average sunny winter day to heat a space over the full 24-hour period.

Size solar glazing as a percentage of the floor area to be heated:



Guidelines from the 2030 Palette:

Solar glazing admits direct sunlight into a space for passive heating in winter.Solar glazing (facing the equator) is sized to admit enough sunlight on an average sunny winter day to heat a space over the full 24-hour period. Size solar glazing as a percentage of the floor area to be heated:

Cold Climates

- 16% at 28º - 40º latitude
- 20% at 44º - 56º latitude

Temperate Climates

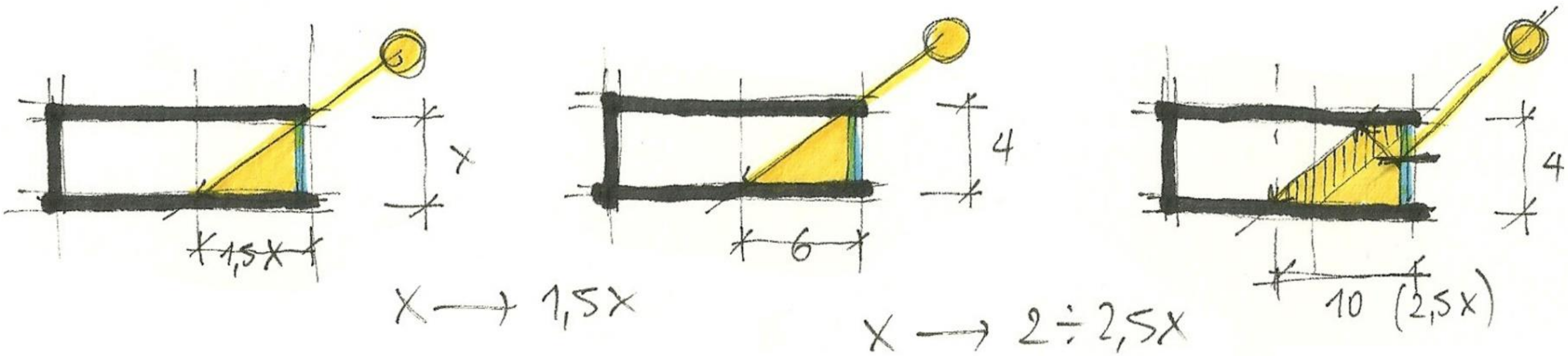
- 10% at 28º - 40º latitude
- 13% at 44º - 56º latitude

Orient solar glazing within 15º of true south in the Northern Hemisphere, or true north in the Southern Hemisphere, and no more that 25º from either orientation. Store a portion of the heat gained during the day for release at night by locating thermal mass in the space. In very cold climates, incorporate moveable insulation over the glazing at night.

BUILDING - SIDE DAYLIGHTING

The side daylighting has been applicated for capture direct natural light, this strategy improve the inside comfort and reduce energy light cost in the winter periods.

We chose size the glazing area as a percentage of the floor area to be daylit, adequate - 15-25% (or 25% to 40% of the exterior wall area)



Guidelines from the 2030 Palette:

Exterior wall glazing provides acceptable interior task-daylight levels at a depth of 1.5 to 2 times the height of a glazed opening.A light shelf added to a glazed opening will reflect daylight deeper into a space, and can increase the daylighting depth to 2.5 times the height of the glazed opening.

Size the glazing area as a percentage of the floor area to be daylit:

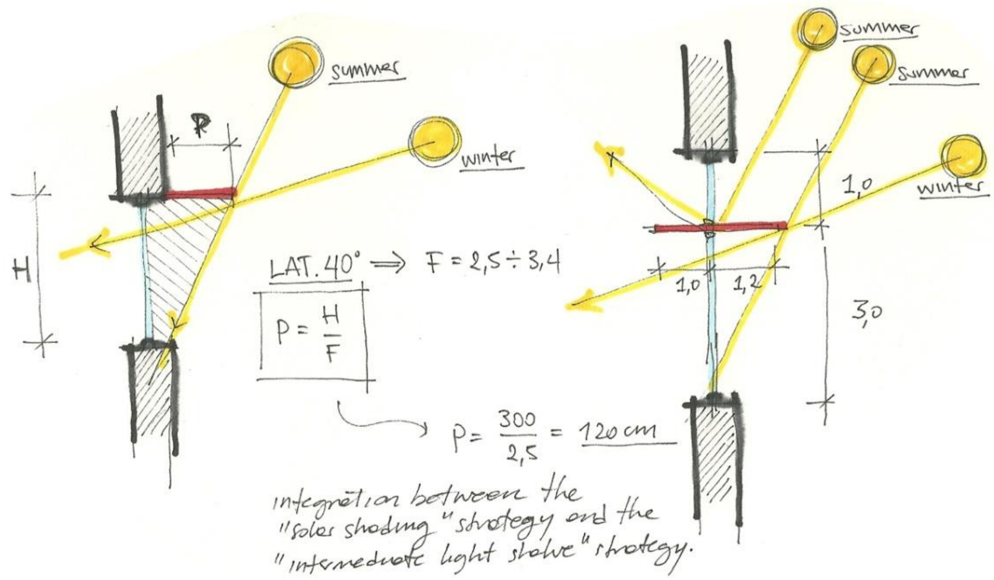
Lighting Level	Aperture Area / Daylit Floor Area
Adequate	- 15-25% (or 25% to 40% of the exterior wall area)
MInimum	- 10-15%

Make the side walls, back wall and ceiling a light color to evenly distribute daylight and prevent glare.

BUILDING - SOLAR SHADING

the solar shading is a strategy to contrast the direct light inside the building in the summer, we dimensioned the shade with our latitude and installed in the south side of the building for better results and reduce the EUI.

We study an accurate system to not block solar heat gain through the south glazing in winter.



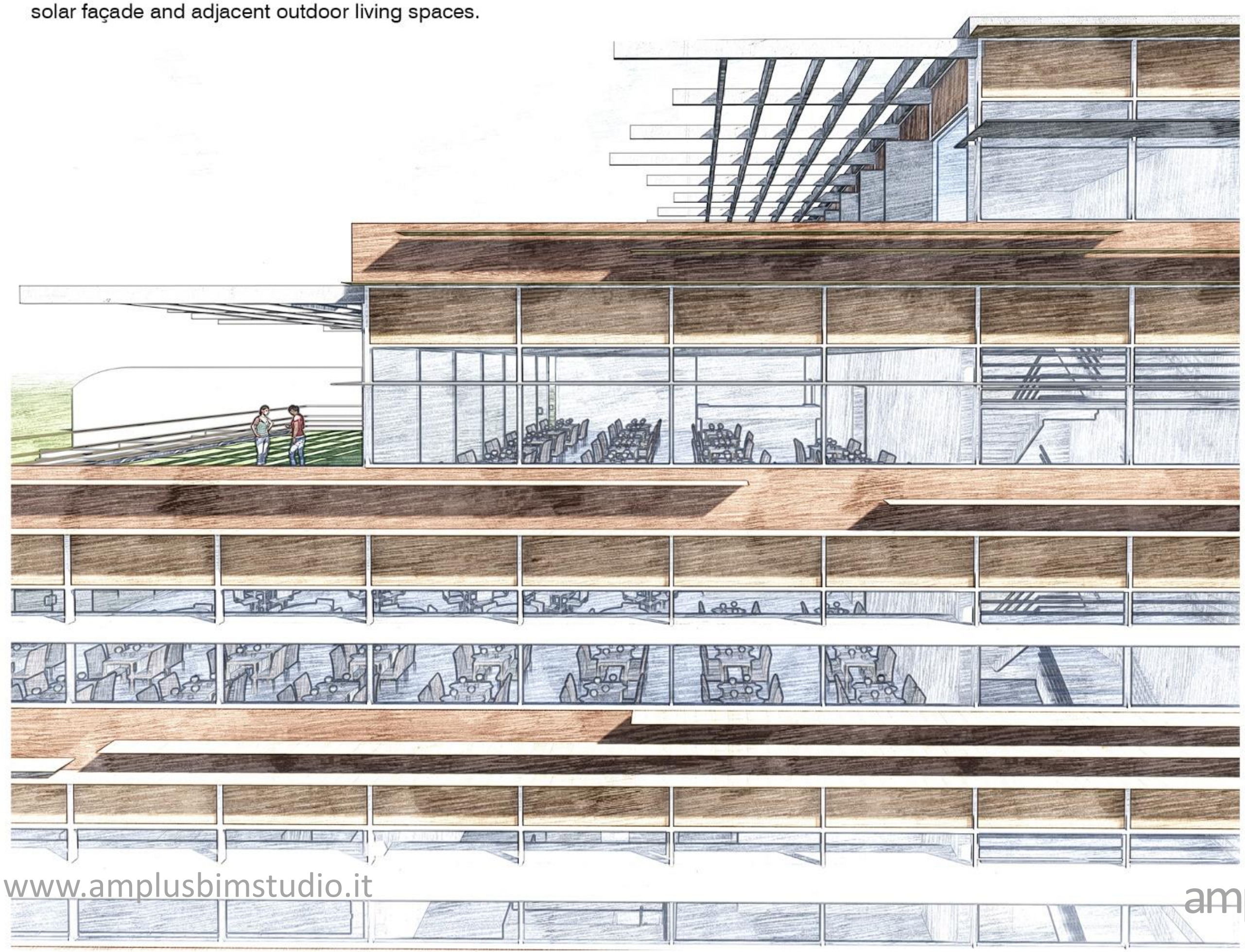
Guidelines from the 2030 Palette:

During warm summer months, overhangs block unwanted direct sunlight from solar glazing, reducing cooling loads.
Locate an overhang above solar glazing (facing the equator – south in northern latitudes and north in southern latitudes).

Extend the overhang projection approximately:

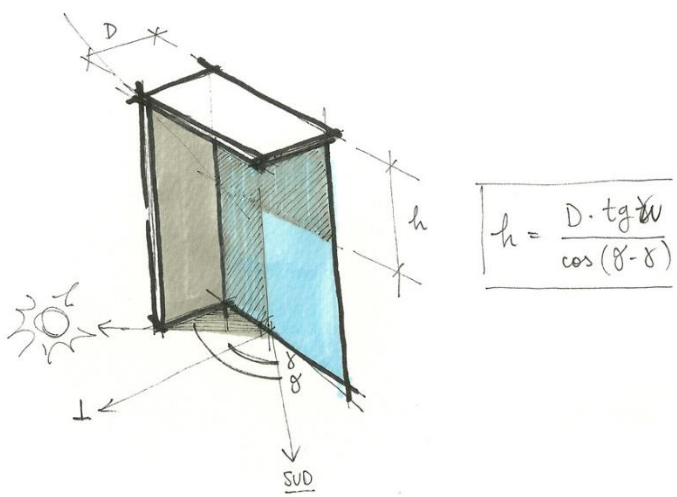
-1/4 the height of the opening at 28°L to 32°L
-1/3 the height of the opening at 36°L to 40°L
-1/2 the height of the opening at 44°L to 56°L

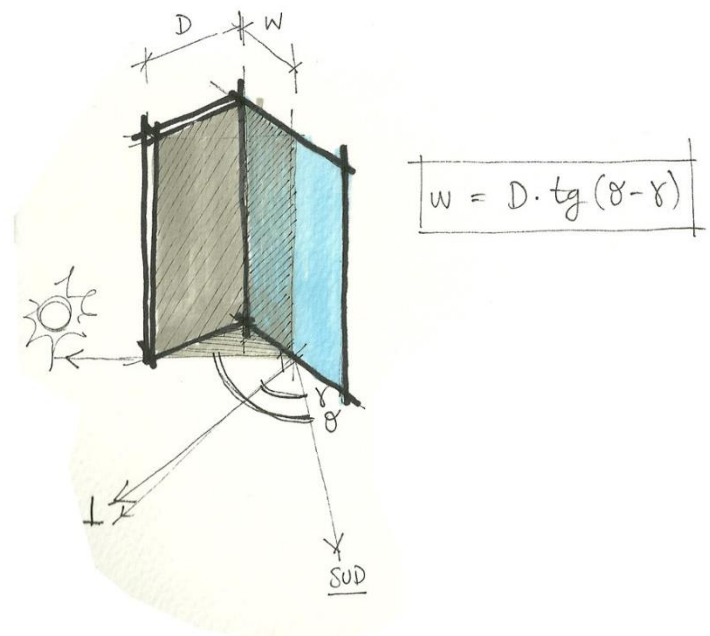
Exterior horizontal louvers can also be used to shade south glazing. Use the above guidelines to size the louver projection as a fraction of the distance between louvers.
In hot climates (28°L or less) that do not require any heating, extend overhangs, roof, or shading devices to cover the entire solar façade and adjacent outdoor living spaces.



BUILDING - <u>EAST/WEST SHADING</u>

The east/west shading it's a technology to block the low morning and afternoon sun during the summer periods, we adopt it for the winter periods.





Guidelines from the 2030 Palette:

Exterior vertical fins, overhang/fin combinations (egg-crates), awnings and drop-down shades, block the low morning and afternoon sun during warm periods.
Incorporate mature trees on the east and west sides to cool ground and air temperatures, intercepting sunlight before it reaches exterior walls in summer.

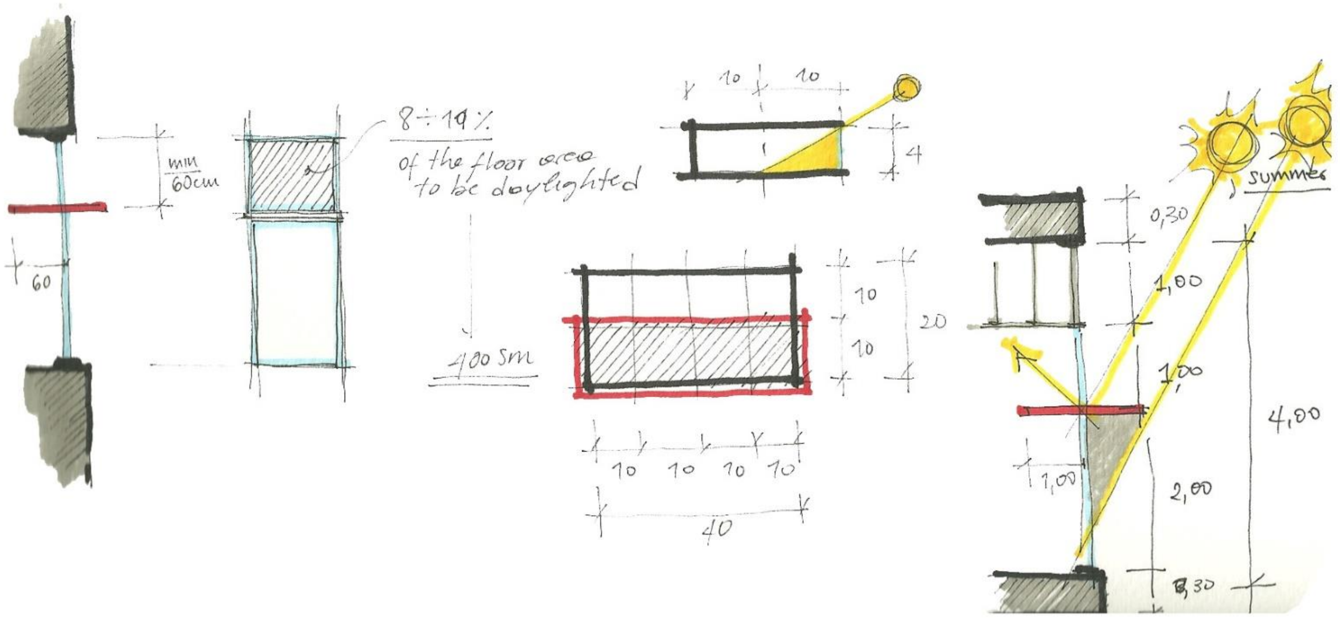
Set east and west vertical fins at an angle toward the:

-Equator in temperate climates – admits sunlight in winter; blocks sunlight in summer.
-North and south poles in warm climates – shades glazing all year.

In hot climates that do not require heating, incorporate deep porches, balconies and covered verandas to block east/west sunlight all year and expand livable areas by creating shaded comfortable outdoor spaces.

BUILDING - INTERMEDIATE LIGHT SHELVES

Intermediate light shelves, block direct sunlight and improve ambience natural light inside a space.
The ambience it will be more comfortable for activity inside building.



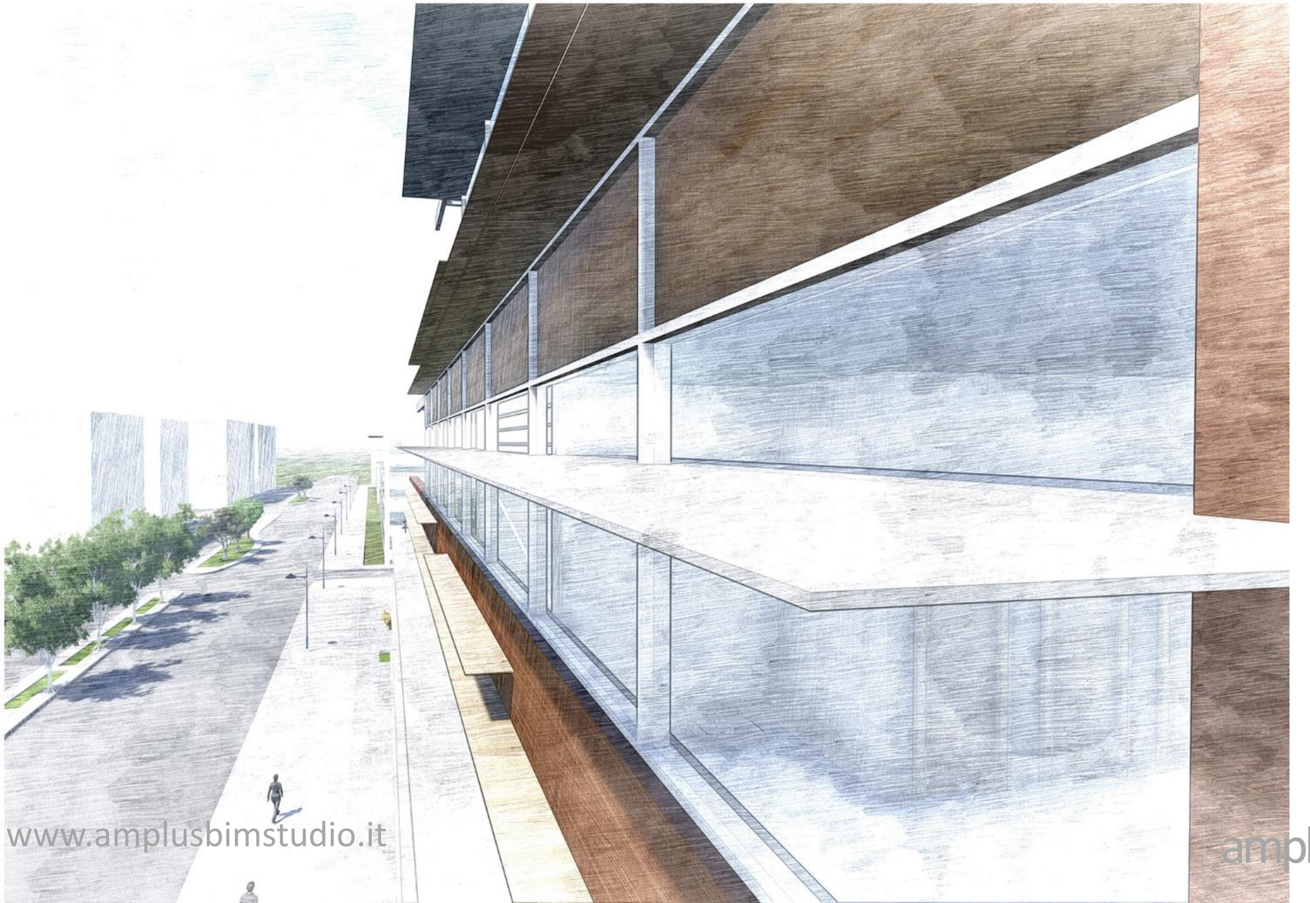
Guidelines from the 2030 Palette:

Intermediate light shelves divide solar glazing, reduce glare and evenly distribute daylight in a space.Intermediate light shelves eliminate direct sunlight on critical task areas located near a solar glazed window (facing the equator), and reflect sunlight to the ceiling where it is evenly redistributed. Light shelves can extend the depth of side daylighting to 2.5 times the height of the glazed opening.

Design a light shelf so that:

-It is a minimum of 60 cm (2 ft.) from the ceiling.
It shades the lower glazing in summer.
-The depth of an interior light shelf is equal to the height of the glazing above it.

Make the upper glazing area a minimum of 8% to 11% of the floor area to be daylit, and the surface of the light shelf and ceiling white in color. Make the floor to ceiling height of the space a minimum of 3 meters (9 ft.).



SITE - WATER CATCHMENT AND STORAGE

We choose to adopt the “water catchment and storage” strategy because it’ll improve free water source that reduces stormwater runoff as well as demand on potable water supplies.

We create roof area will capture 0.46 gallons of rainwater for one inch of rainfall.

The water catchment and storage strategy, Rainwater reuse offers a number of benefits:Provides inexpensive supply of water, Augments drinking water supplies, Reduces stormwater runoff and pollution, Provides water that needs little treatment for irrigation or non-potable indoor uses, Helps reduce peak summer demands.

Guidelines from the 2030 Palette:

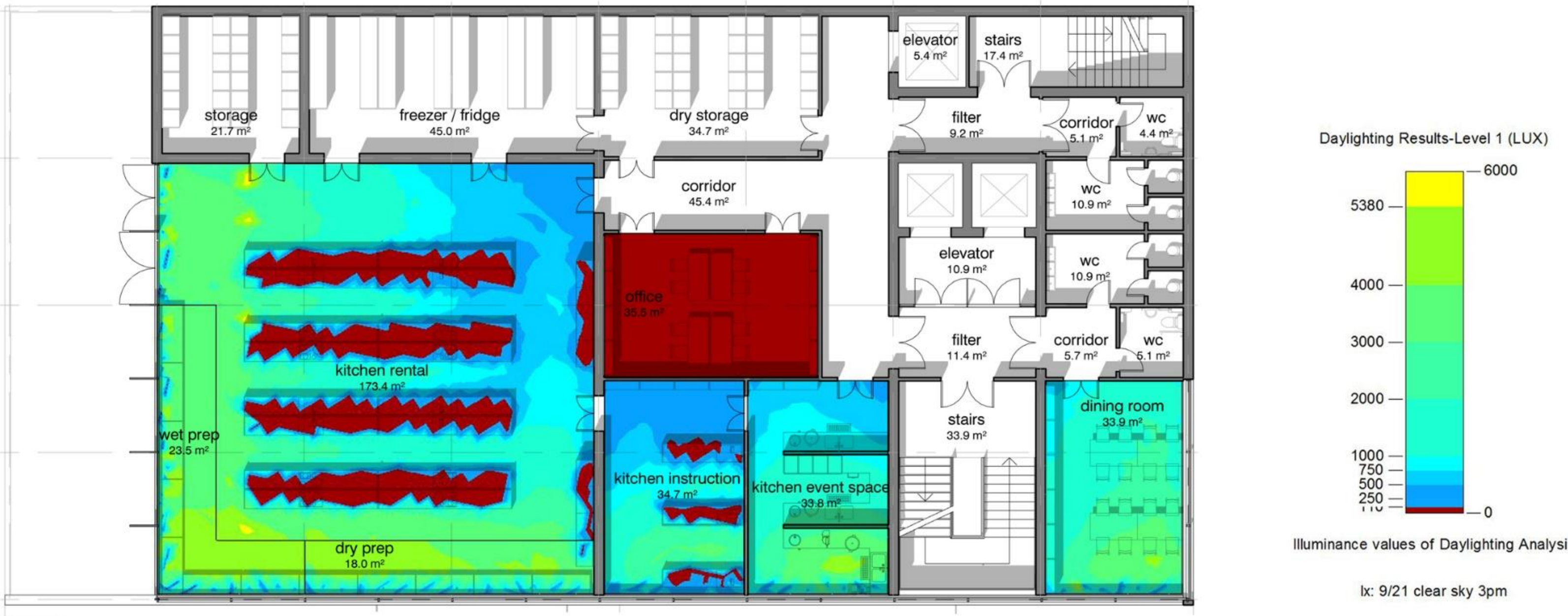
Water catchment systems divert and store rainwater, providing a clean, free water source that reduces stormwater runoff as well as demand on potable water supplies.A typical system collects water from a roof piped to a storage tank where it can be used for both potable (drinkable) and non-potable purposes such as landscaping, toilet flushing and clothes washing. Each square meter (square foot) of roof area will capture 7.37 liters (0.46 gallons) of rainwater for one centimeter (inch) of rainfall.

Sizing the system:

Storage tank capacity (liters) = water catchment area (m2) x rainfall (cm) x 7.38
Storage tank capacity (gallons) = water catchment area (ft2) x rainfall (inches) x 0.46
Where rainfall = peak monthly average.
The larger the storage tank, the longer water will be available between rain events. Rainwater intended for potable use must be treated using appropriate filtration and disinfection methods.

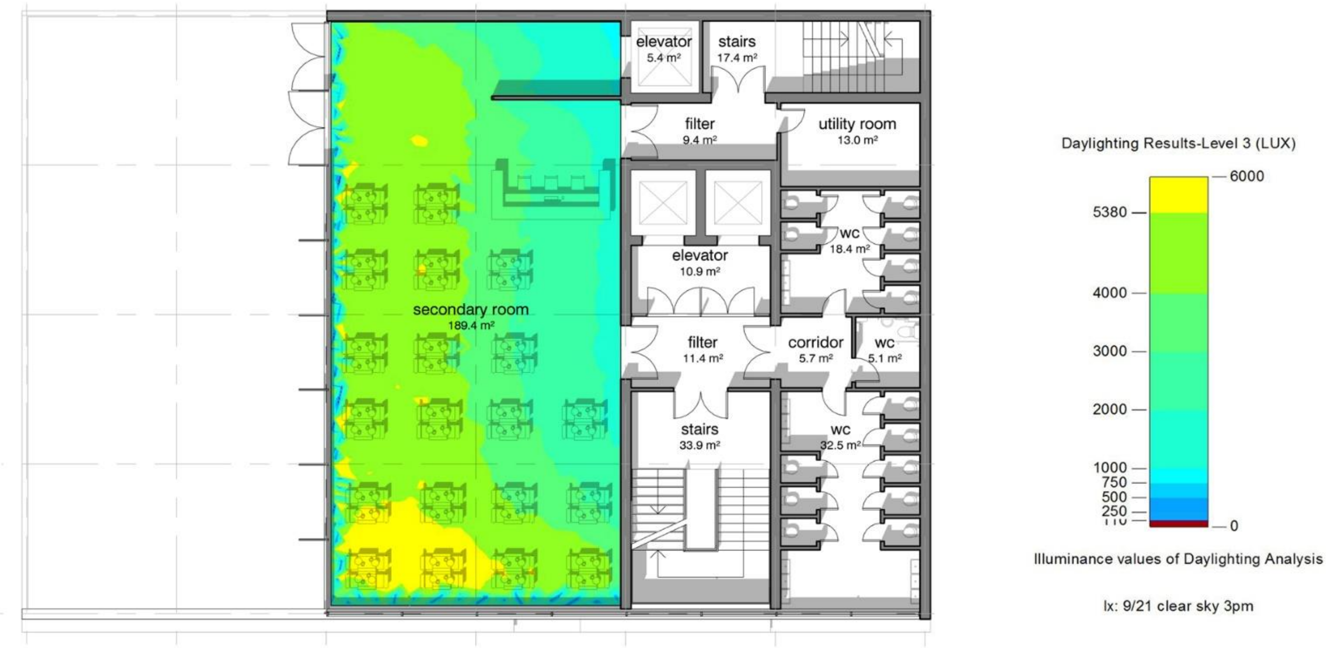
Transformation 2030
building performance analisys

part 2) special event and culinary spaces



storage
21.7 m²
freezer / fridge
45.0 m²
dry storage
34.7 m²
elevator
5.4 m²
stairs
17.4 m²
filter
9.2 m²
corridor
5.1 m²
wc
4.4 m²
corridor
45.4 m²
wc
10.9 m²
elevator
10.9 m²
wc
10.9 m²
office
35.5 m²
filter
11.4 m²
corridor
5.7 m²
wc
5.1 m²
kitchen rental
173.4 m²
wet prep
23.5 m²
stairs
33.9 m²
dining room
33.9 m²
kitchen instruction
34.7 m²
kitchen event space
33.8 m²
dry prep
18.0 m²
Daylighting Results-Level 1 (LUX)
6000
5380
4000
3000
2000
1000
750
500
250
0
Illuminance values of Daylighting Analysis
lx: 9/21 clear sky 3pm

prep. room
16.5 m²
prep. room
17.7 m²
sorage
46.6 m²
elevator
5.4 m²
stairs
17.4 m²
filter
9.4 m²
utility room
13.0 m²
elevator
10.9 m²
wc
18.4 m²
filter
11.4 m²
corridor
5.7 m²
wc
5.1 m²
main space
300.9 m²
stairs
33.9 m²
wc
32.5 m²
Daylighting Results-Level 2 (LUX)
6000
5380
4000
3000
2000
1000
750
500
250
0
Illuminance values of Daylighting Analysis
lx: 9/21 clear sky 3pm


elevator
5.4 m²
stairs
17.4 m²
filter
9.4 m²
utility room
13.0 m²
wc
18.4 m²
elevator
10.9 m²
secondary room
189.4 m²
filter
11.4 m²
corridor
5.7 m²
wc
5.1 m²
stairs
33.9 m²
wc
32.5 m²
Daylighting Results-Level 3 (LUX)
6000
5380
4000
3000
2000
1000
750
500
250
110
0
Illuminance values of Daylighting Analysis
lx: 9/21 clear sky 3pm

BUILDING PERFORMANCE ANALYSIS

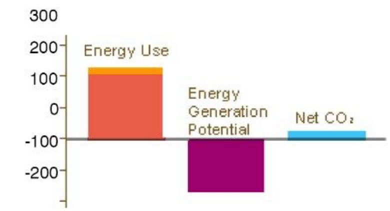
WHOLE BUILDING ENERGY ANALYSIS

BUILDING PERFORMANCE FACTORS

Location:	NY
Weather Station:	50958
Outdoor Temperature:	Max: 35°C/Min: -18°C
Floor Area:	3,692 m²
Exeterior Wall Area:	2,360 m²
Average Lighting Power:	12.92 W/m²
People:	356 people
Exterior Window Ratio:	0.35
Electrical Cost:	$0.17 / kWh
Fuel Cost:	$1.33 / Therm

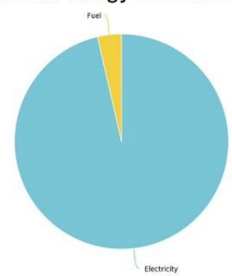
Annual Carbon Emissions

metric tons/yr



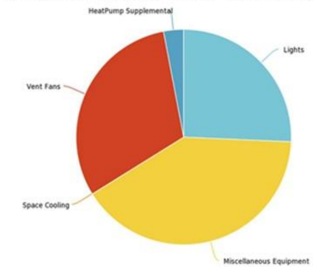
	(metric tons/yr)
Electricity Consumption	205
Fuel Consumption	9
Roof PV Potential (High Efficiency)	-196
Single 15' Wind Turbine Potential	0
Net CO_2	16

Annual Energy Use/Cost



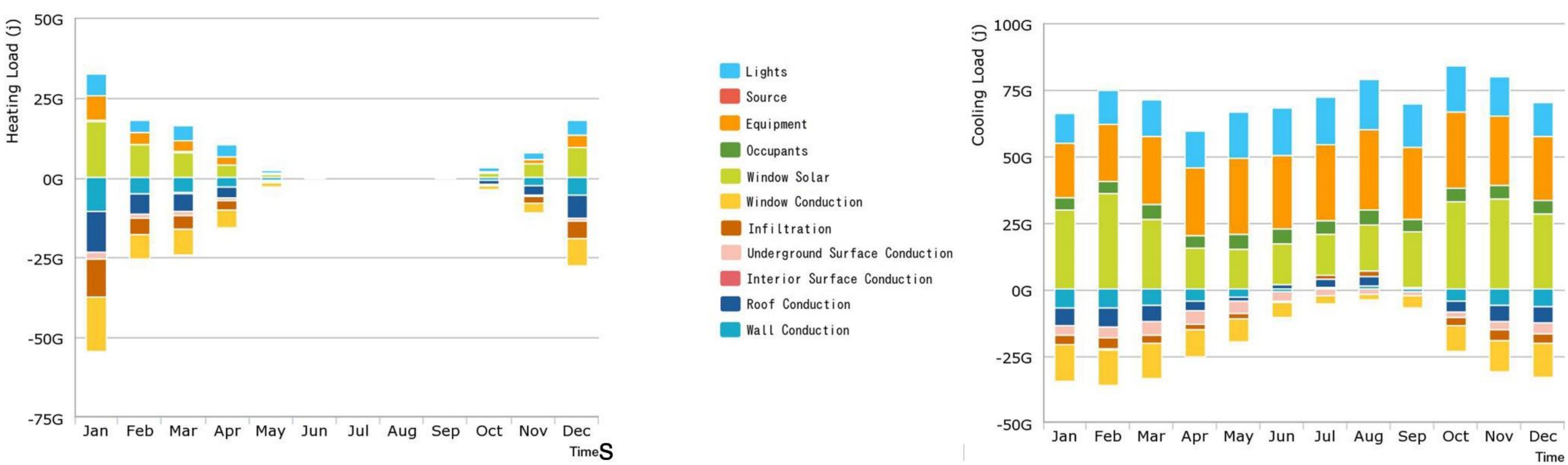
Electricity	96%	$44,307	260,635 kWh
Fuel	4%	$350.4	35,040 MJ
		$44,657.4	

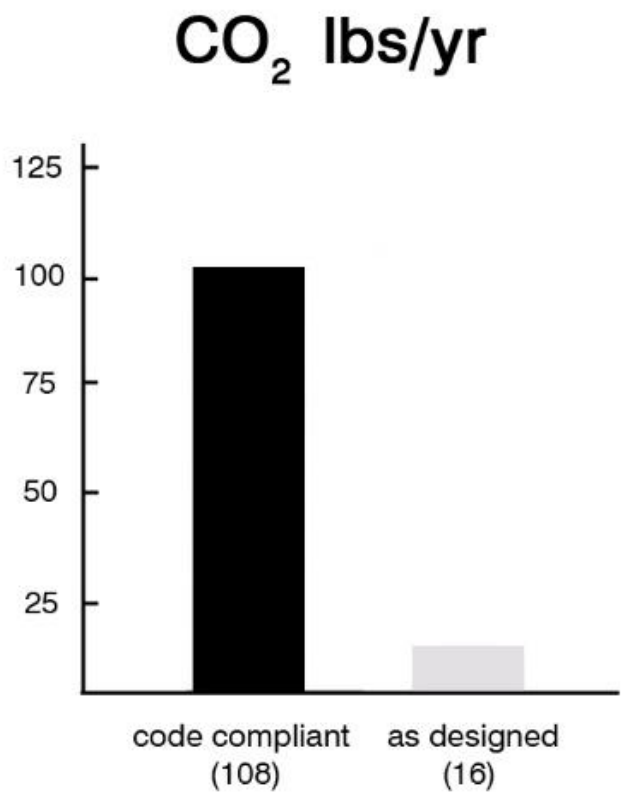
Annual Energy Use: Electricity

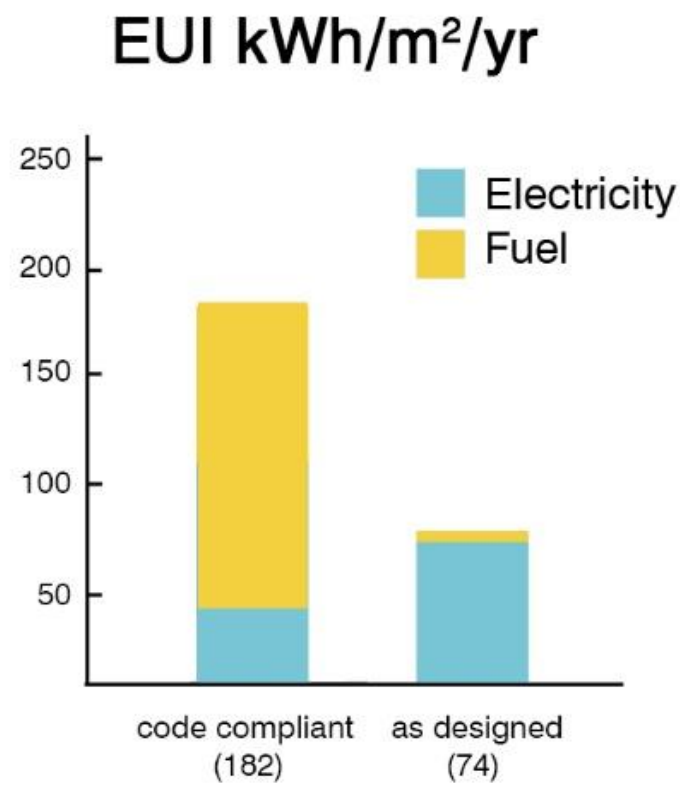


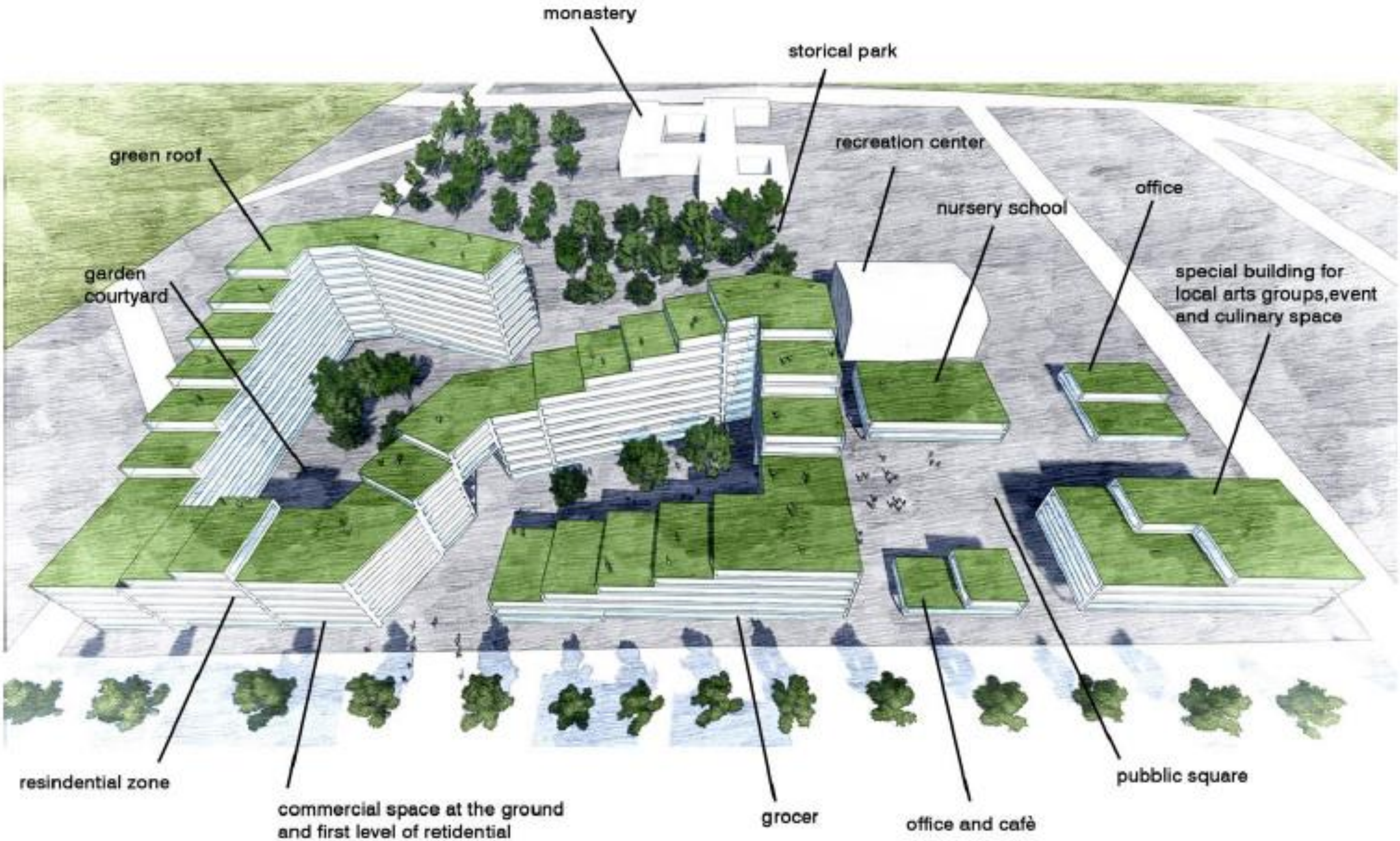
Energy Use Intensity

Electricity EUI:	71 kWh/sm/yr
Fuel EUI:	3 kWh/sm/yr
Total EUI:	74 kWh/sm/yr




CO2 lbs/yr
125
100
75
50
25
code compliant
(108)
as designed
(16)


EUI kWh/m²/yr
250
200
150
100
50
Electricity
Fuel
code compliant
(182)
as designed
(74)


monastery
storical park
green roof
recreation center
office
nursery school
garden courtyard
special building for local arts groups,event and culinary space
resindential zone
commercial space at the ground and first level of retidential
grocer
office and cafè
pubblic square