The creation of
a Biophilic Environment
in the
Rehabilitation Area
of
AMC

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Student No: 4618424


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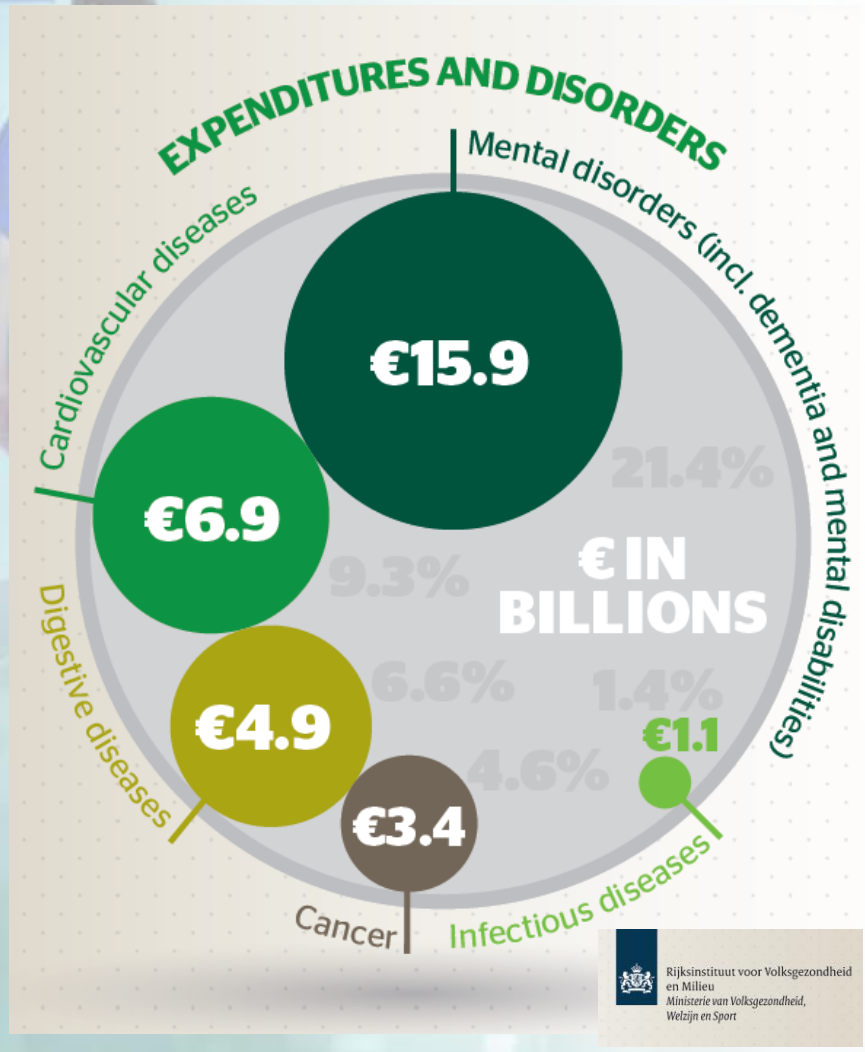
Growing number of long term chronic illness patients in the Netherlands



1.34 Deaths by cause, 2014

	Men	Women
	x 1,000	
Total	67.1	72.1
of which		
Cancer	23.2	19.8
of which		
trachea and lung	6.2	4.2
colorectal	2.7	2.3
prostate	2.5	
breast		3.0
Cardiovascular diseases	17.7	20.2
of which		
cerebrovascular events	3.7	5.6
acute heart failure	2.9	4.2
acute heart infarct	2.9	2.4
Respiratory diseases	5.4	5.1
of which		
COPD	3.1	2.7
Psychological disorders	3.4	6.8
of which		
dementia	3.0	6.6
Nervous system disorders	2.9	4.0
of which		
Alzheimer's disease	0.9	2.2
External causes of death	3.7	3.1
of which		
road traffic accidents	0.4	0.2
suicide	1.3	0.6

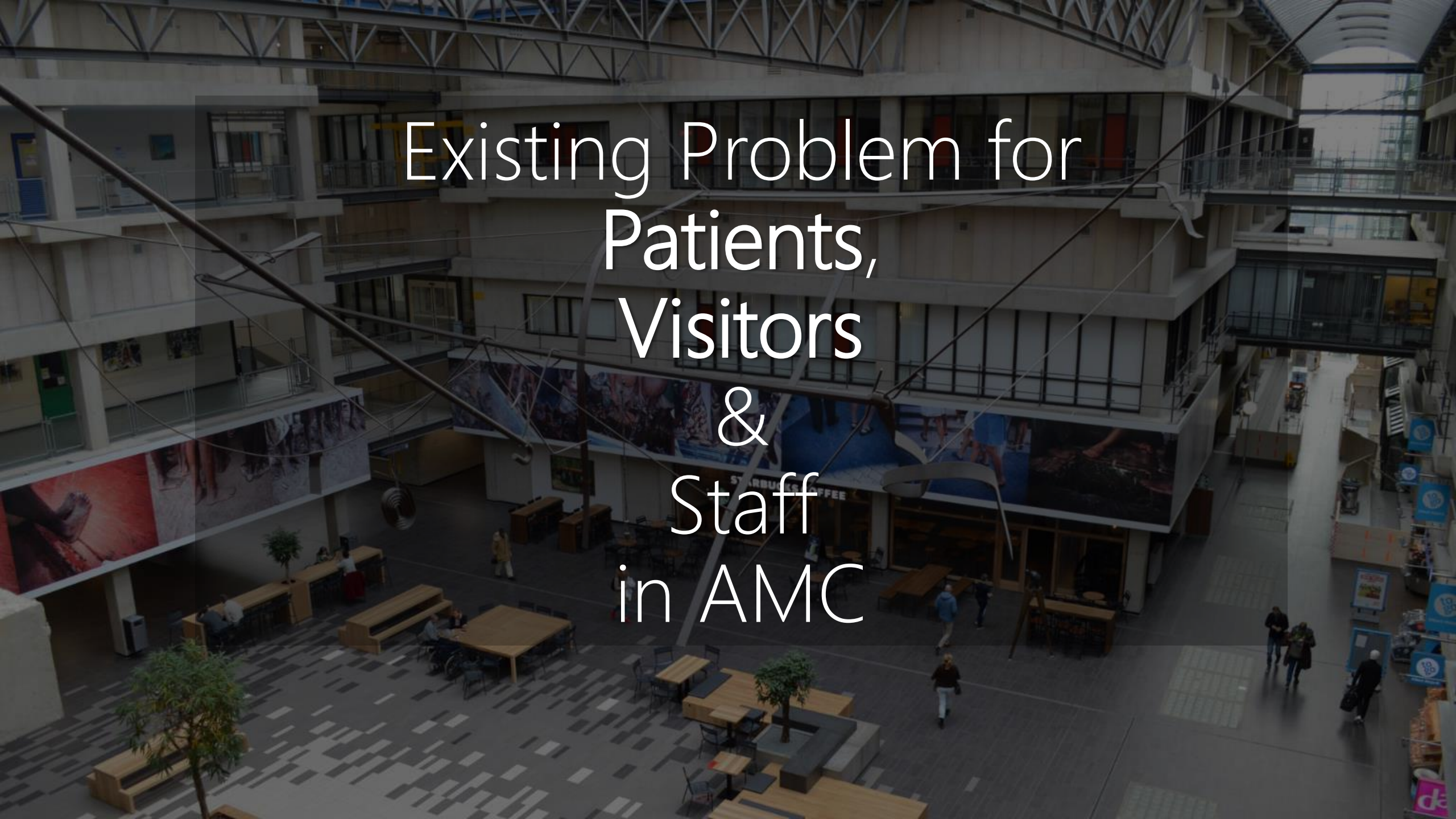

amc
Amsterdam

Content

- 1. Introduction to AMC and Existing Problems
- 2. Biophilic Design Principles
- 3. Design- Biophilic Strategy
  - Result
  -Program Layout
- 4. Site Connection
- 5. Construction
- 6. Choice of material and Climate

AMC- Academic Medical Center

- Built in 1980s
- Research Hospital affiliated with University of Amsterdam
- One of the largest and leading hospital in Netherlands



Existing Problem for **Patients**, **Visitors** & Staff in AMC

Imagine you are a patient…

Problem for Patients in AMC

1. Lack of Privacy

2. Lack of Connection to the outside world

3. Lack of easily accessible outdoor space

Imagine you are a visitor….

Problem for visitors of AMC

1. Difficult in **wayfinding**

2. **Crowded** in existing shared patient room

3. **Lack of space** for waiting

Imagine you are one of the staff…

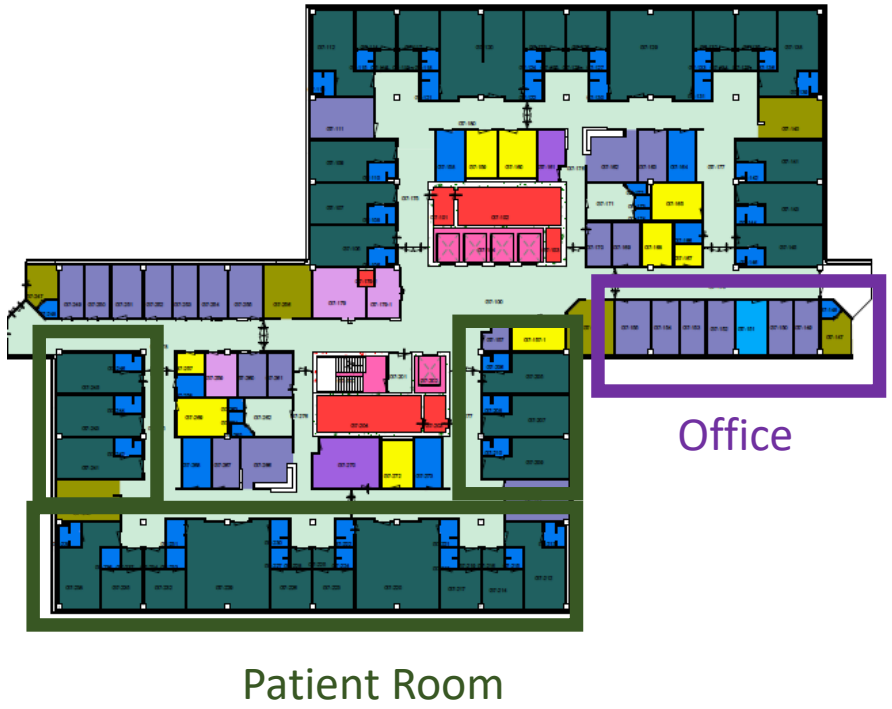
*“One of the comments I’ve heard during interviews with the nurses is that ‘**we’re human. We’re not machines**,’” Cai says.*

*“They need that **human contact**. They need to talk with their peers, even if it’s just to vent. It’s necessary for a **better working experience**.”*

February 7, 2017, Jamie Morgan, Health Facilities Management Magazine

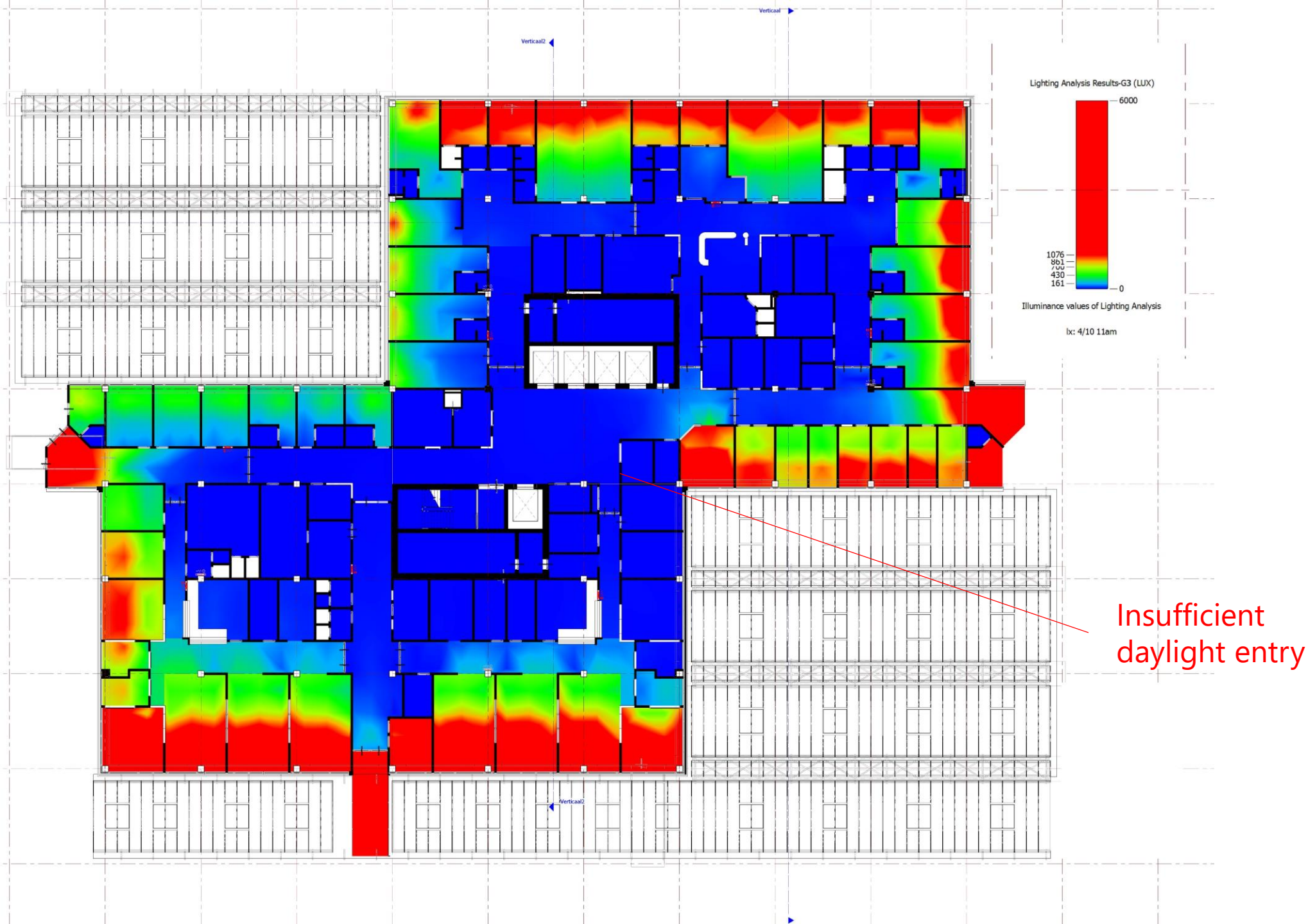
Problem for staff

1. Separation between patients & staff



2. Lack of place to relax

3. Unmotivated working environment


Verticaal
Verticaal2
Lighting Analysis Results-G3 (LUX)
6000
1076
861
430
161
0
Illuminance values of Lighting Analysis
lx: 4/10 11am
Verticaal2
Insufficient
daylight entry


BIOPHILIA
An innate love for the natural world; the instinctive bond between all living systems; an attraction to all that is alive and vital.

BIOPHILIC DESIGN

Source: Oliver Heath

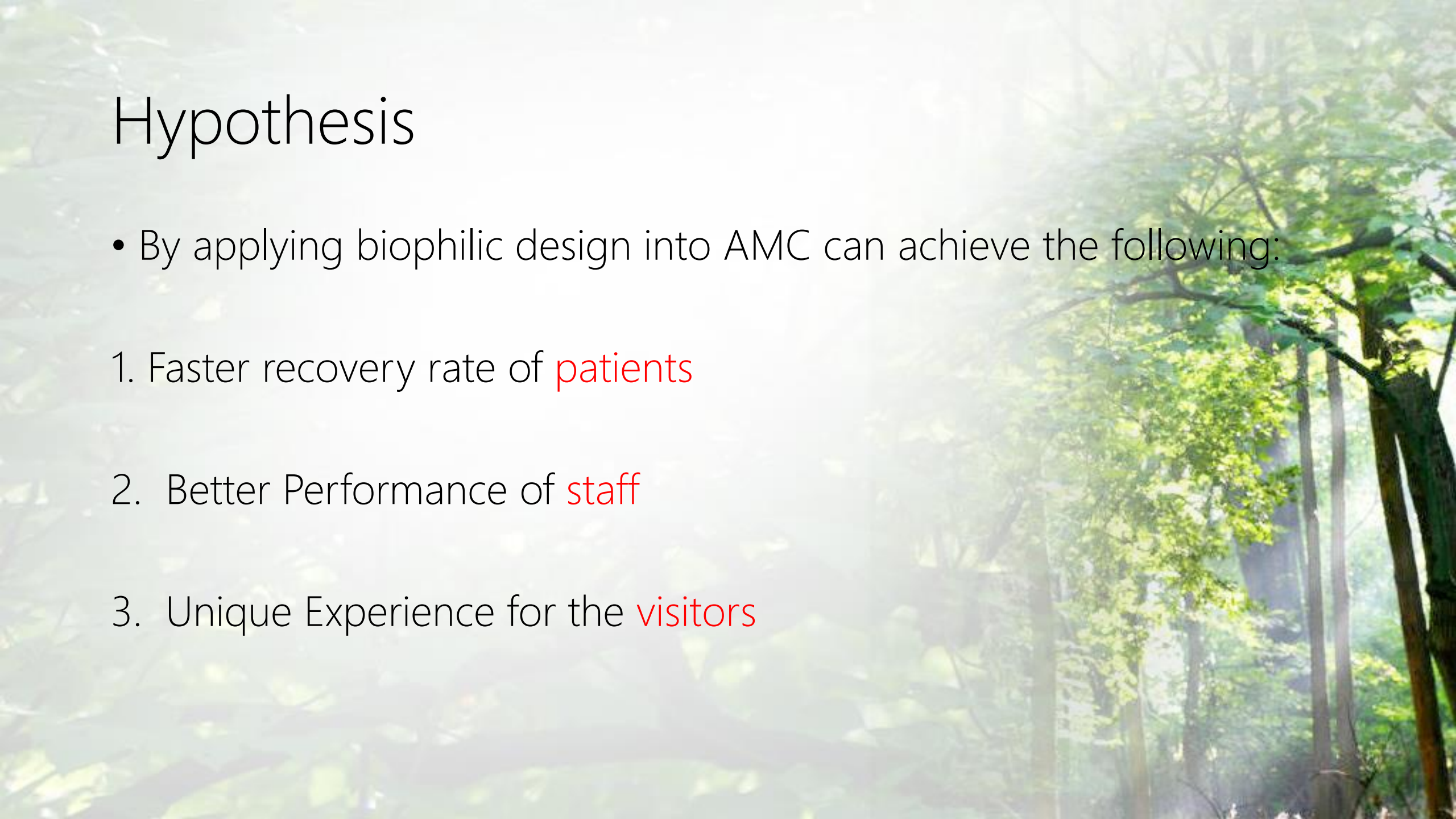
Hypothesis

- By applying biophilic design into AMC can achieve the following:

1. Faster recovery rate of patients

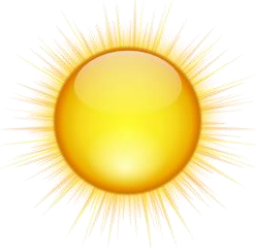
2. Better Performance of staff

3. Unique Experience for the visitors



6 Main types of Biophilic Elements

ENVIRONMENTAL FEATURES



NATURAL SHAPES + FORMS

NATURAL PATTERNS+ PROCESSES

From International Living Institute

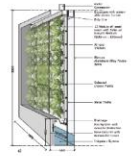
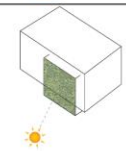
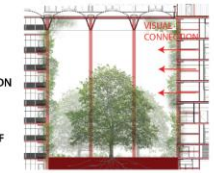
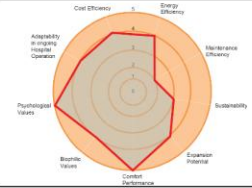
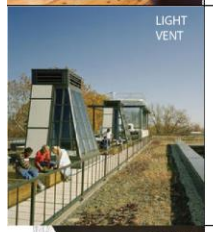
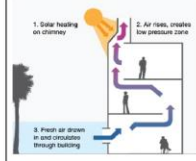
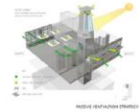
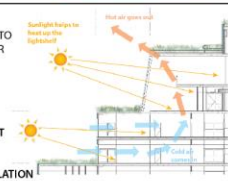
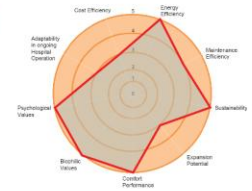
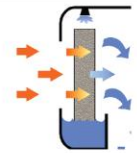
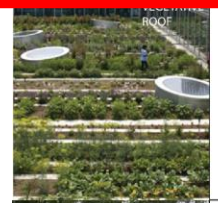
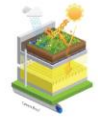
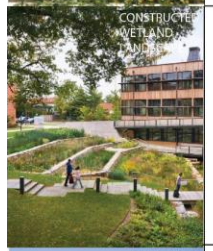
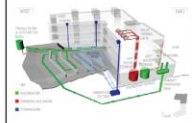
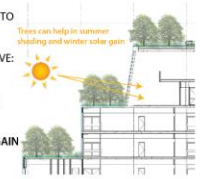
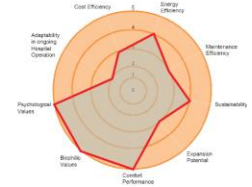
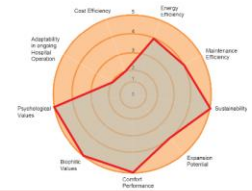
6 Main types of Biophilic Elements

LIGHT + SPACE

PLACE-BASED RELATIONSHIPS

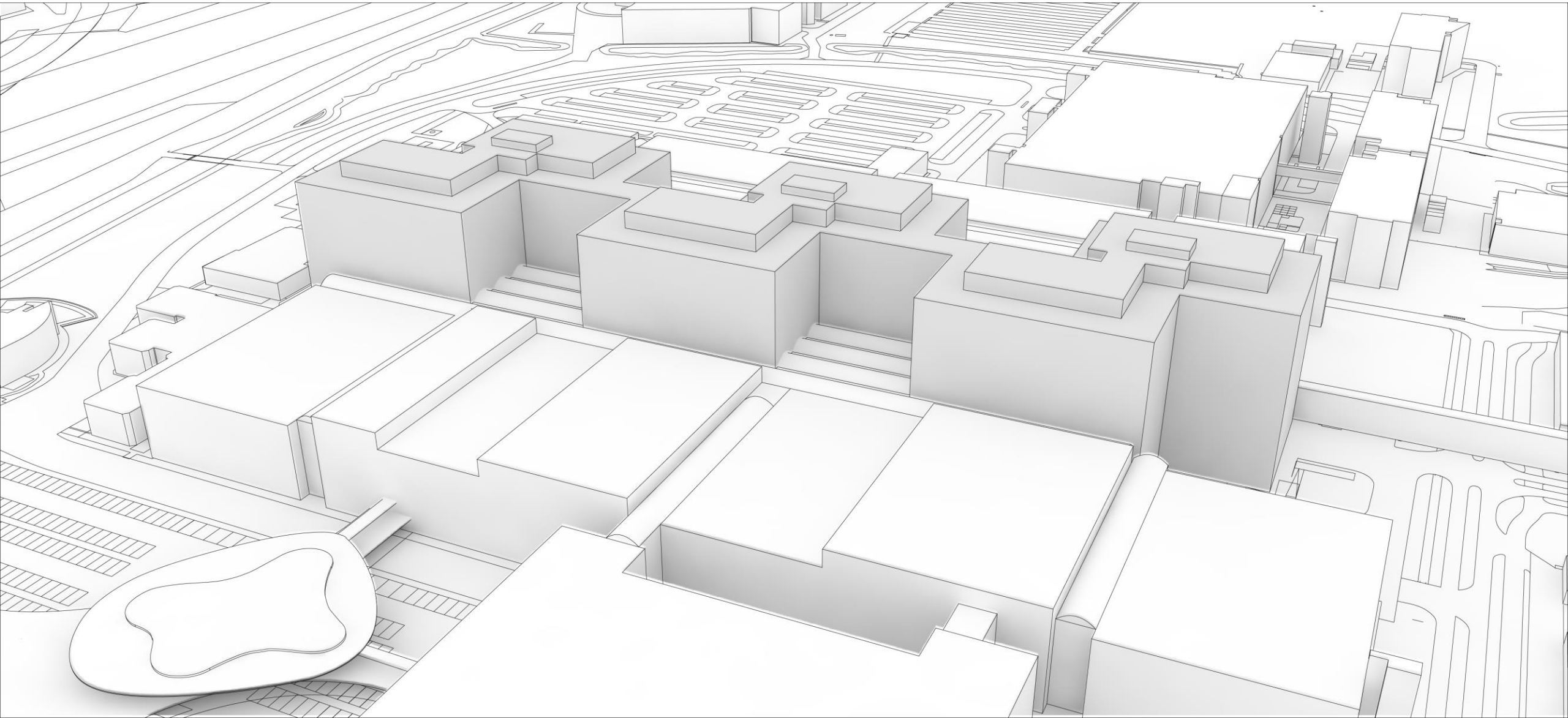
EVOLVED HUMAN-NATURE RELATIONSHIPS

From International Living Institute

RELATIONSHIP WITH BIOPHILIC TECHNOLOGY	BIOPHILIC ELEMENTS	TEMPERATURE (HEATING/ COOLING)	WATER	LIGHT	AIR	APPLICATION TO AMC	Evaluation
	ENVIRONMENTAL FEATURES(PLANTS)	 NATURAL AIR COOLING		 LIVING WALL IN THE FACADE CAN HELP SUMMER SHADING	 IMPROVED AIR QUALITY	APPLICATION IN THE CENTRAL ATRIUM OF BLOCK G , TO ACHIEVE: **-VISUAL CONNECTION** TO NATURE FROM PATIENT ROOMS **-COOLING DOWN OF ATIRUM SPACE** 	
	LIGHT + SPACE (NATURAL LIGHT, DIFFUSED LIGHT)	 DRAW NATURAL COLD AIR IN FOR COOLING		 TRANSMIT DAYLIGHT DEEP INTO THE BUILDING	 MINIMIZE MECHANICAL VENTILATION BY MAXIMIZING NATURAL VENTILATION	APPLICATION OF LIGHT VENT INTO 7th and 8th FLOOR OF BLOCK G, TO ACHIEVE: -HIGHER AND DEEPER **SUNLIGHT ENTRY** **-NATURAL VENTILATION** BY DRAWING COOL AIR FROM 6th and 7th FLOOR 	
	ENVIRONMENTAL FEATURES(WATER)	 NATURAL COOLING BY WATER FLOW	 COLLECT AND REUSE OF STORMWATER AND RAINWATER			APPLICATION OF RAIN VEIL FROM 3rd to 6th floor OF BLOCK G, TO ACHIEVE: -REDUCTION IN CONSUMPTION OF WATER BY **REUSING RAINWATER** 	
	EVOLVED HUMAN-NATURE RELATIONSHIPS (CHANGE AND METAMORPHOSIS)	 REDUCE HEAT ISLAND EFFECT	 SLOW DOWN THE FLOW OF RAINWATER		 IMPROVED AIR QUALITY	 APPLICATION OF GREEN ROOF ON THE ROOFTOP OF BUILDING G, TO SLOW DOWN THE RAINWATER FLOW AND AND COOL DOWN THE TOOPFLOOR AREA	
	PLACE-BASED RELATIONSHIPS (LANDSCAPE ECOLOGY)		 PURIFIED AND FILTERED WASTEWATER		 IMPROVED AIR QUALITY	RECONSTRUCTING 4th TO 9th FLOOR OF BLOCK G INTO A STEPPING LANDSCAPE, TO ACHEIVE: -FILTERED RAINWATER **-SUMMER SHADING** AND **WINTER SOLAR GAIN** 	
	NATURAL SHAPES + FORMS (RESISTING STRAIGHT LINES)	 SHADING HELPS AVOID OVERHEATING, CATCH THE WIND FOR COOLING		 ACHIEVED OPTIMIZED SUNLIGHT WHILE REDUCING GLAZE	 ALLOW AIR TO FLOW IN AS VENTURI EFFECT, WHICH INCREASE AIR VELOCITY WITH MECHANICAL VENTILATION	 APPLICATION OF FAN SHAPE DESIGN IN FRONT OF PATIENTS ROOM, SO TO ACHIEVE **SUMMER SHADING** TO PATIENTS, AND **NATURAL VENTILATION**	

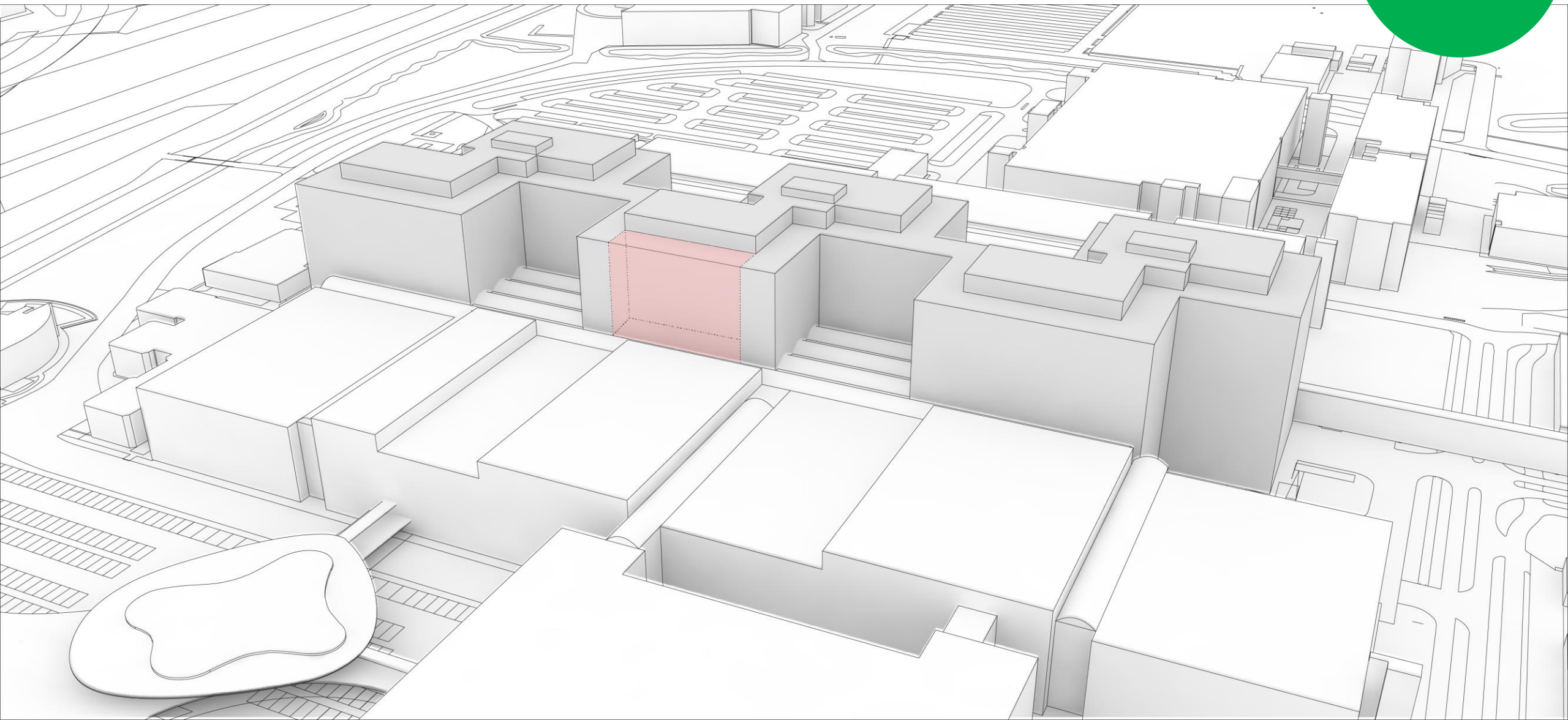
Biophilic Strategy

Original Massing

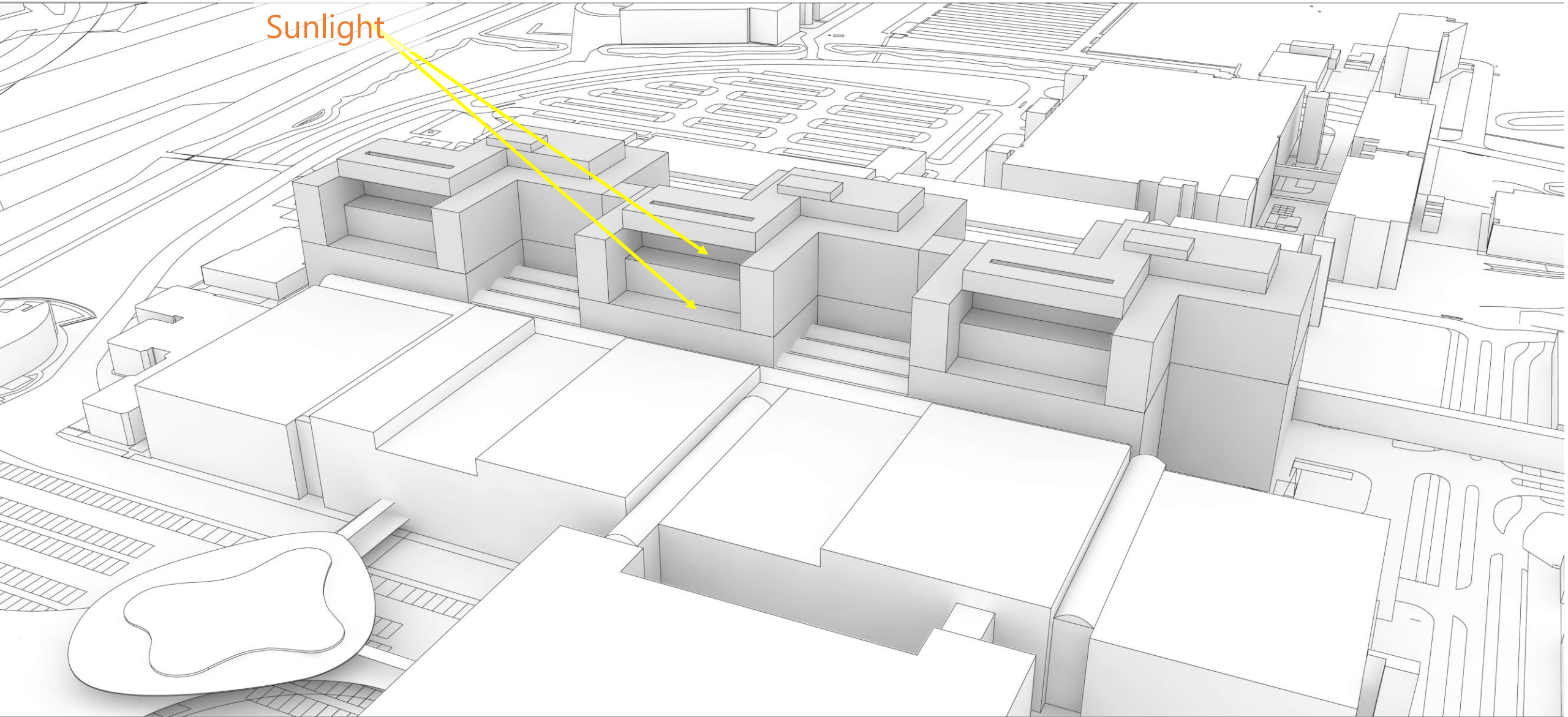


Strategy 1 :Removal of part of building

PLACE-BASED RELATIONSHIPS

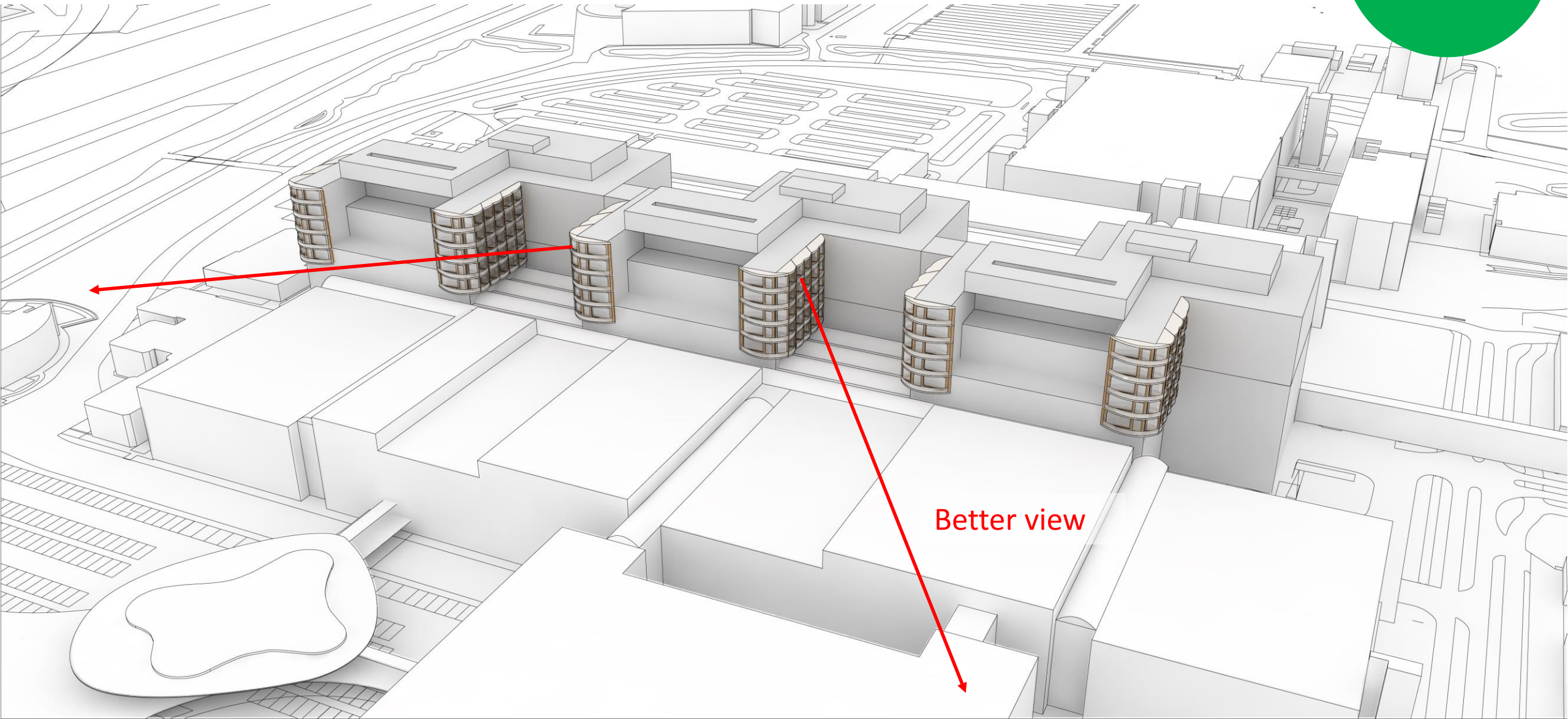


Creating Outdoor Community Space



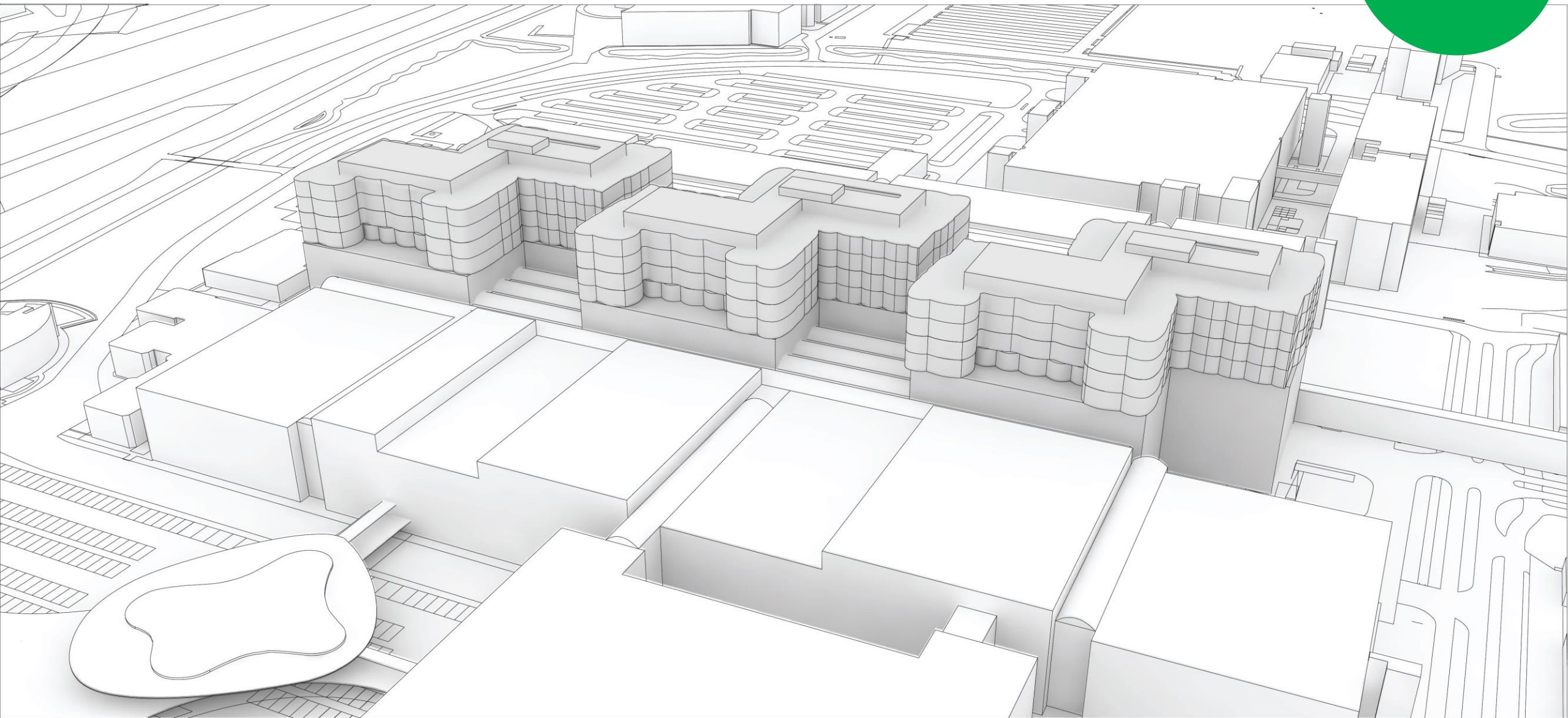
Strategy 2: New Modular façade design

ENVIRONMENTAL FEATURES



Creating Soft boundary around the building

NATURAL
SHAPES + FORMS



Result from the Biophilic Strategy

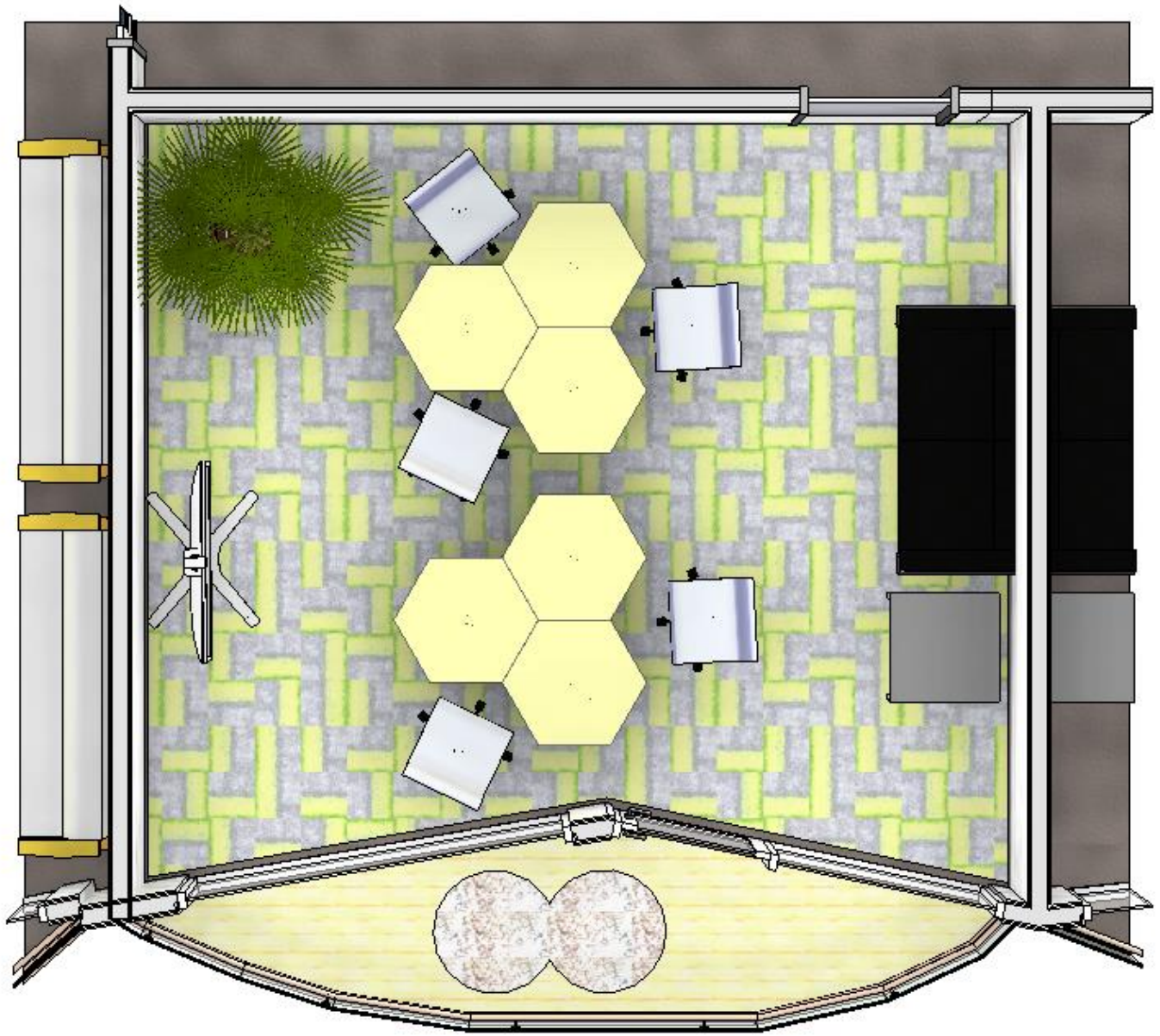
Result 1: Every Patient will have a view to nature

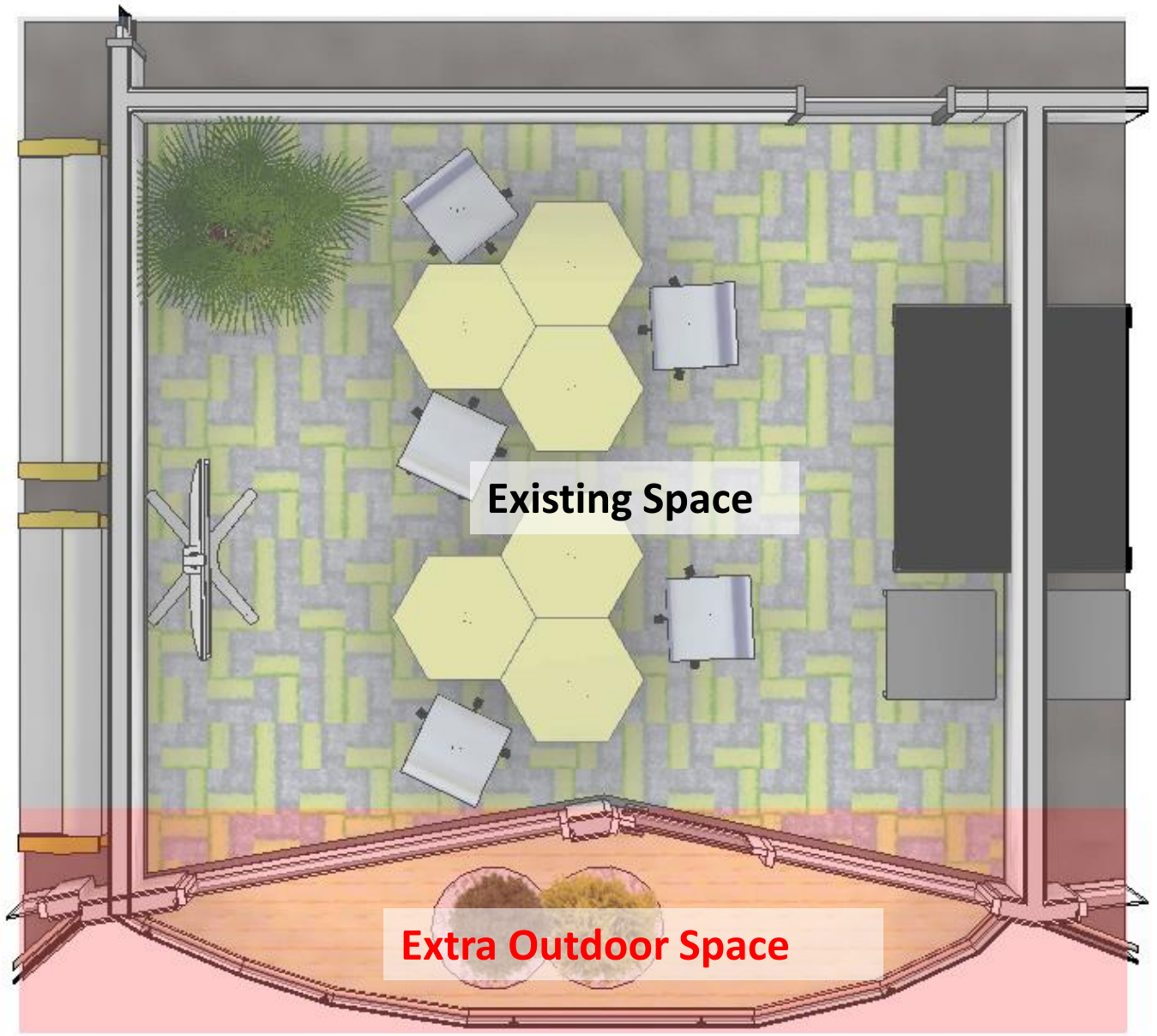

Existing
Space
Additional Indoor
& Outdoor Space

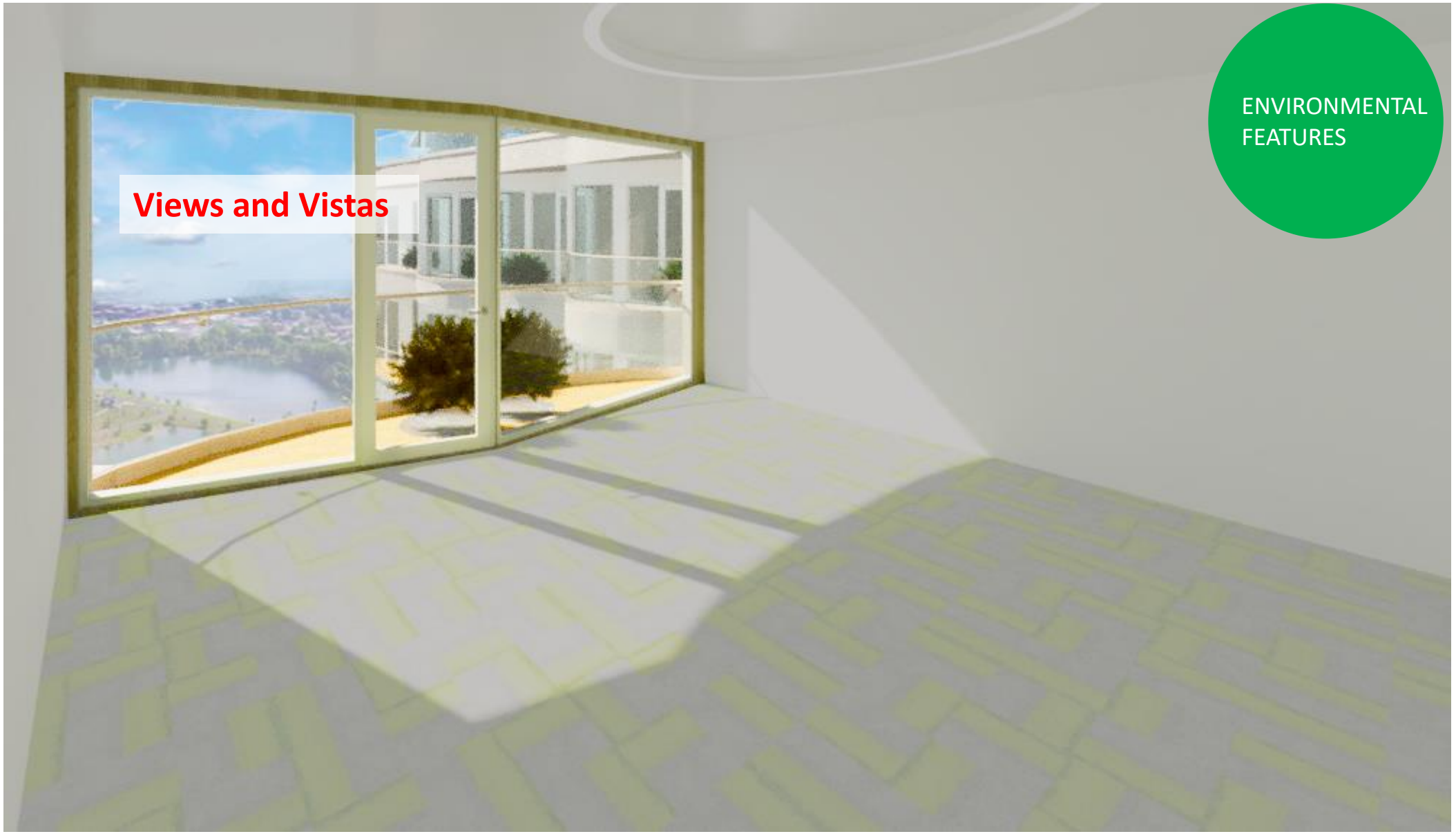

ENVIRONMENTAL FEATURES
LIGHT + SPACE
NATURAL PATTERNS+ PROCESSES
Natural Material
Natural Light
Inside-Outside Space


ENVIRONMENTAL
FEATURES
Views and Vistas

Result 2: Every Staff can work in a motivated environment




Existing Space
Extra Outdoor Space

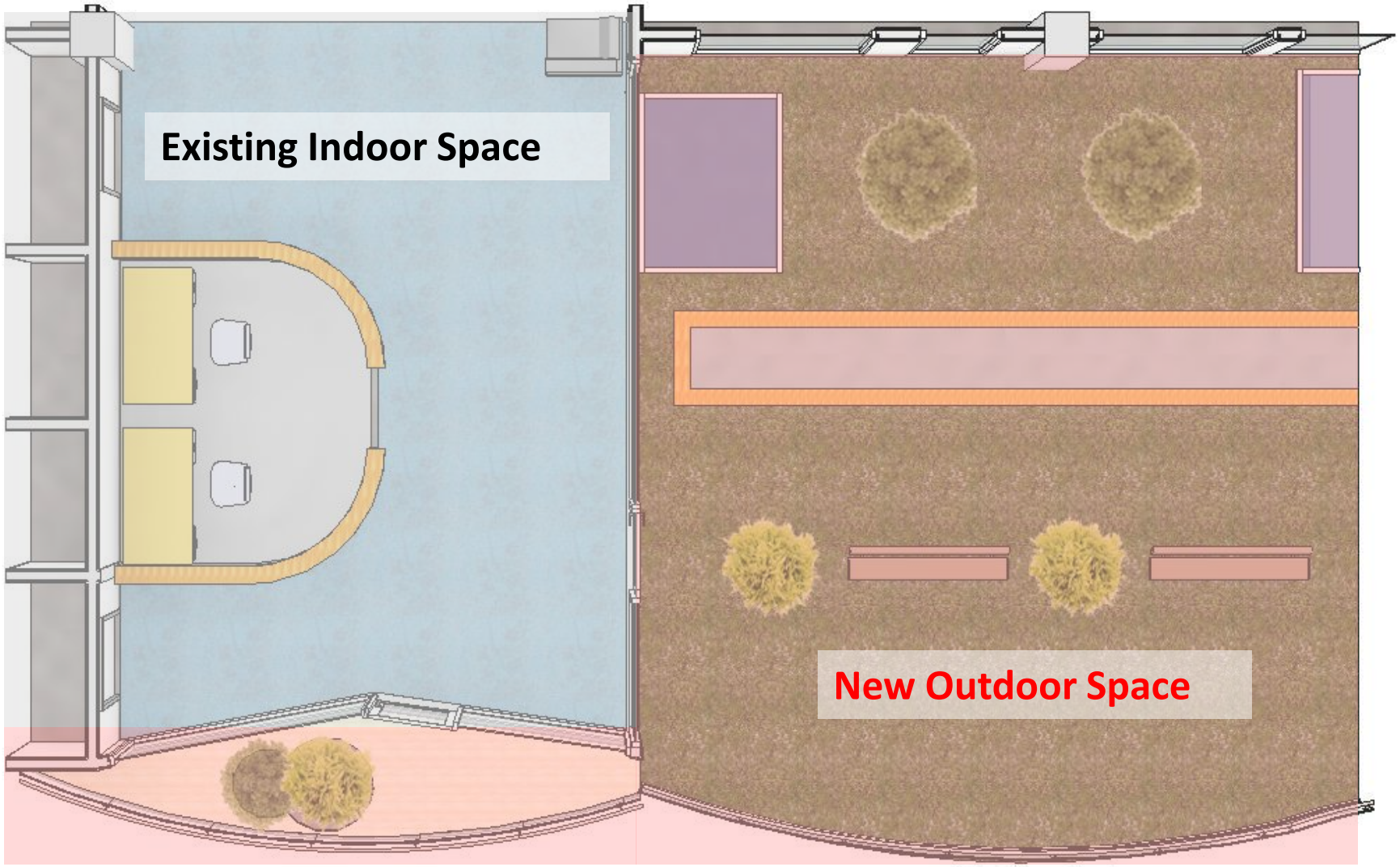


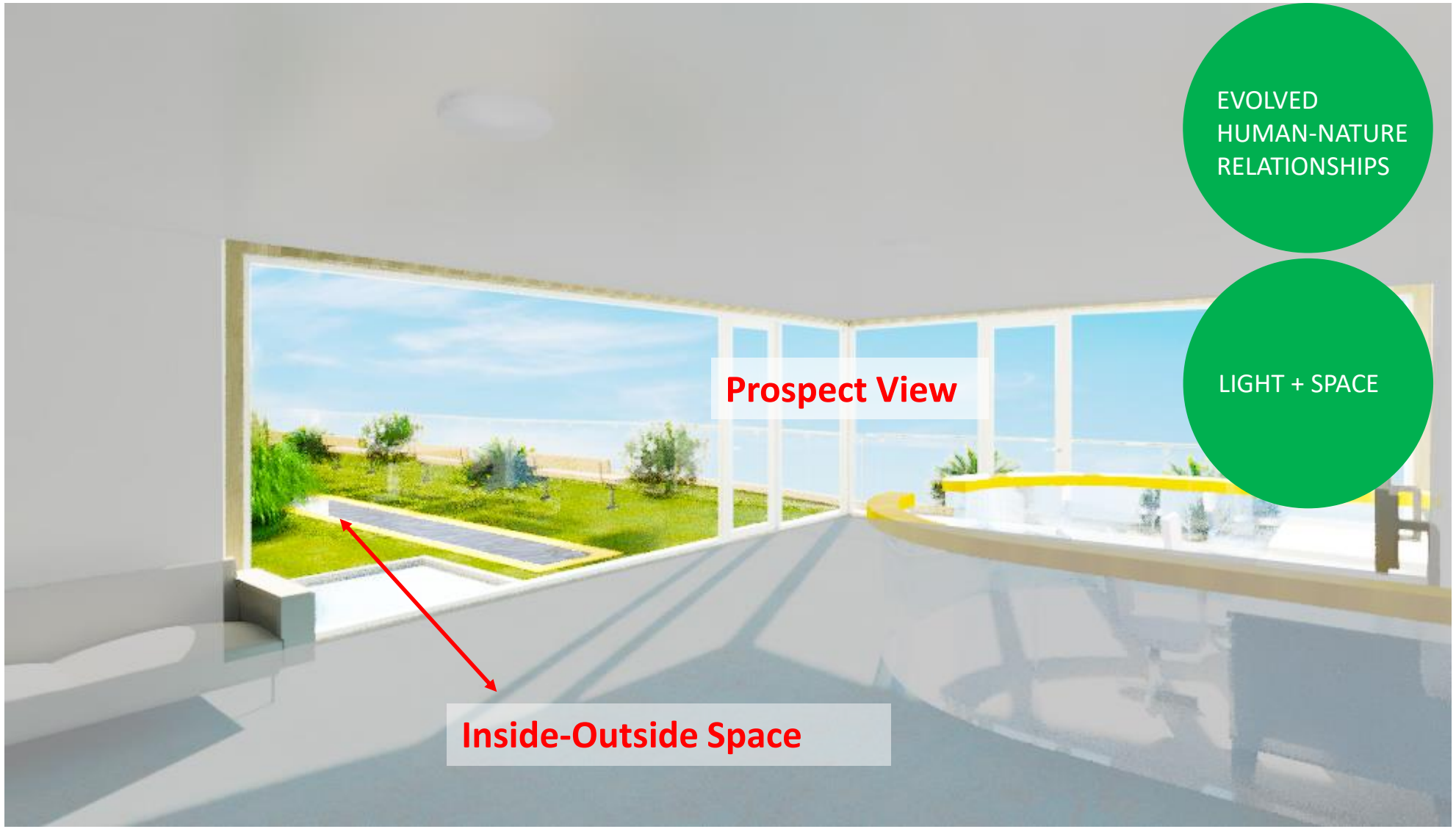
ENVIRONMENTAL FEATURES


LIGHT + SPACE
NATURAL
SHAPES + FORMS
Light and Shadow
Biomorphic Pattern


PLACE-BASED
RELATIONSHIPS
Visual Connection
to Nature

Result 3: Visitors can spend their time indoor or outdoor

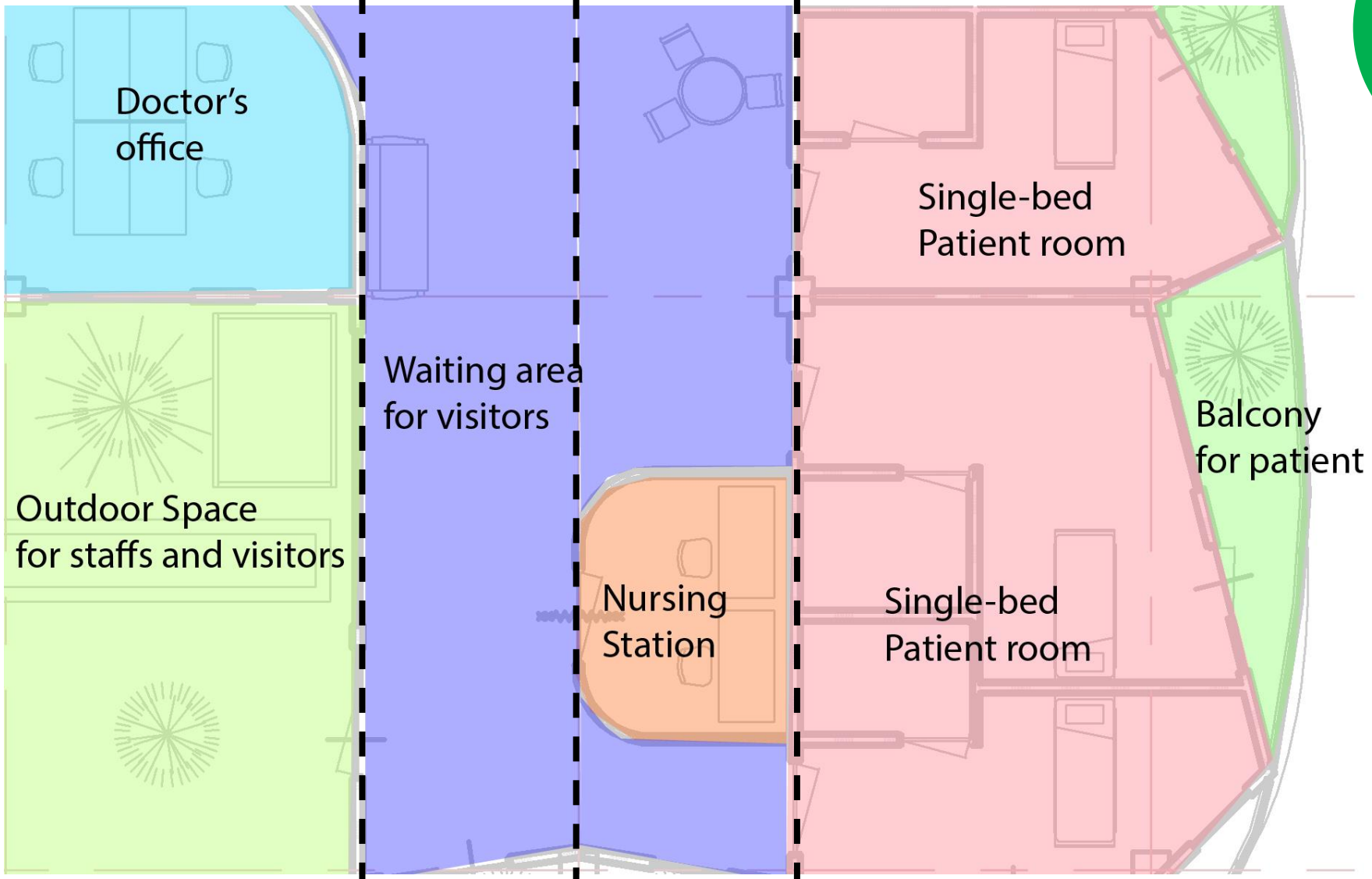



EVOLVED
HUMAN-NATURE
RELATIONSHIPS
LIGHT + SPACE
Prospect View
Inside-Outside Space


ENVIRONMENTAL FEATURES
NATURAL SHAPES + FORMS
PLACE-BASED RELATIONSHIPS
Organic Form
Water Element

Hierarchy of Space

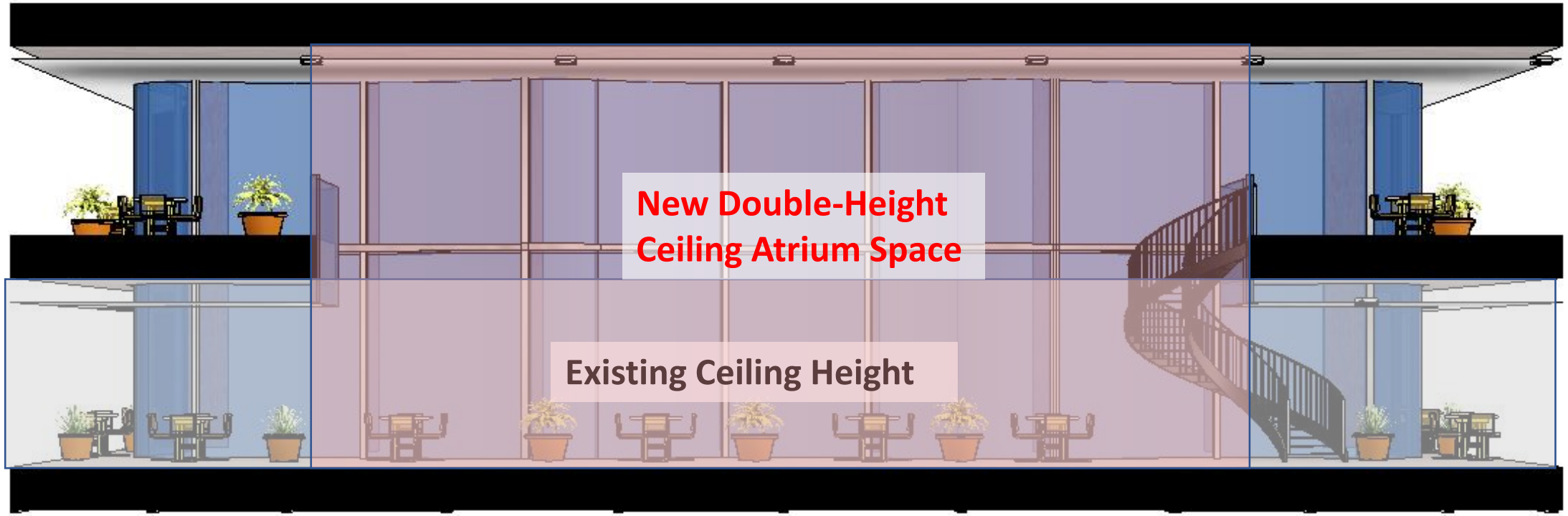
NATURAL PATTERNS+ PROCESSES

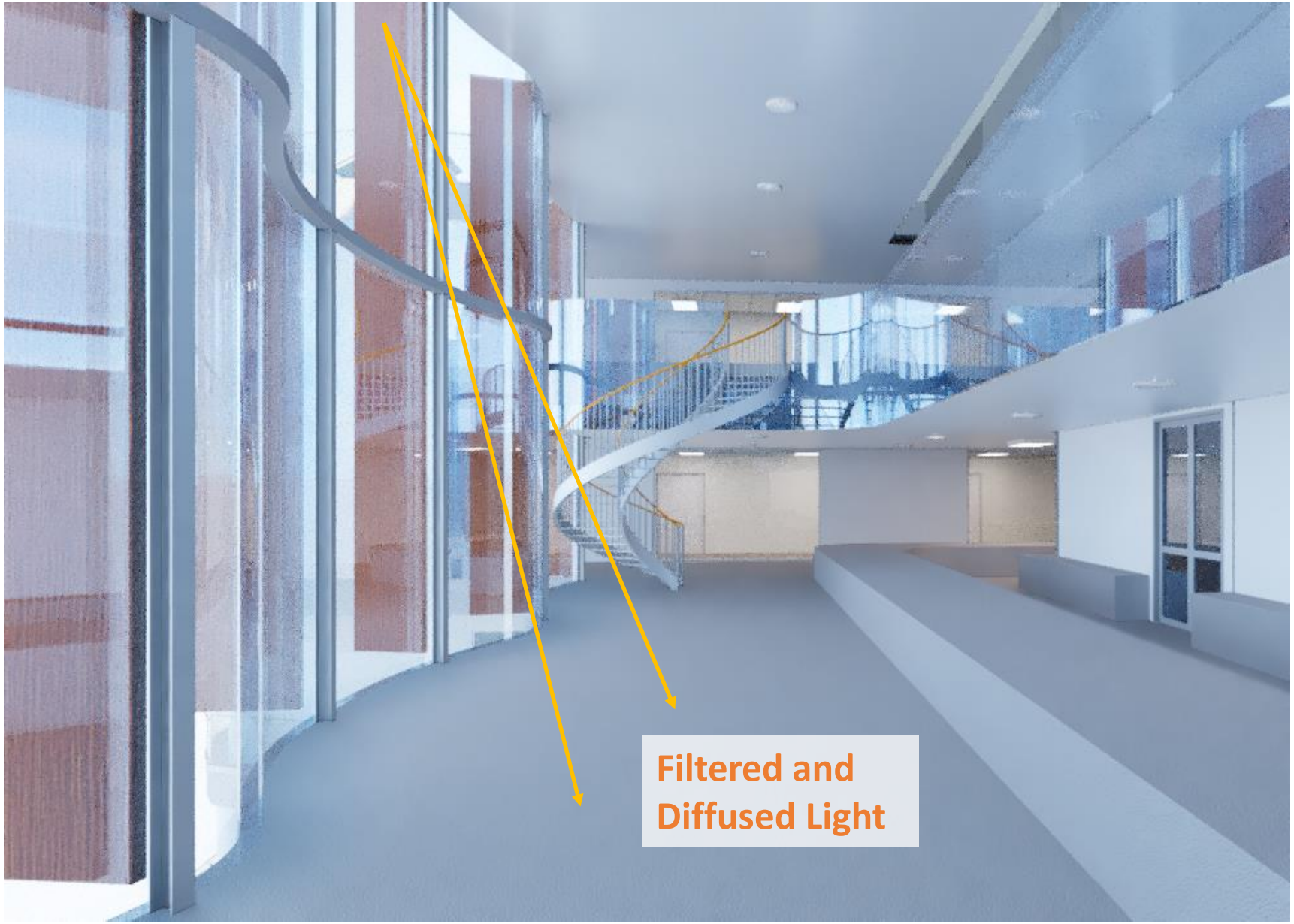


Most Public → **Most Private**

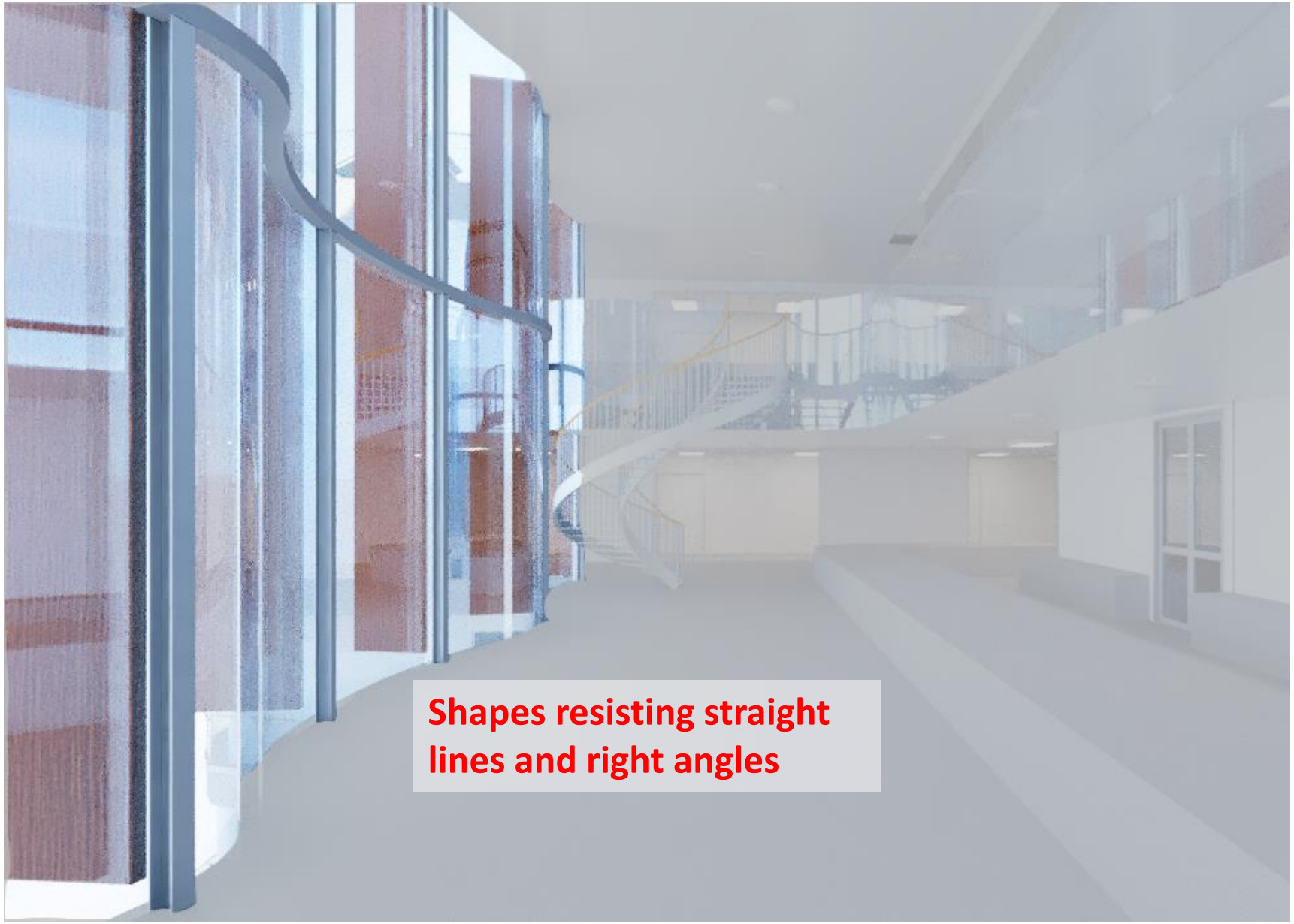
Transitional Space

Result 5: Every Visitor and Staff can enjoy a spacious cafeteria with a view


New Double-Height
Ceiling Atrium Space
Existing Ceiling Height



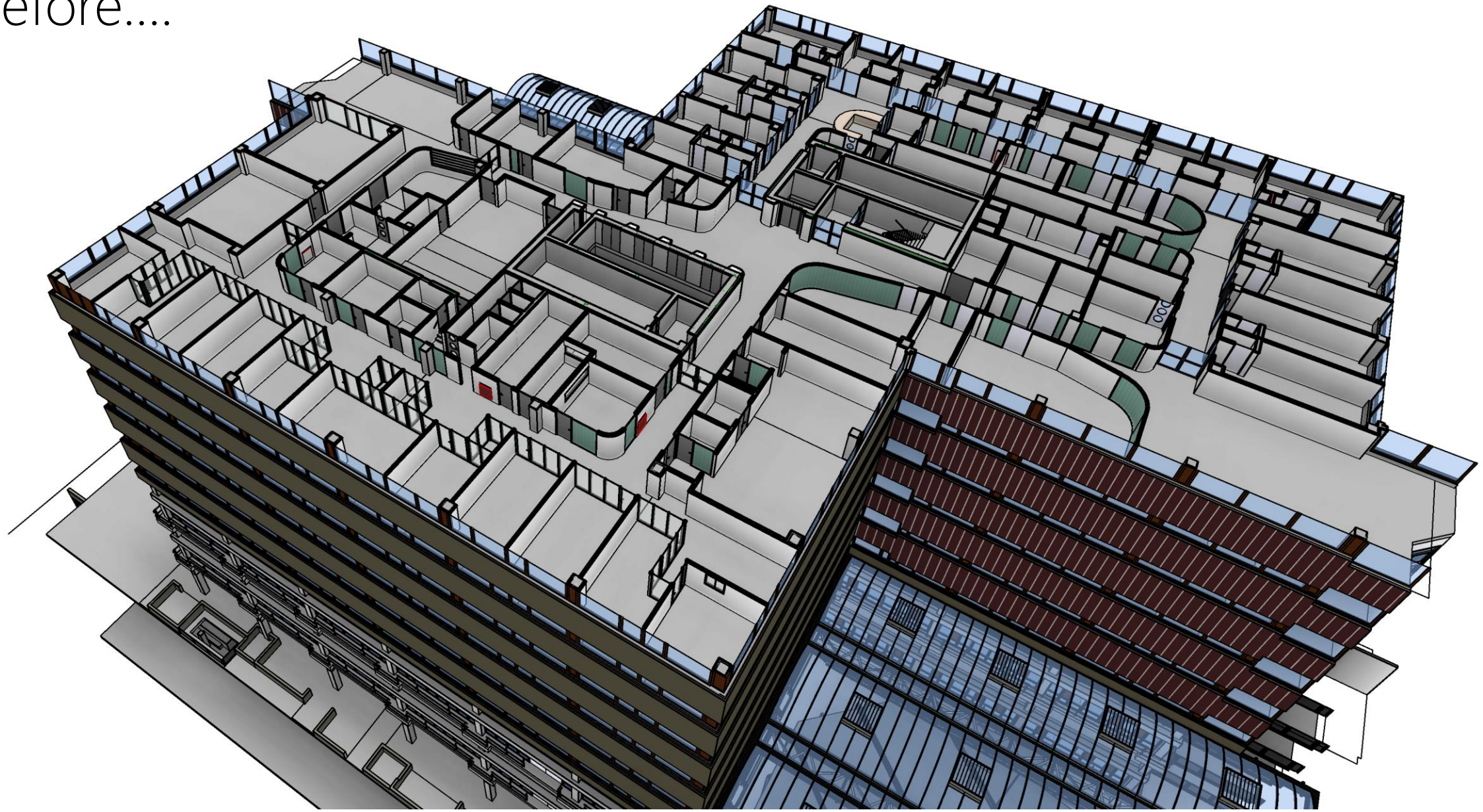
LIGHT + SPACE



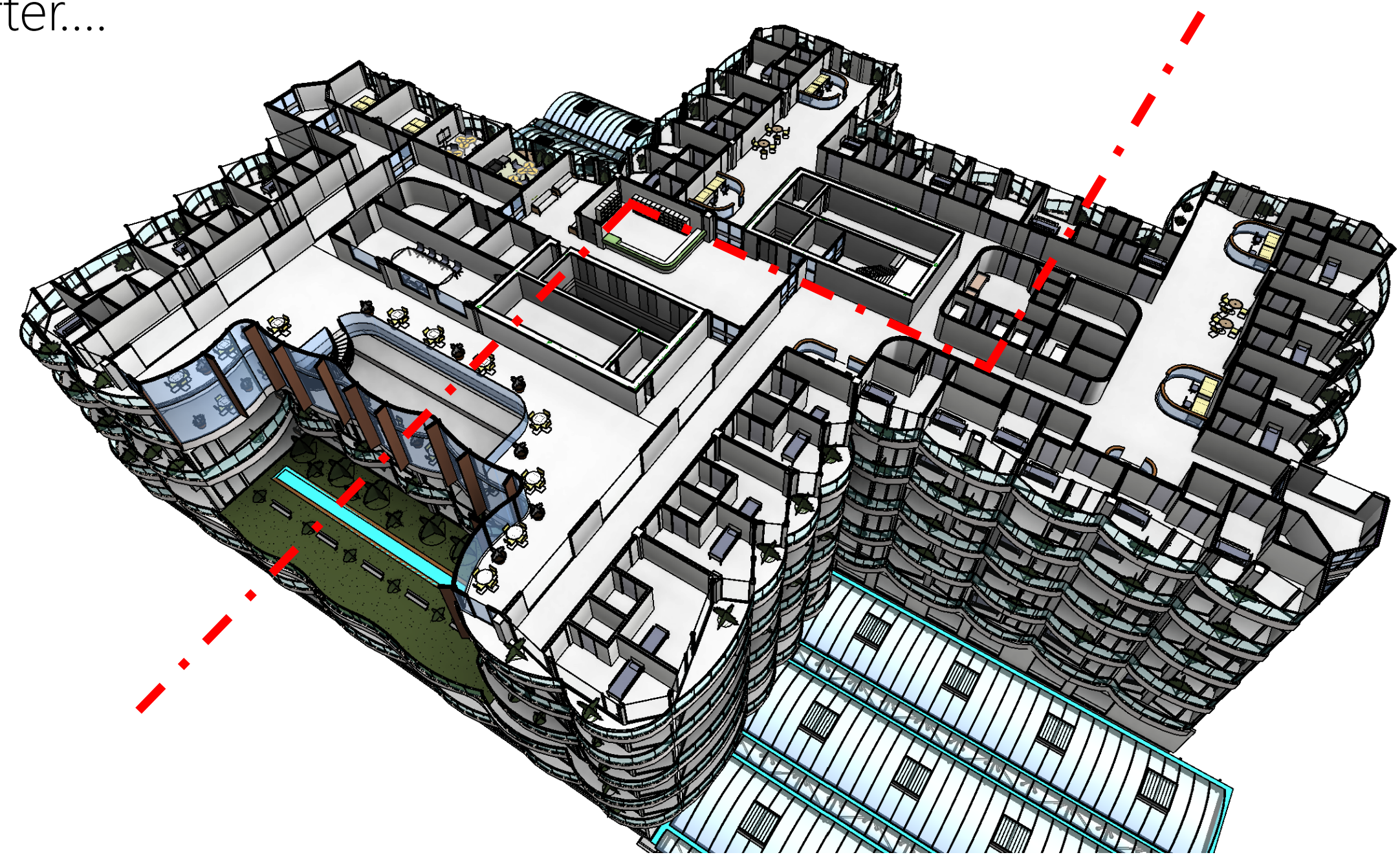
NATURAL
SHAPES + FORMS

Change in Program Layout

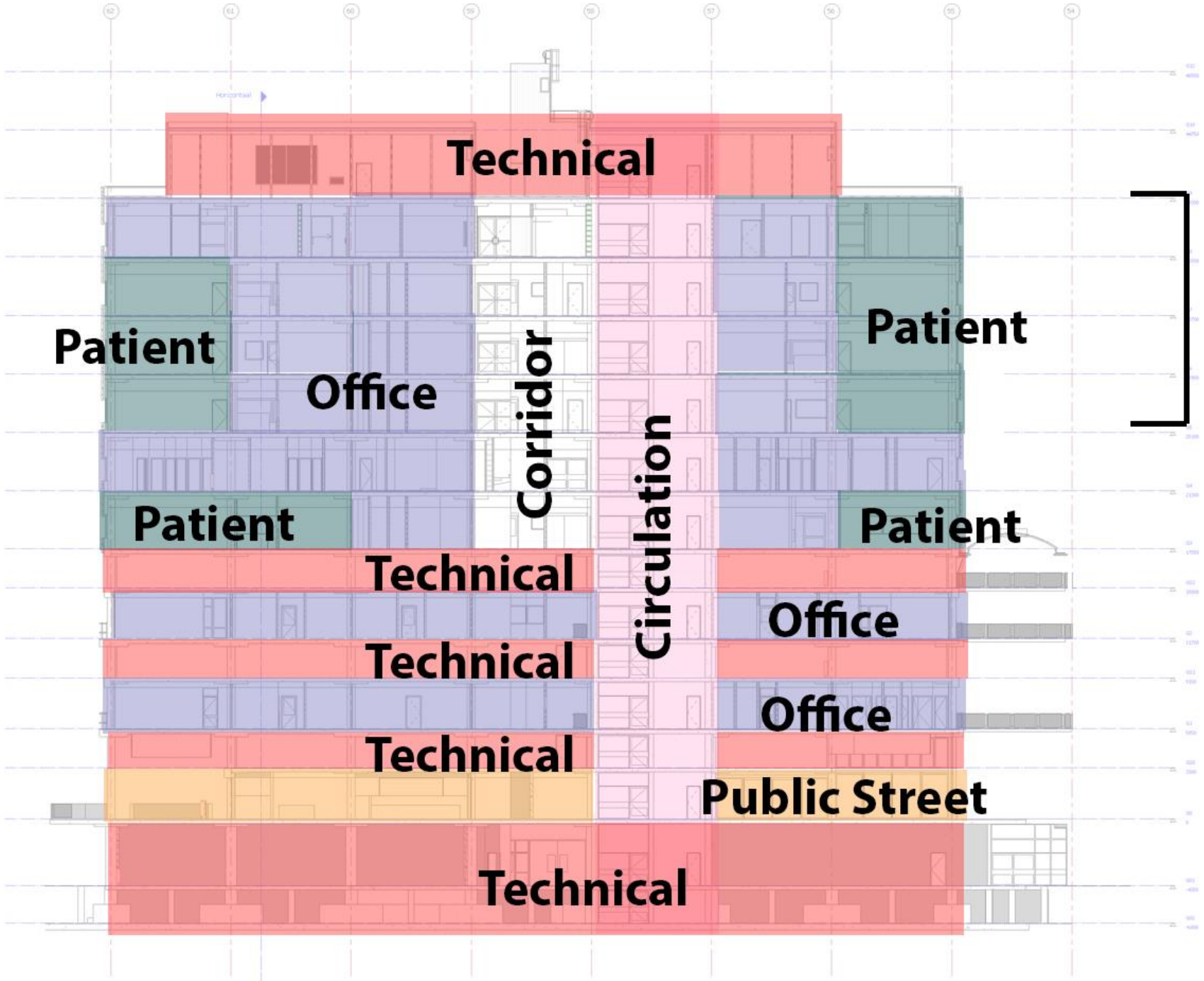
Before….



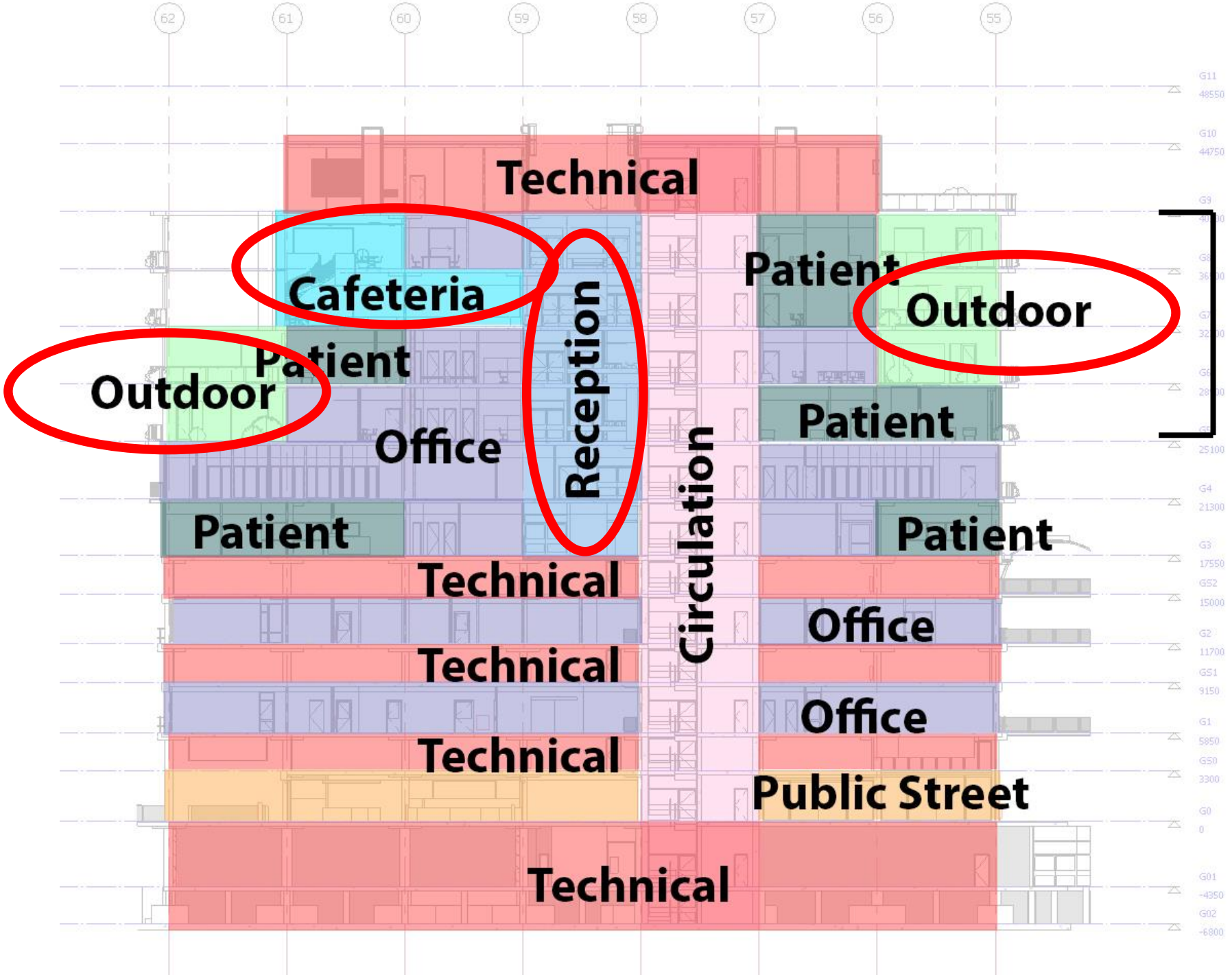
After....



Before….


Technical
Patient
Office
Corridor
Circulation
Patient
Patient
Patient
Technical
Office
Technical
Office
Technical
Public Street
Technical
Rehabilitation Area

After….



NATURAL PATTERNS+ PROCESSES

Rehabilitation Area

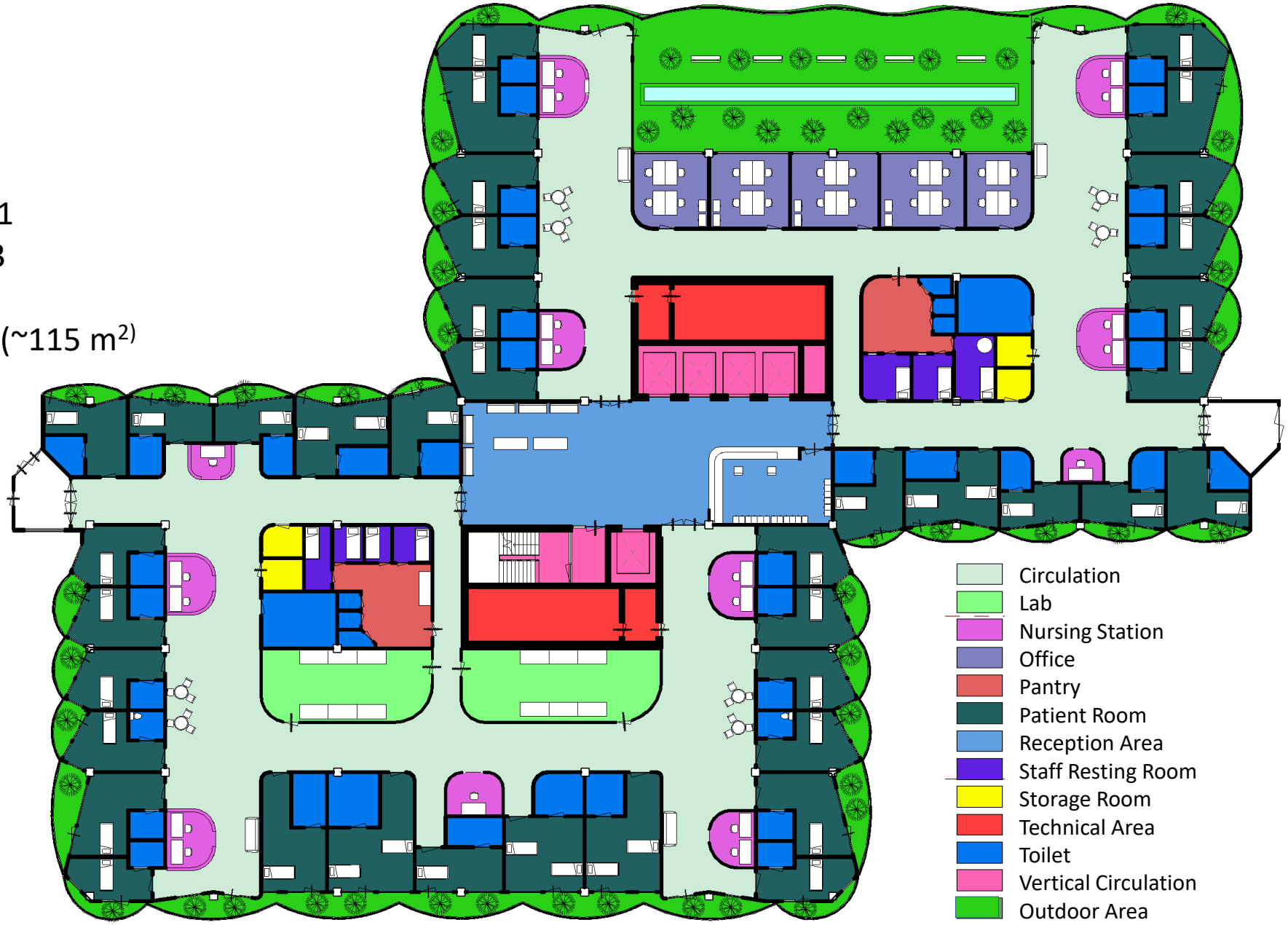
Number of :

Patient Room : 32
Beds: 58
Office Room: 25
Working seats:31
Common Space: 3(~20 m^2)

Existing Level 5th

Number of :

Patient Room : 39
Beds: 44
Office Room: 5
Nursing Station: 11
Working Station: 3
Working Seats: 43
Common Space: 3(~115 $m^{2)}$



New Level 5th

Number of :

Patient Room : 32
Beds: 58
Office Room: 23
Working Seats: 28
Common Space: 6 (~ 40m^2)

Existing Level 6th

Number of :

Patient Room : 35
Beds: 44
Office Room: 5
Nursing Station: 10
Working Station: 3
Working Seats: 43
Common Space: 3(~115m^2)

New Level 6th

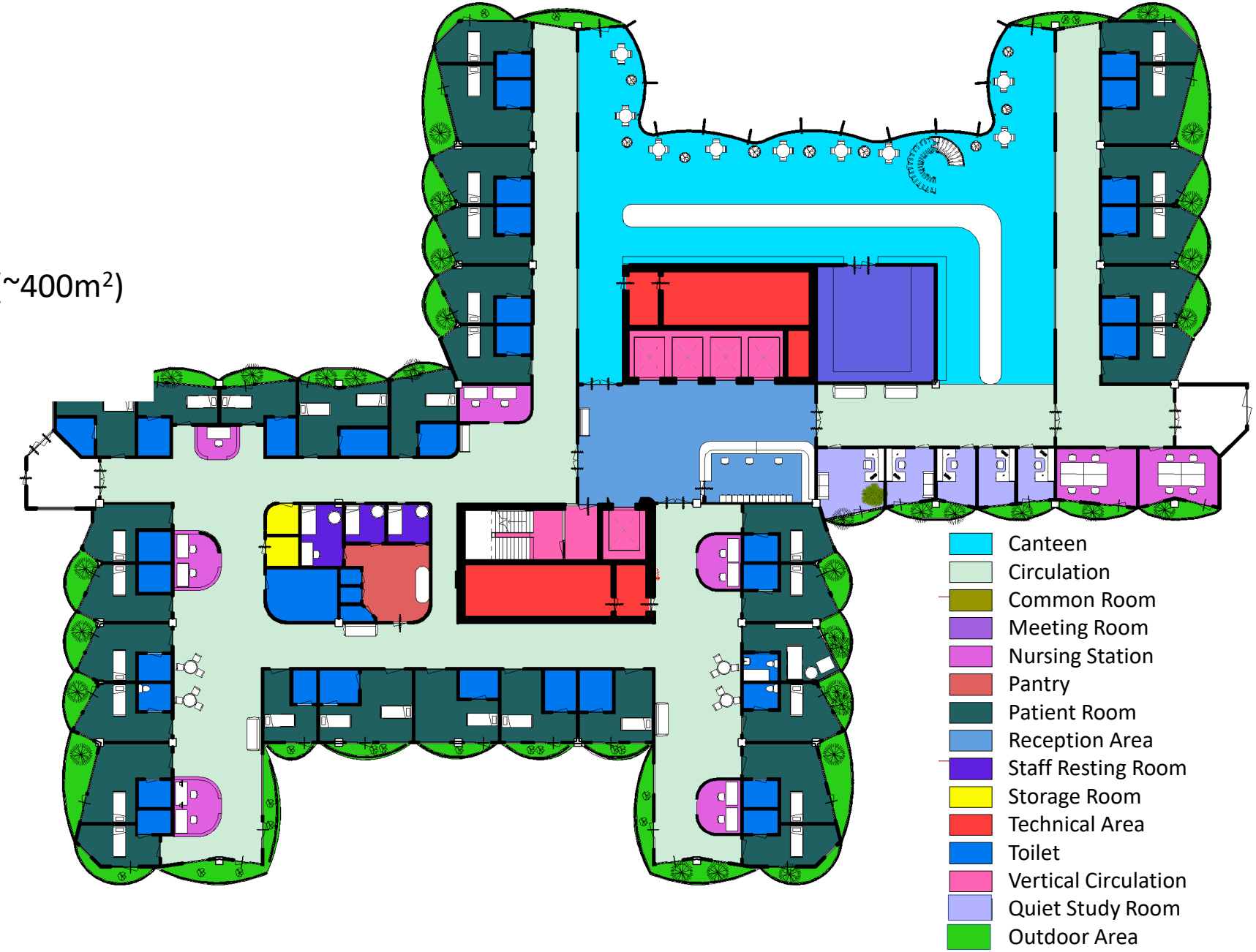
Number of :

Patient Room : 32
Beds: 58
Office Room: 23
Working Seats: 28
Common Space: 6 (~ 40m^2)

Existing Level 7th

Number of :

Patient Room : 35
Beds: 36
Nursing Station: 8
Working Station: 3
Working Seats:25
Common Space: 2(~400m^2)



New Level 7th

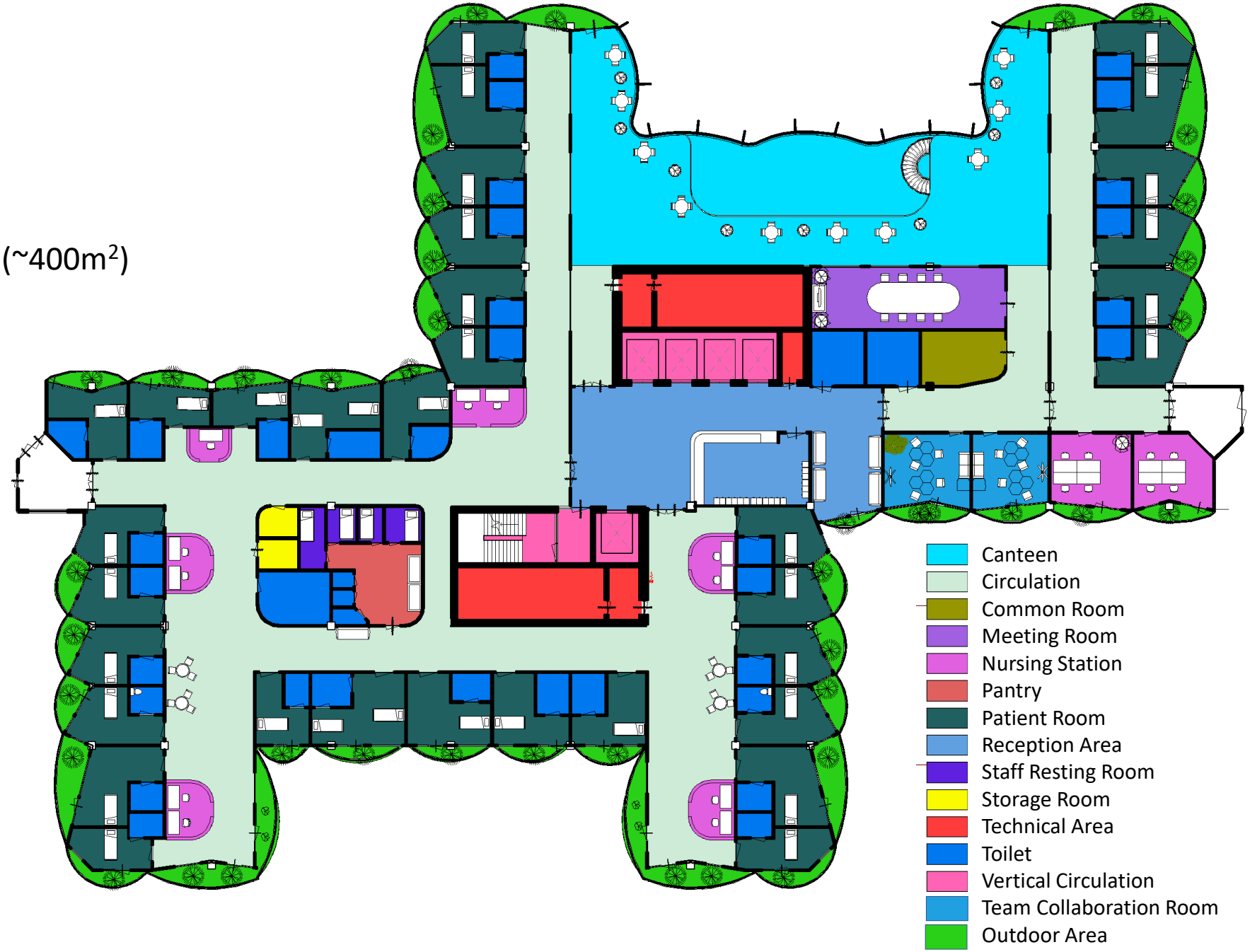
Number of :

Patient Room : 18
Beds: 38
Office Room: 25
Working Seats: 56
Common Space: 3 (~ 60m^2)

Existing Level 8th

Number of :

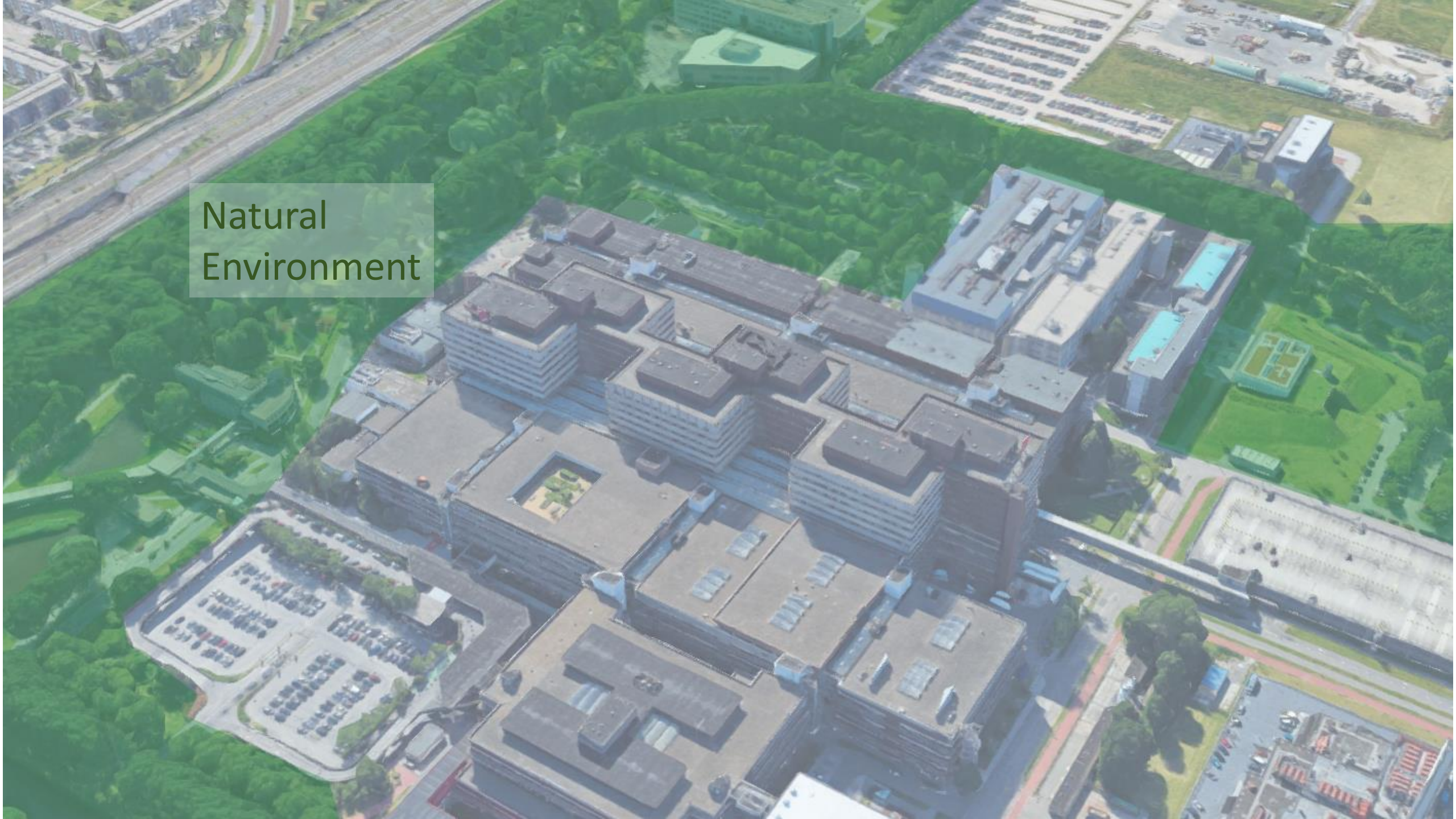
Patient Room : 35
Beds: 36
Nursing Station: 8
Working Seats:22
Common Space: 2(~400m^2)



New Level 8th

Floor/ Program	G5		G6		G7		G8		Total		Difference
Number of	**Old**	**New**	**Old**	**New**	**Old**	**New**	**Old**	**New**	**Old**	**New**	
Patient Room	32	39	32	35	32	35	18	35	114	144	***↑ by 30***
Beds	58	44	58	44	58	36	38	36	212	160	*↓by 52*
Office Space	25	5+11+3= 19	23	5+10+ 3=18	23	8+3 =11	25	8	96	56	*↓ by 40*
Working Seating	31	43	28	43	28	25	56	22	143	133	*↓ by 10*
Common Space (In area)	3(~20 m^2)	3(~115 $m^{2)}$	6 (~ 40m^2)	3(~115 m^2)	6 (~ 40m^2)	2(~400 m^2)	3 (~ 60m^2)	2(~400m^2)	160	1030	***↑ by 870m^2***

Site Connection


Natural
Environment

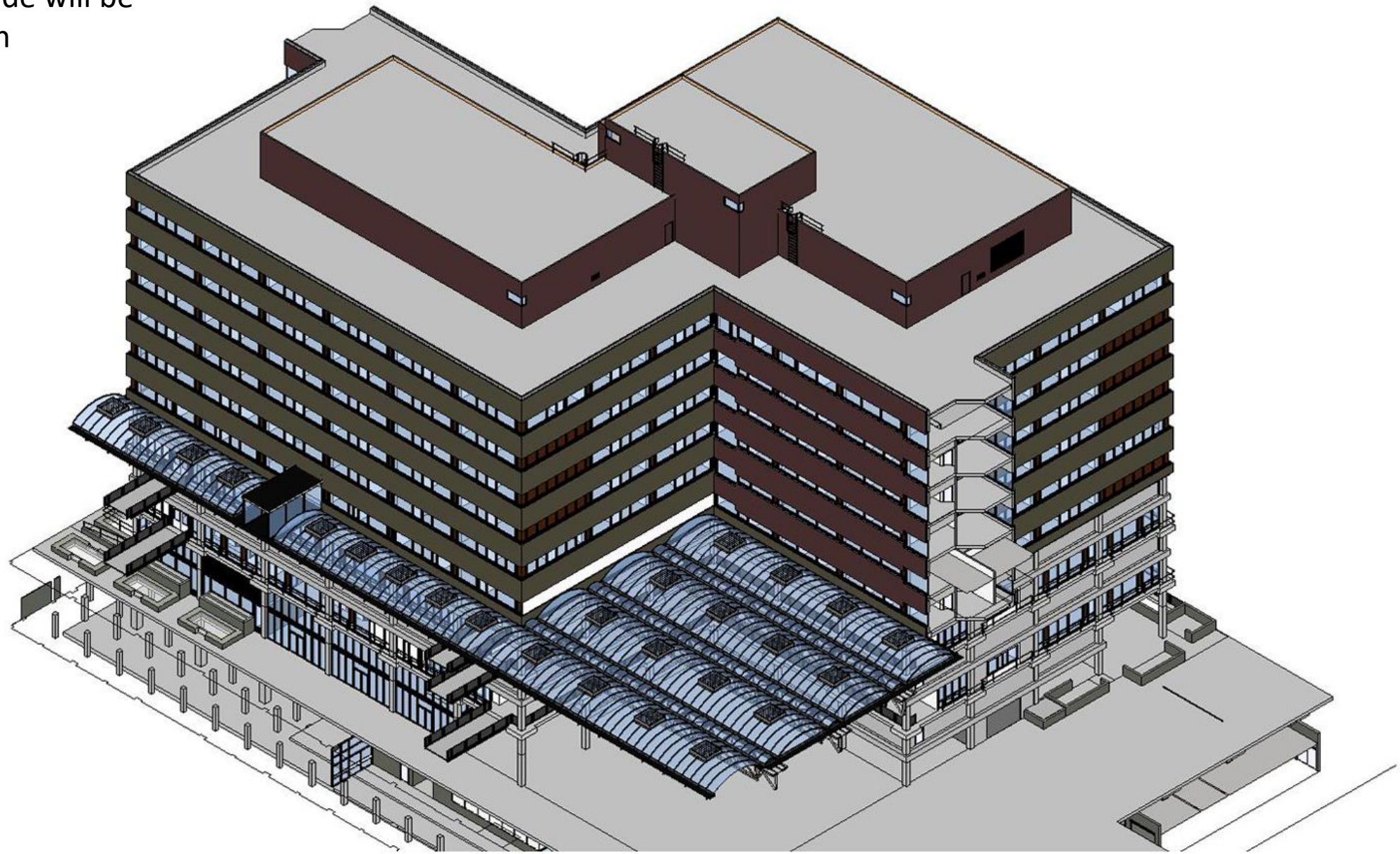

Enhance connection with the nature from Patient Room
Enhance connection with the entrance for visitors
PLACE-BASED RELATIONSHIPS
EVOLVED HUMAN-NATURE RELATIONSHIPS

Source: *Temp.architecture, Studio Nuy van Noort, Studio BLAD*

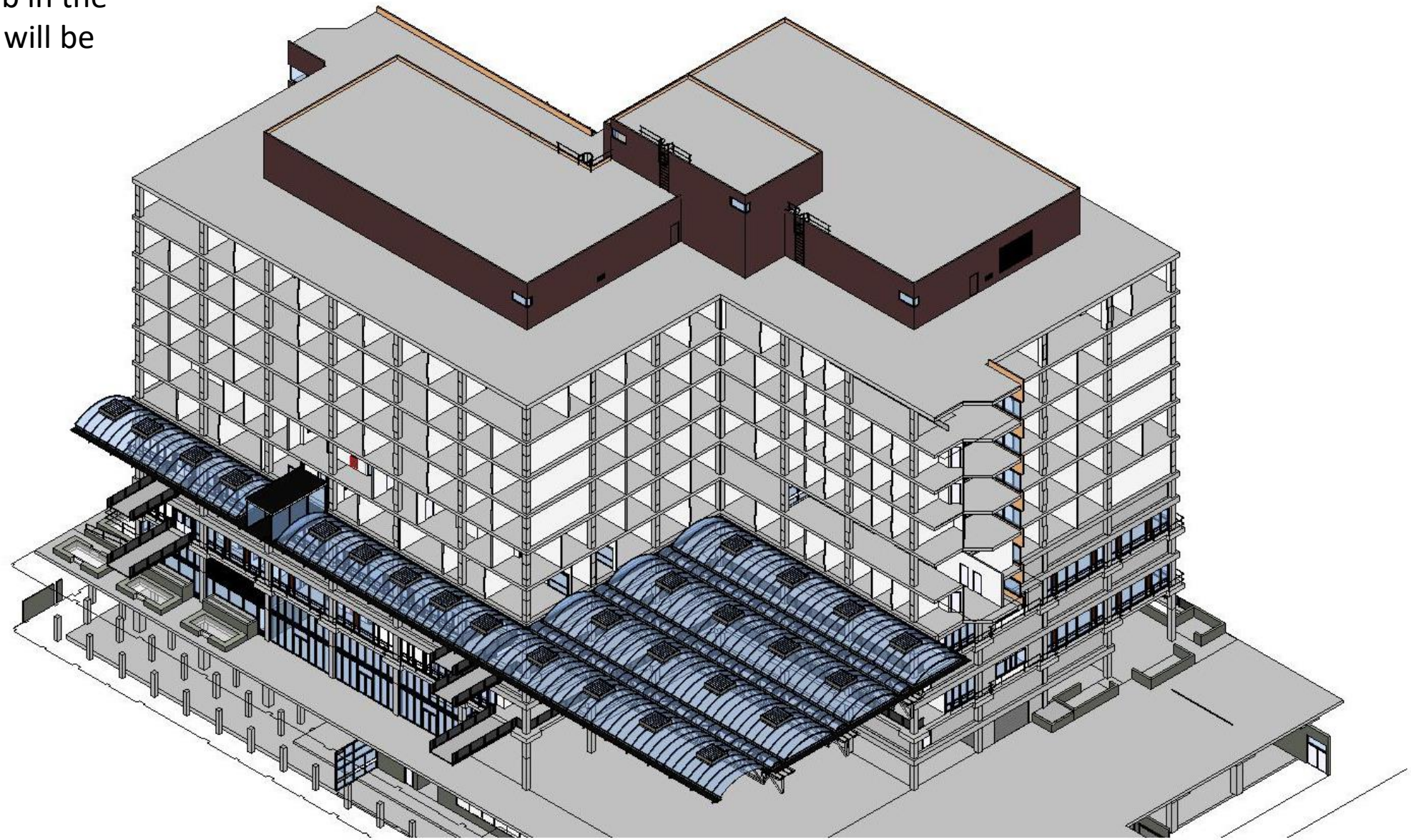

PLACE-BASED
RELATIONSHIPS
EVOLVED
HUMAN-NATURE
RELATIONSHIPS
To create co-relation with the
new entrance
To create co-relation with the
Patients

Construction

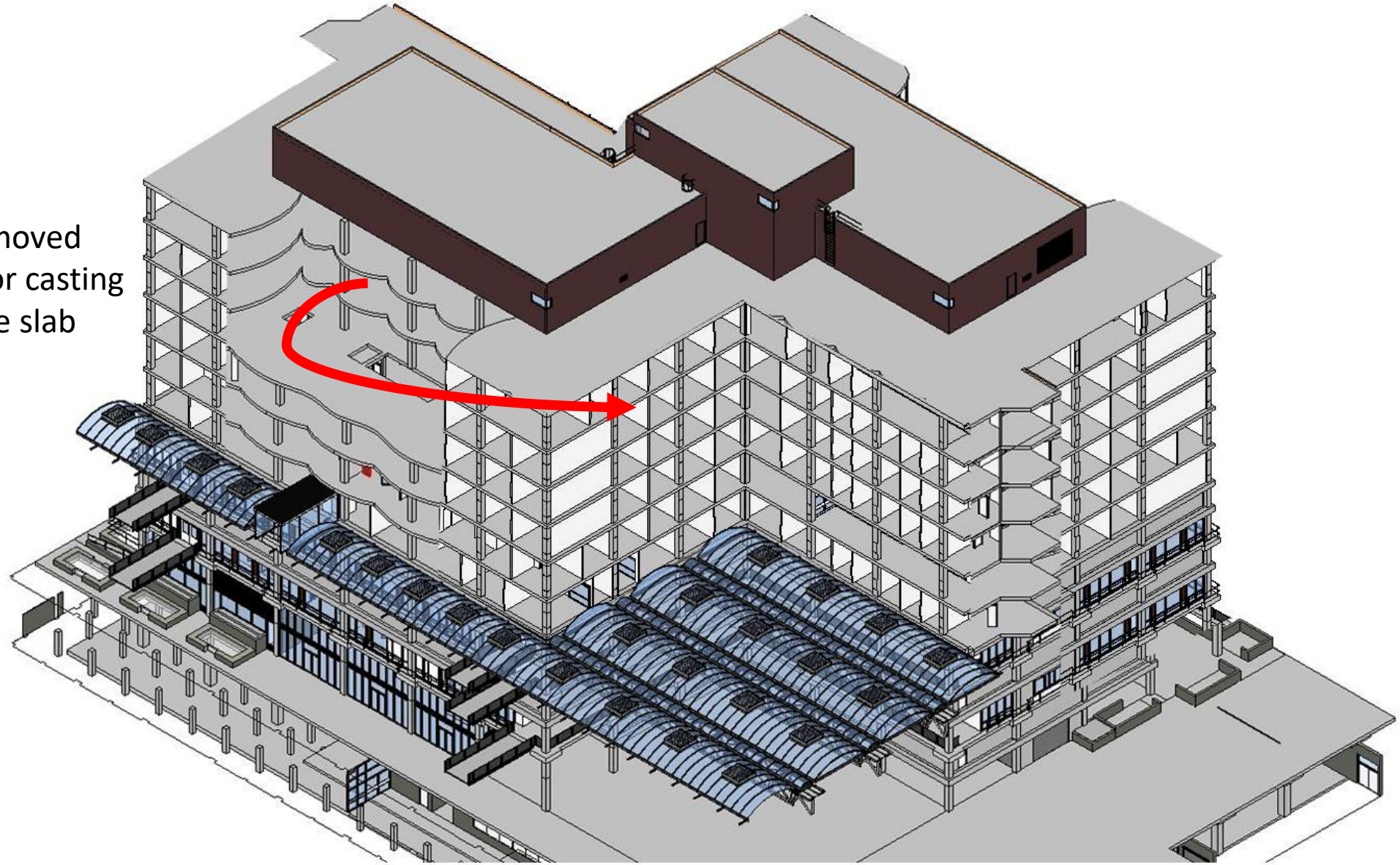
The old façade will be teared down

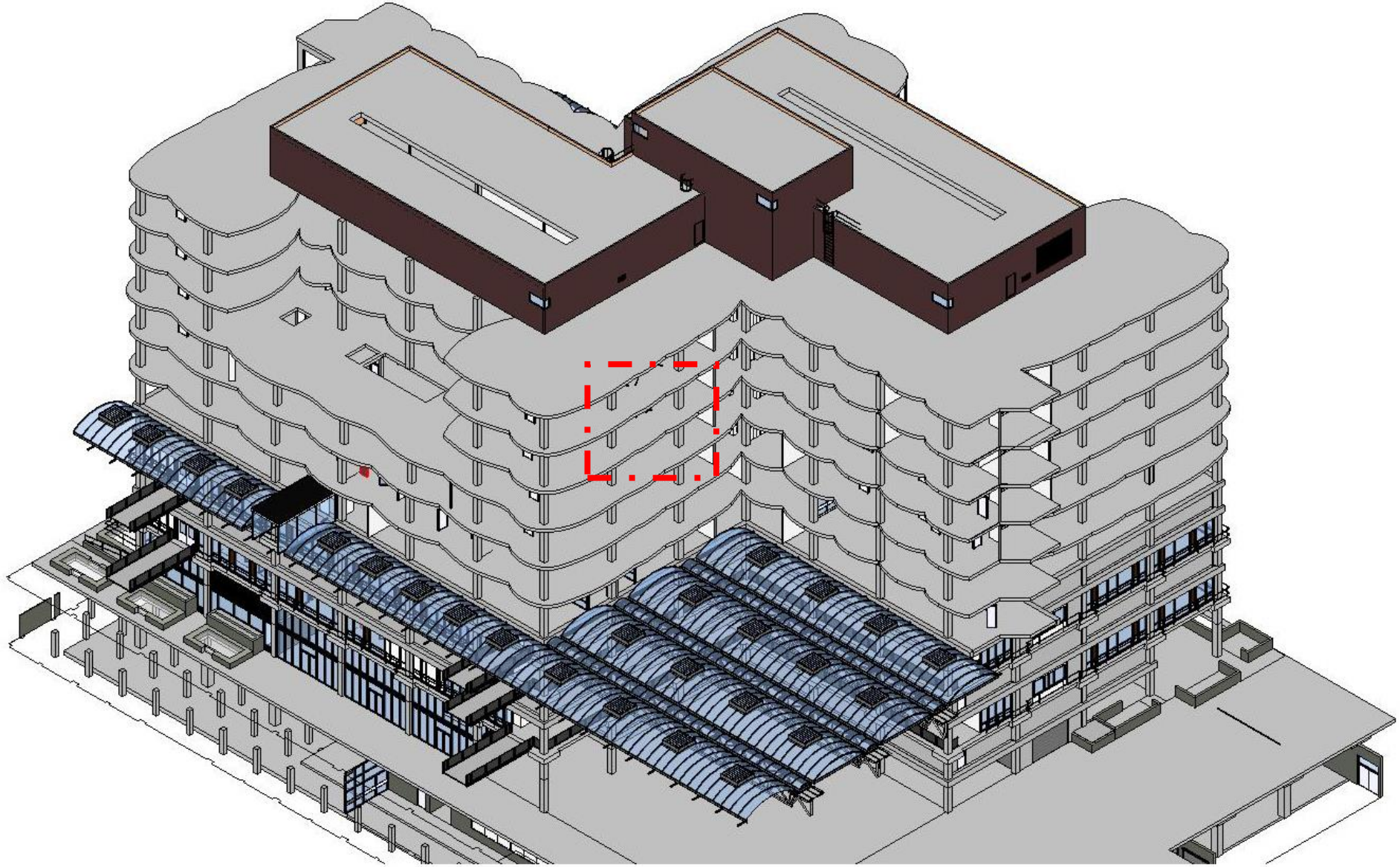


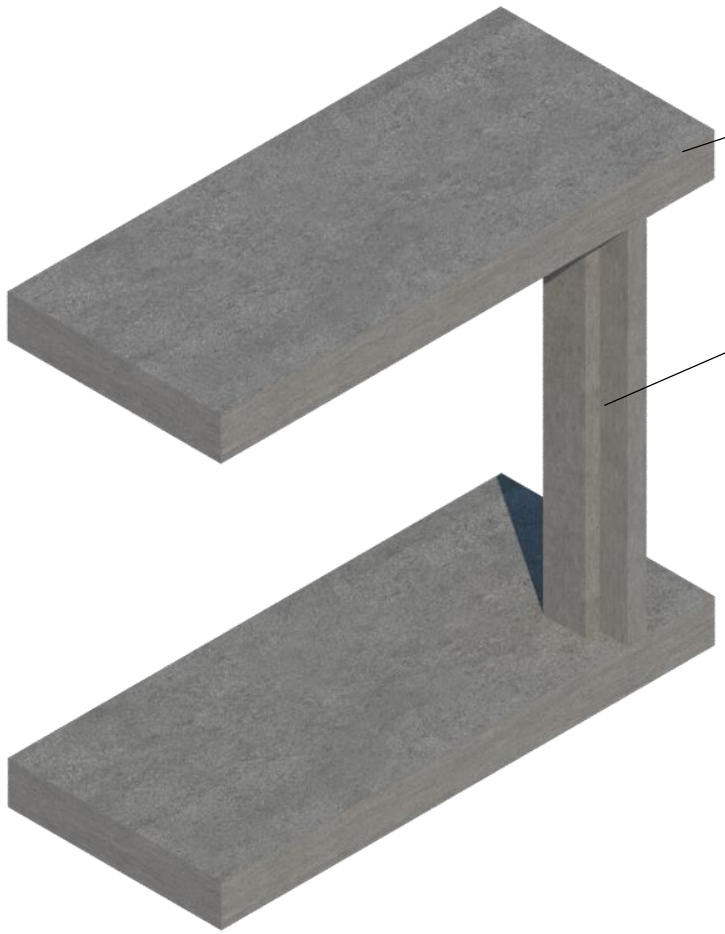
Concrete slab in the central area will be removed



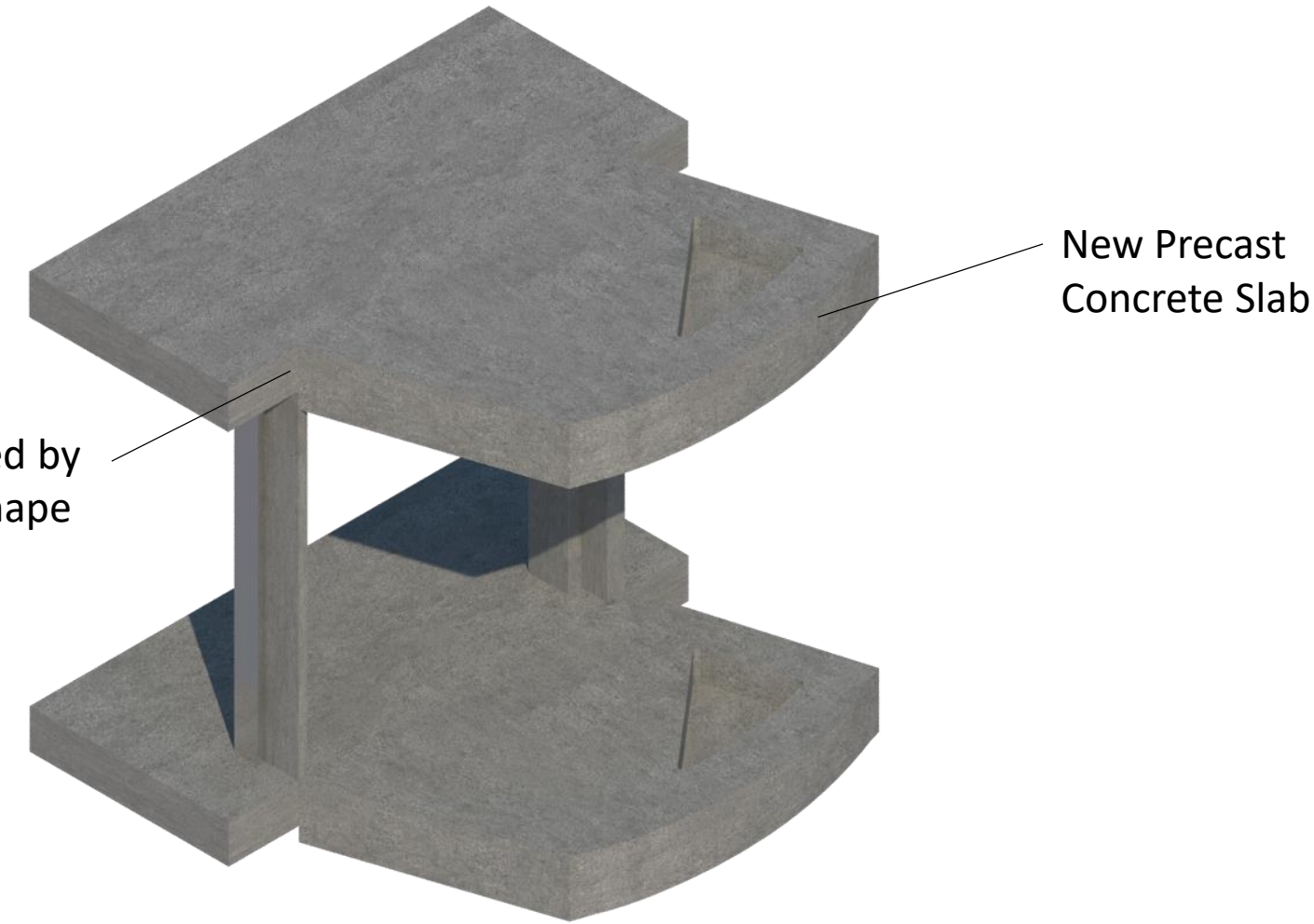
Concrete removed to be used for casting new concrete slab

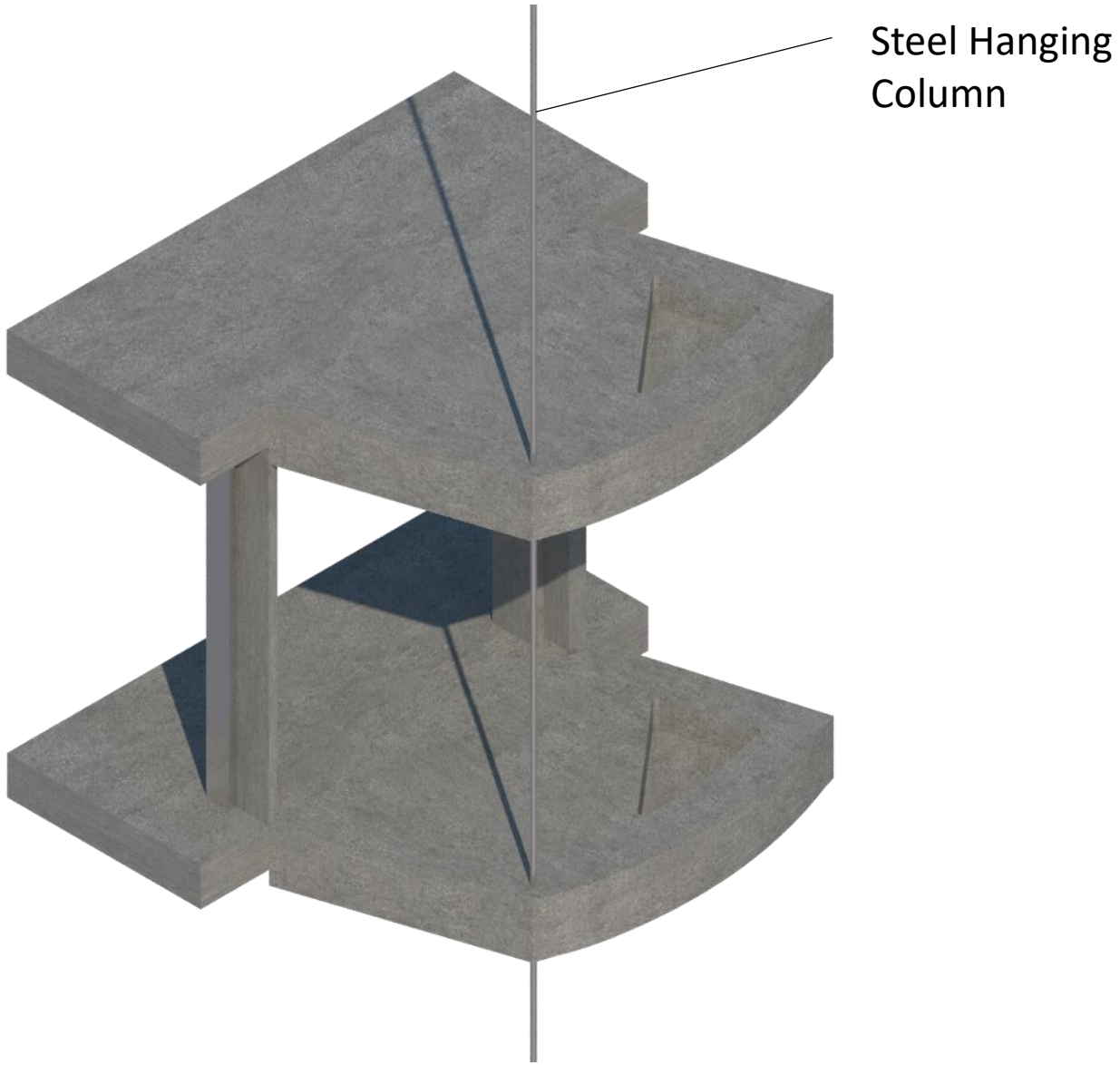


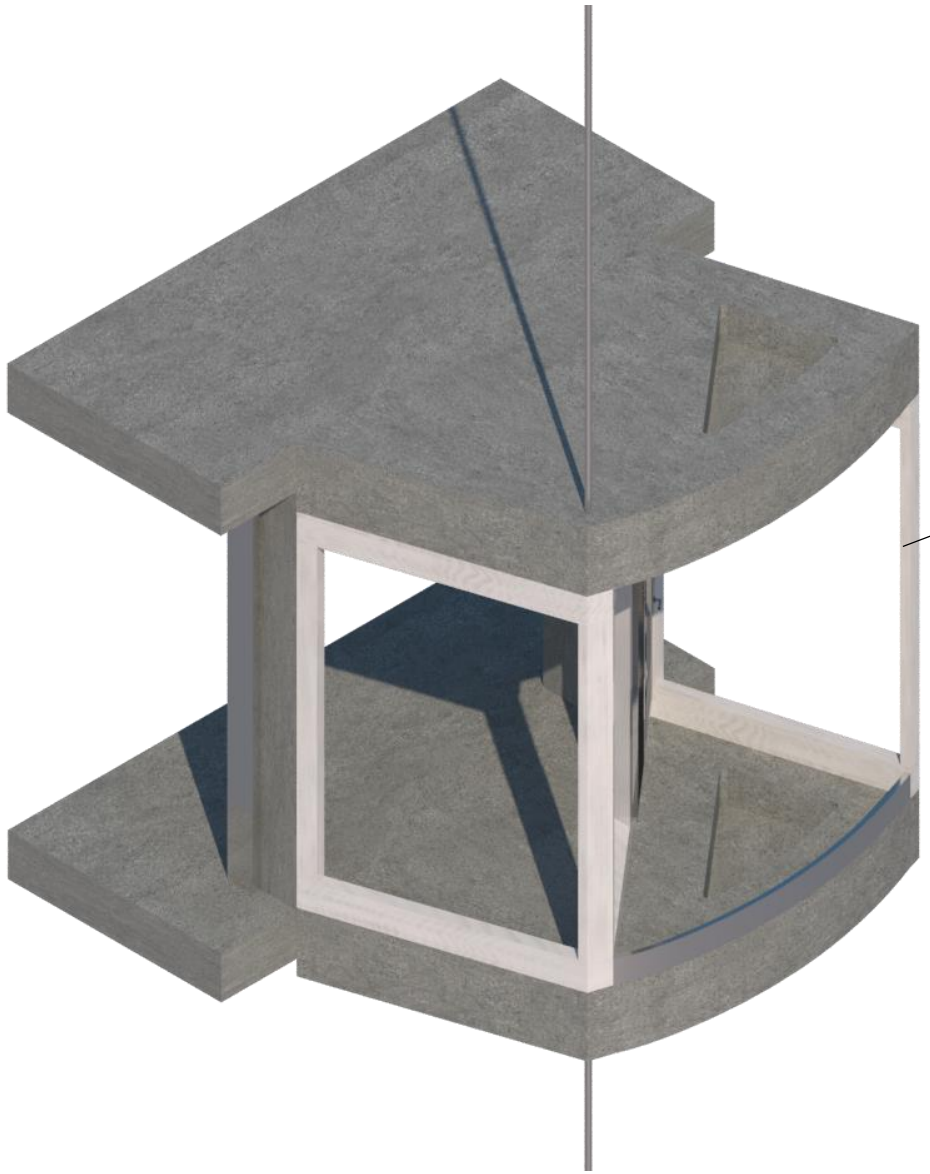


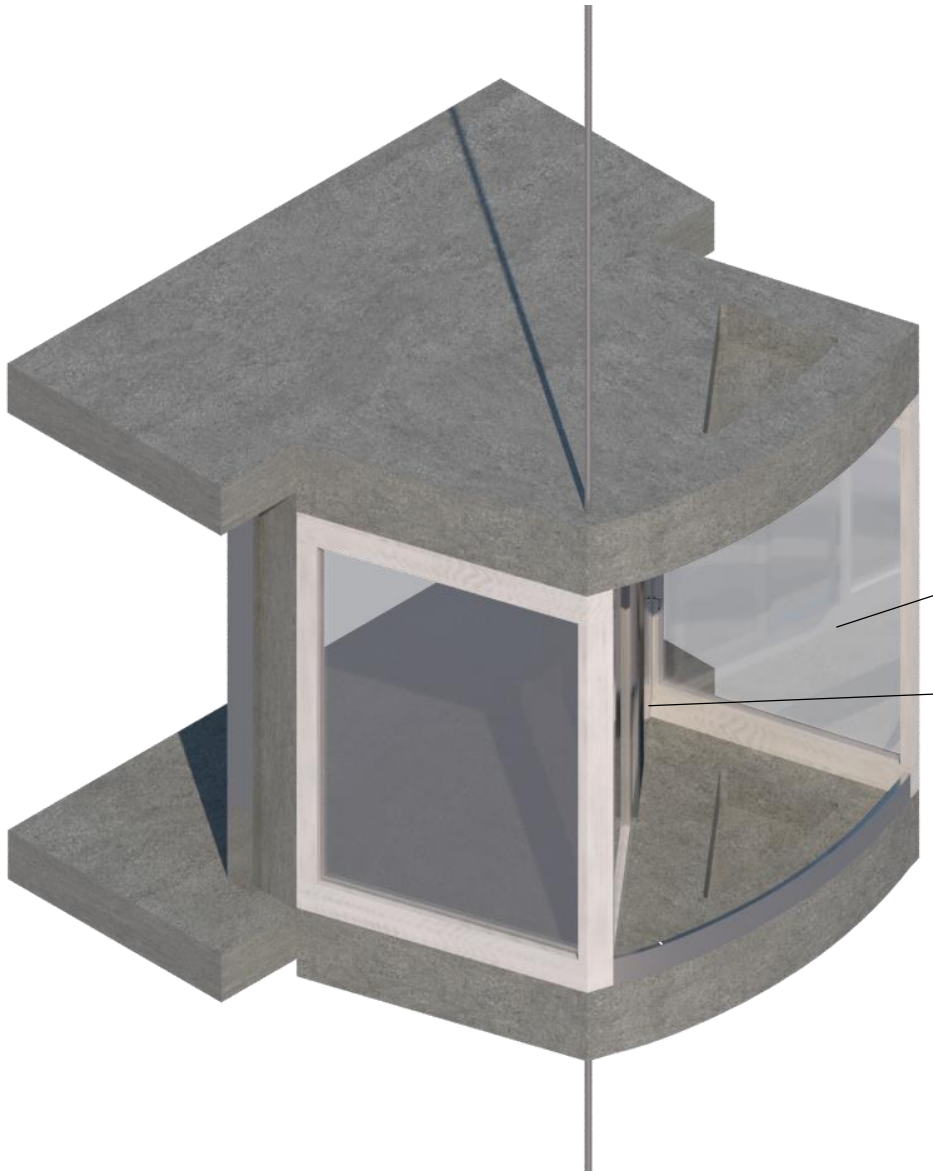

Existing Concrete
Floor Slab
Existing Concrete
Column

New Steel Column

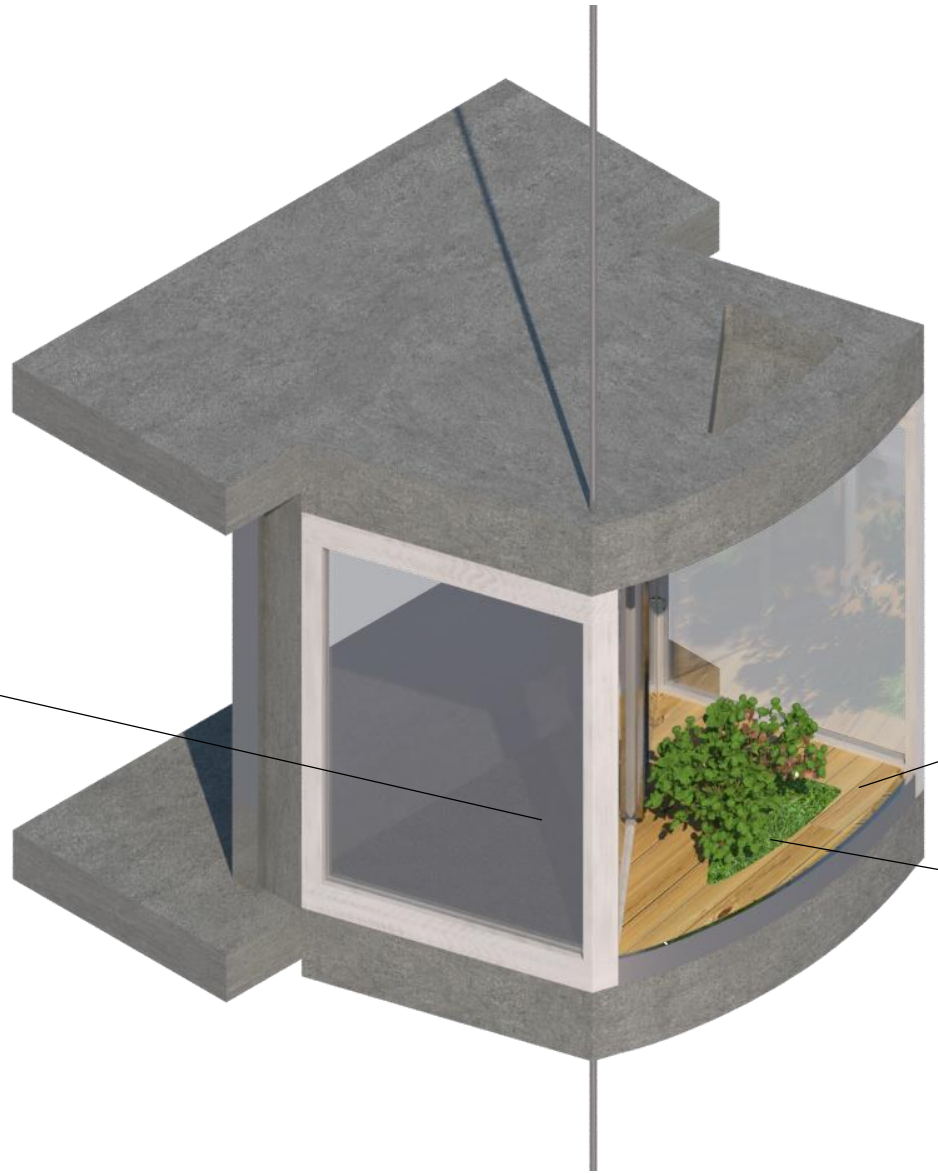

New Precast
Concrete Slab
Connected by
Steel L-shape
Joint


Steel Hanging
Column


Painted Wood
Casing

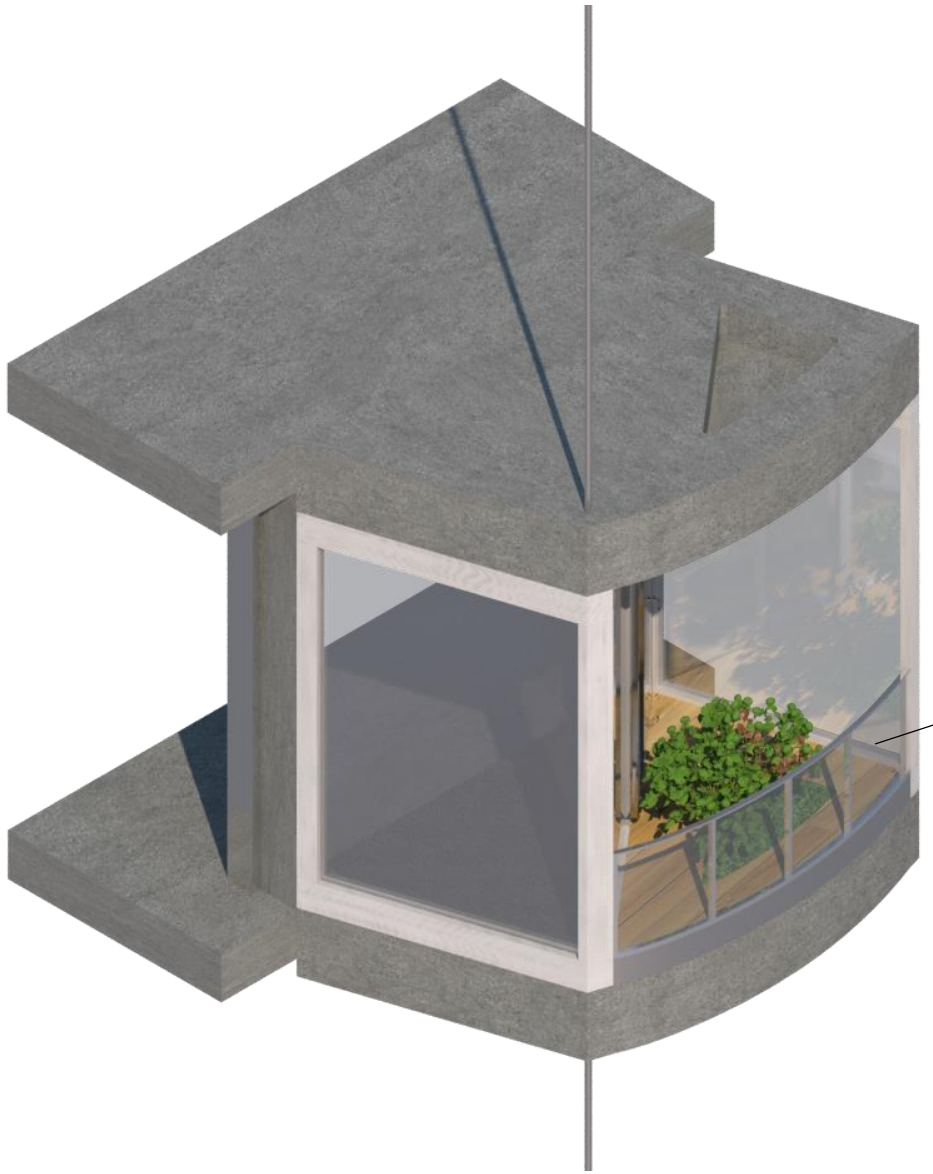

Install Low-E Glass
Install Sliding Door

1. Thermal Insulation
2. Damp proof membrane
3. Underfloor heating pipes
4. Screed
5. Carpet finishes

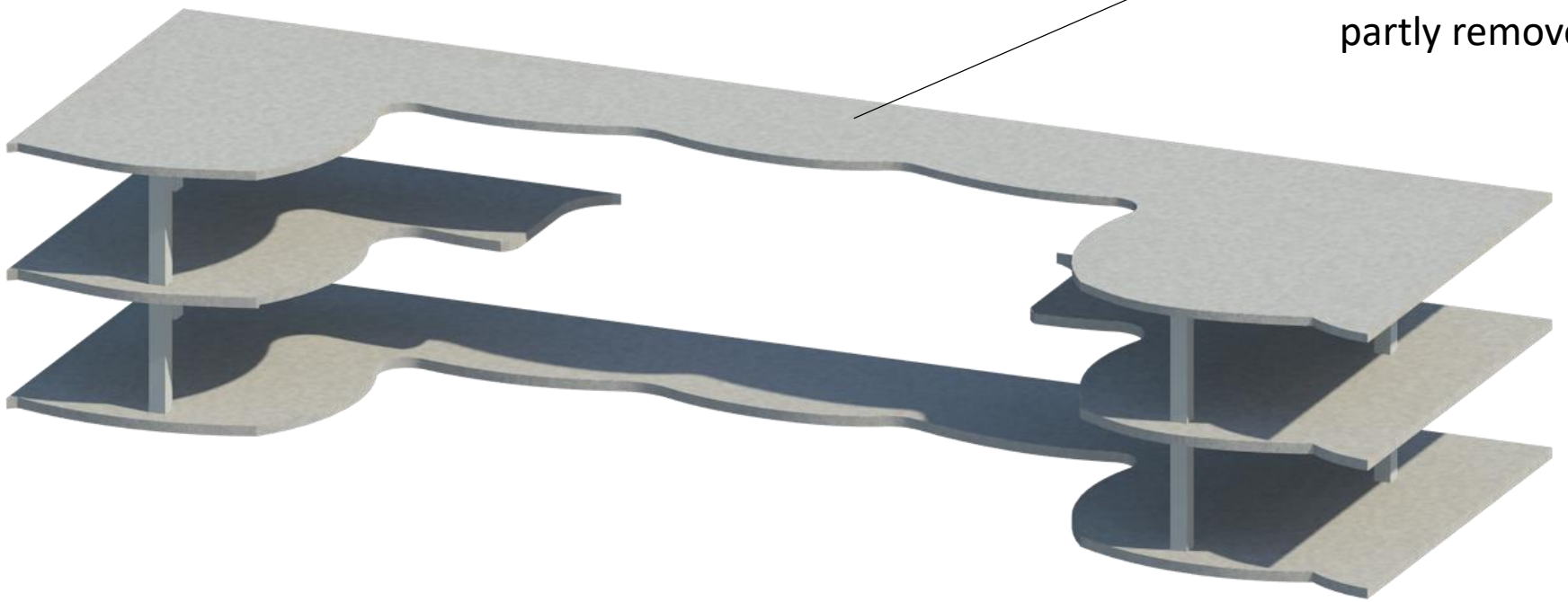


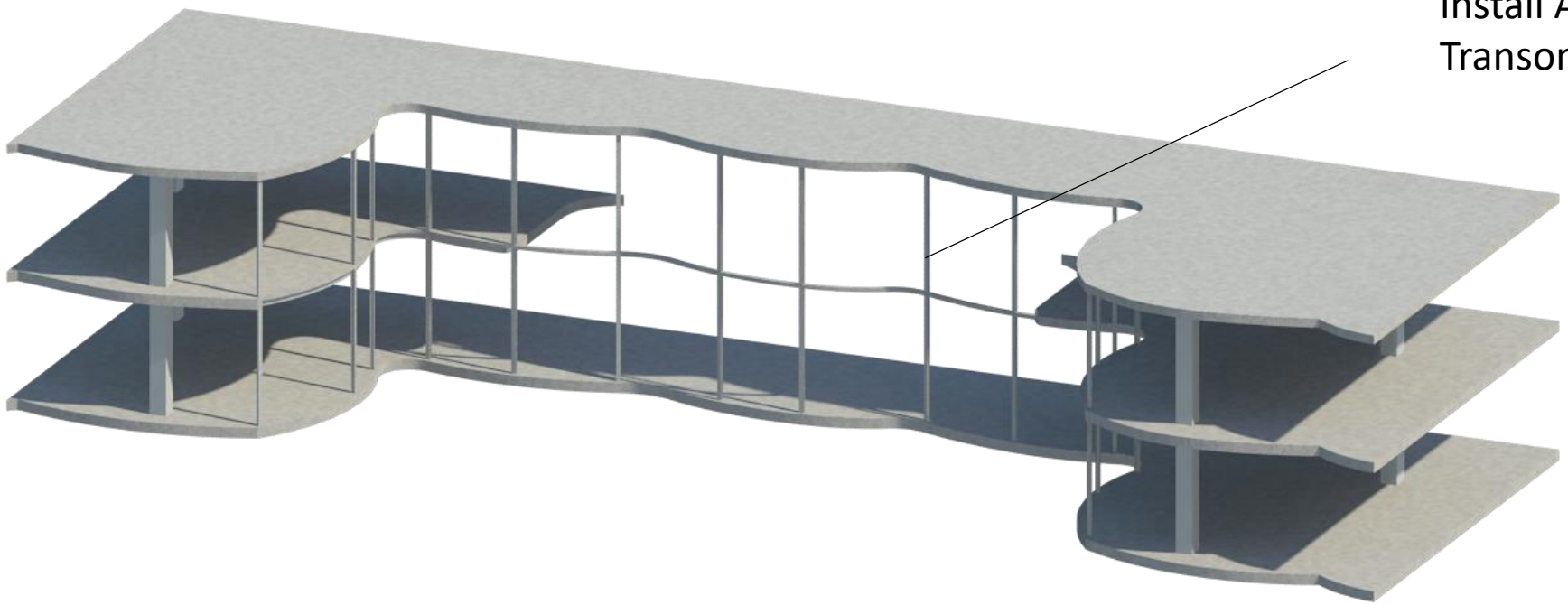
1. Damp Proof Membrane
2. Wooden Floor Board with Battern underneath

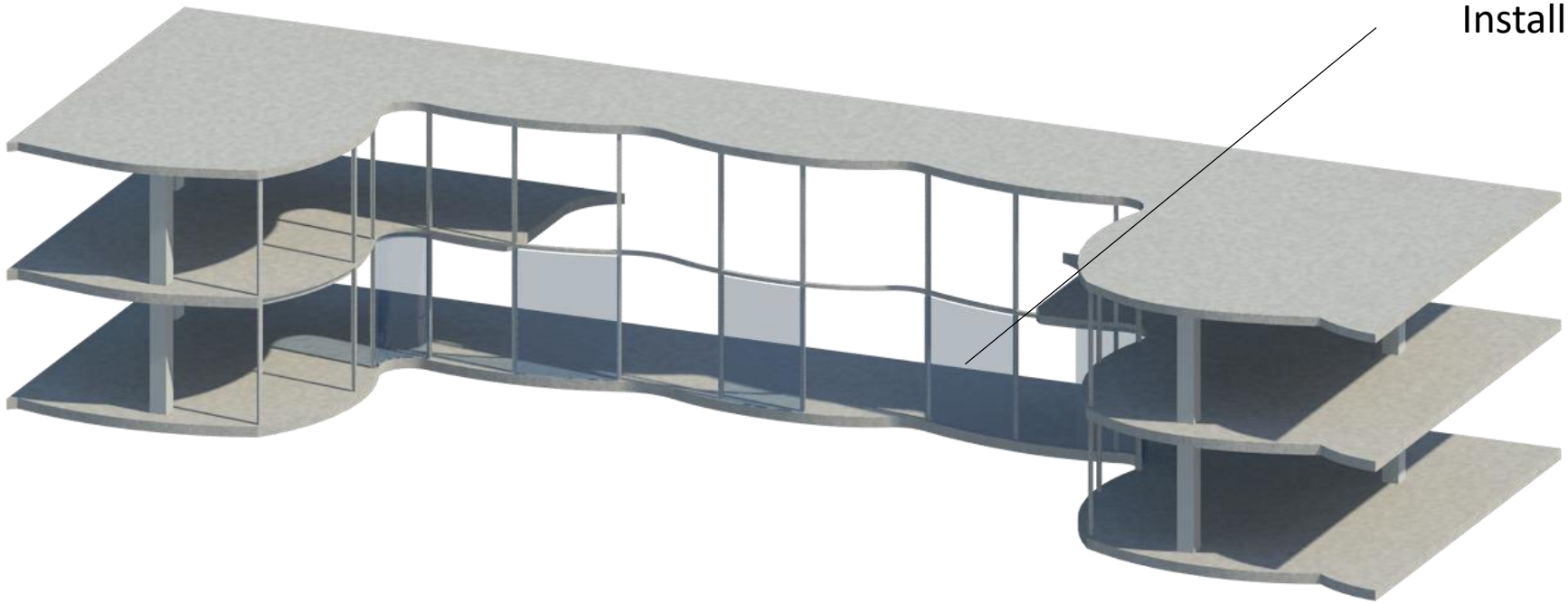
1. Substrate
2. Gravel

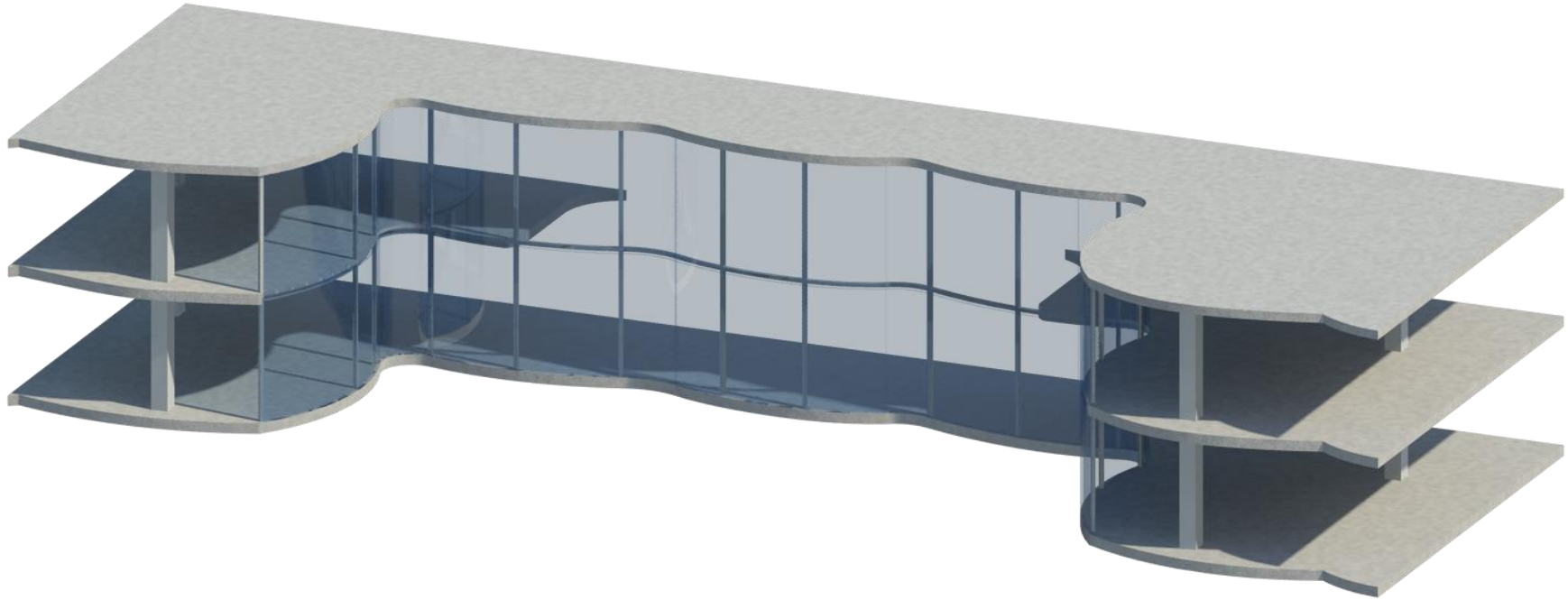


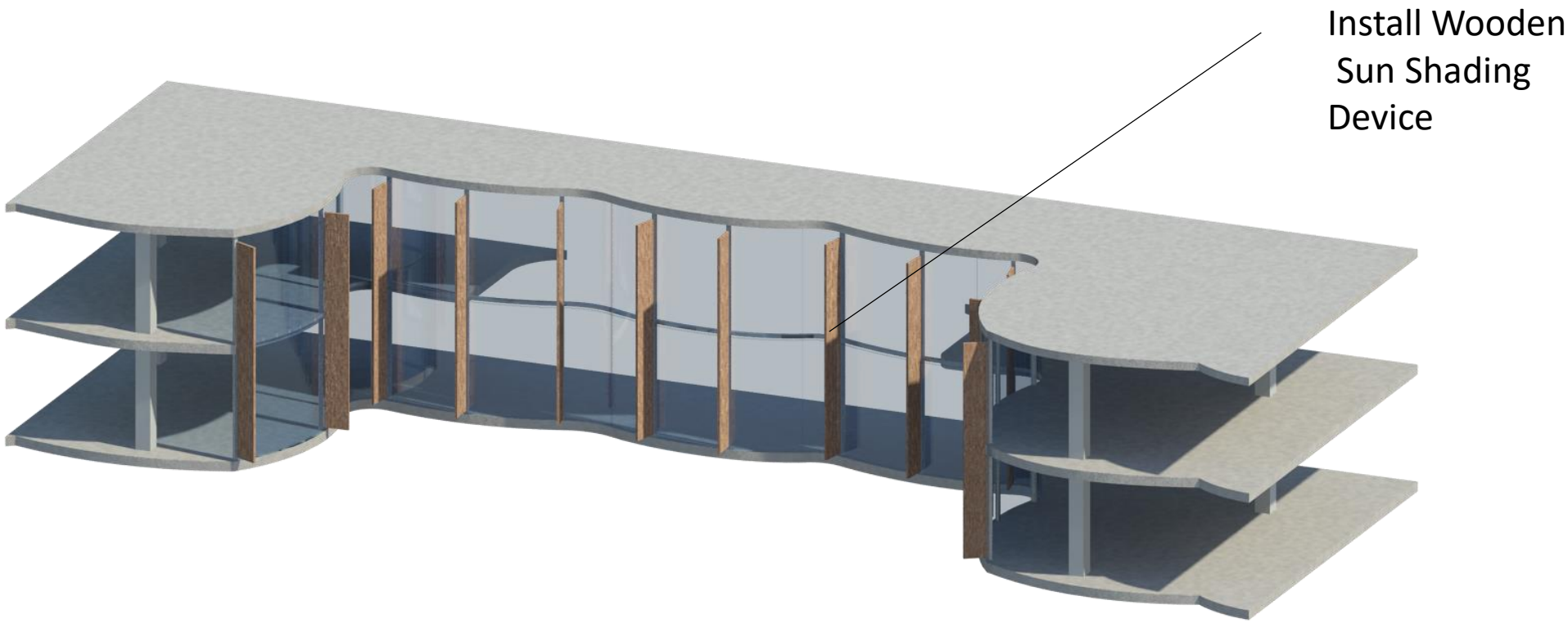
Glass railing with Steel Frame


Existing Concrete
Floor Slab after
partly removed


Install Aluminum
Transom Mullion


Install Low-E glass



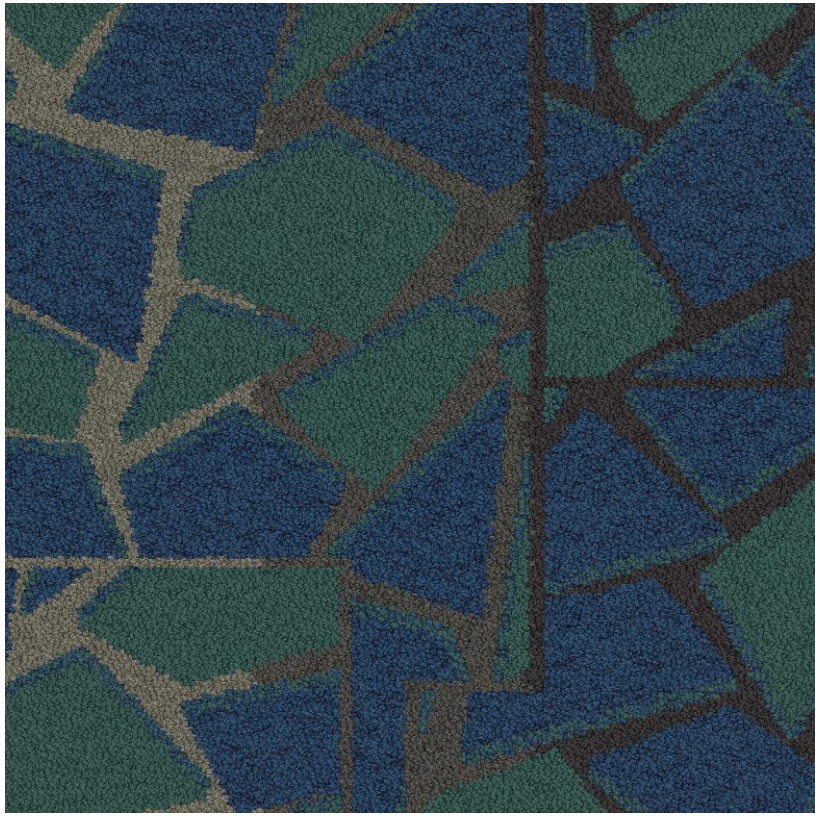

Install Wooden
Sun Shading
Device

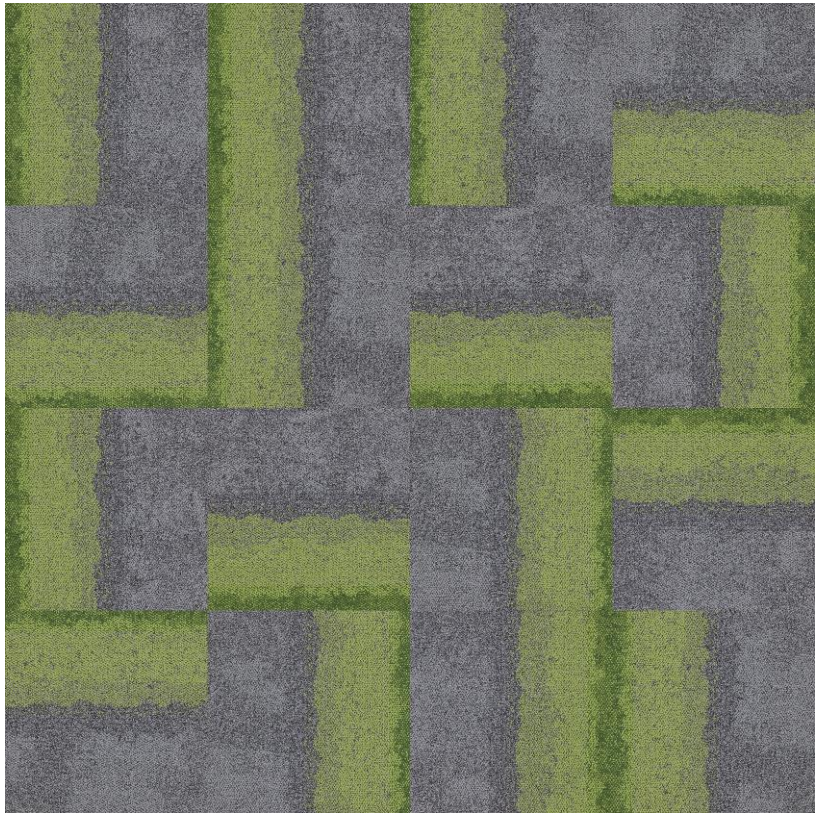
Choice of Material

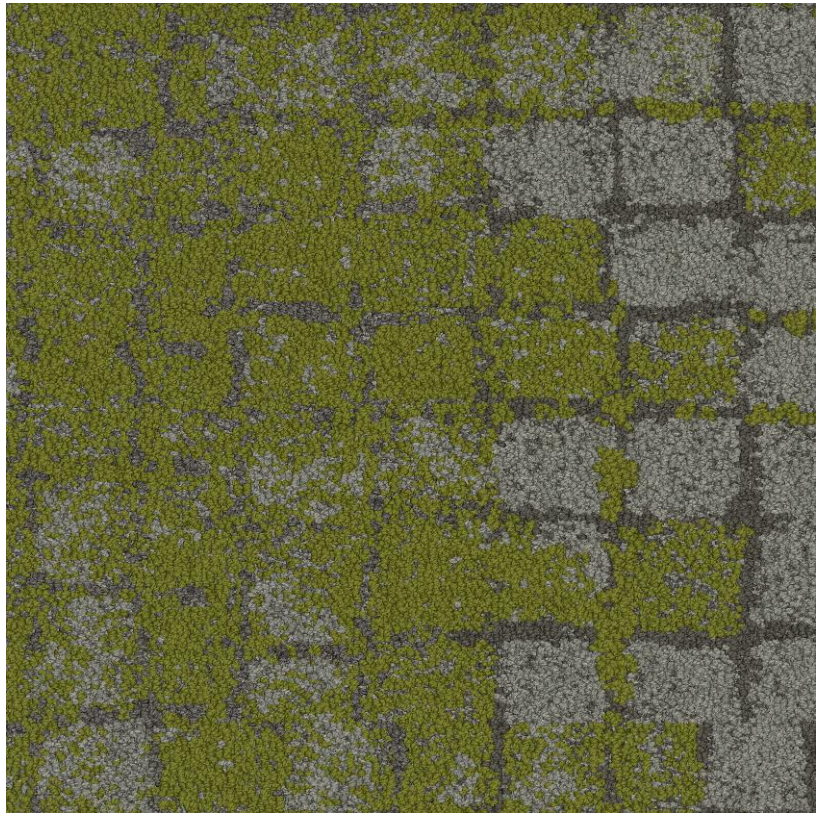
Interface Biophilic Carpet

NATURAL
SHAPES + FORMS

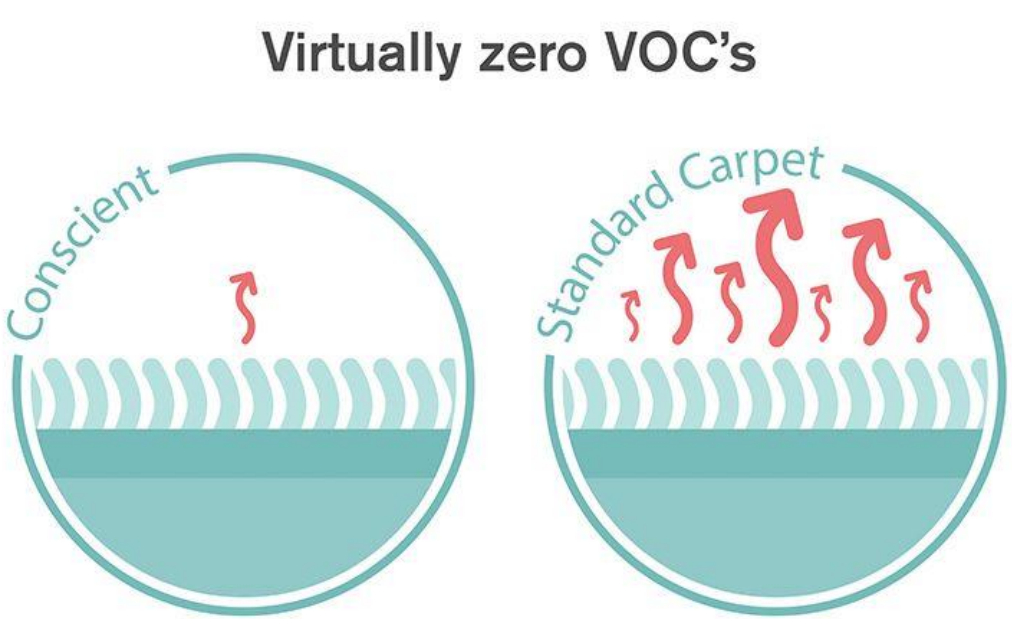
NATURAL
PATTERNS+
PROCESSES

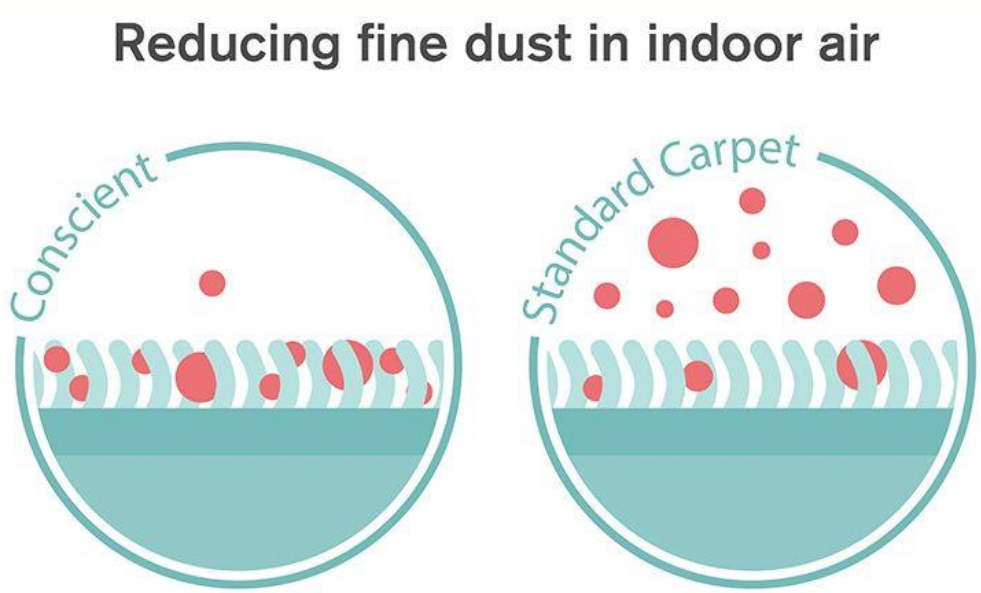






Benefits





Source: Interface

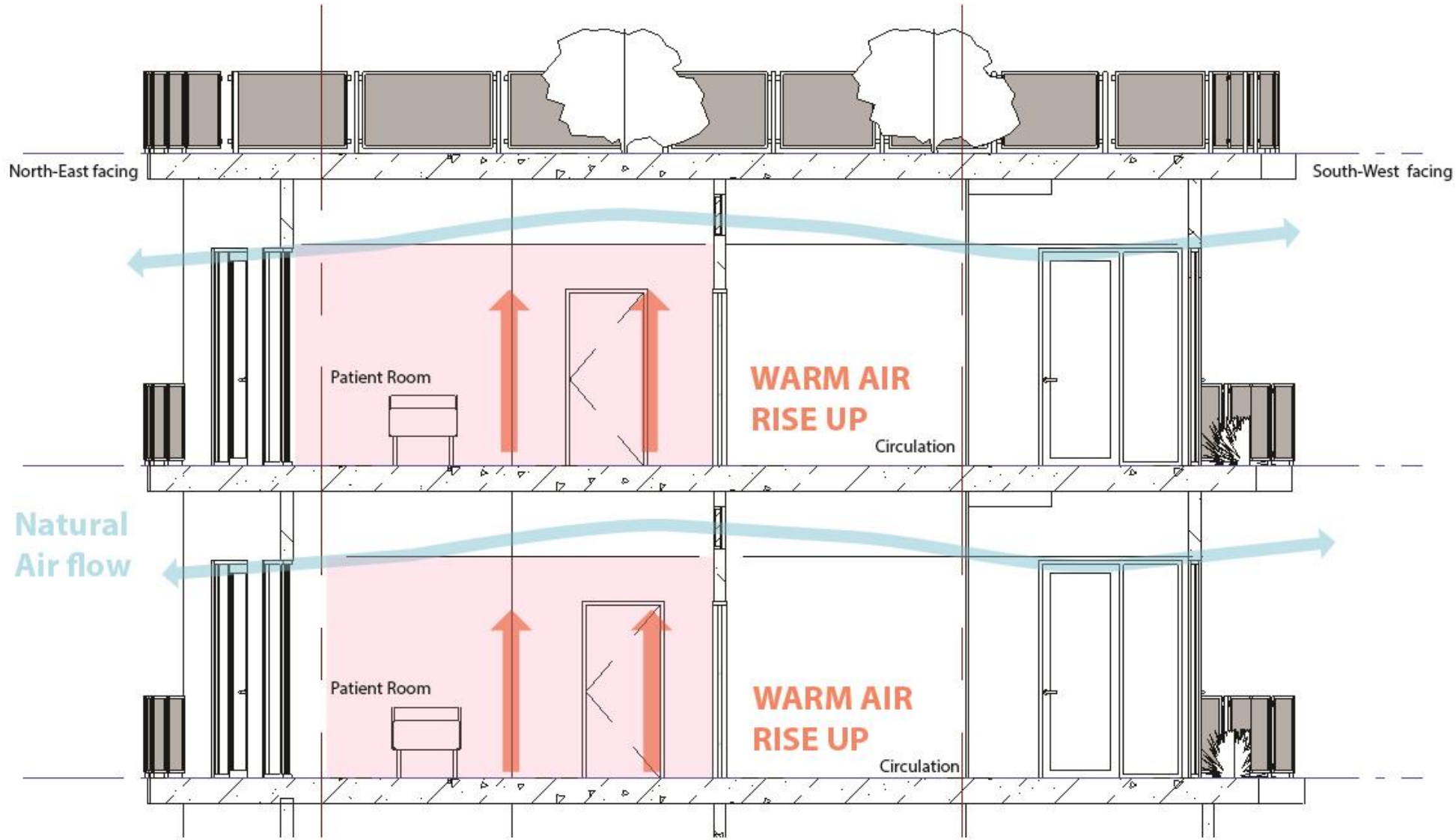
Climate

Installation of **Natural Ventilation System** above each glass wall and sliding door, and on doors

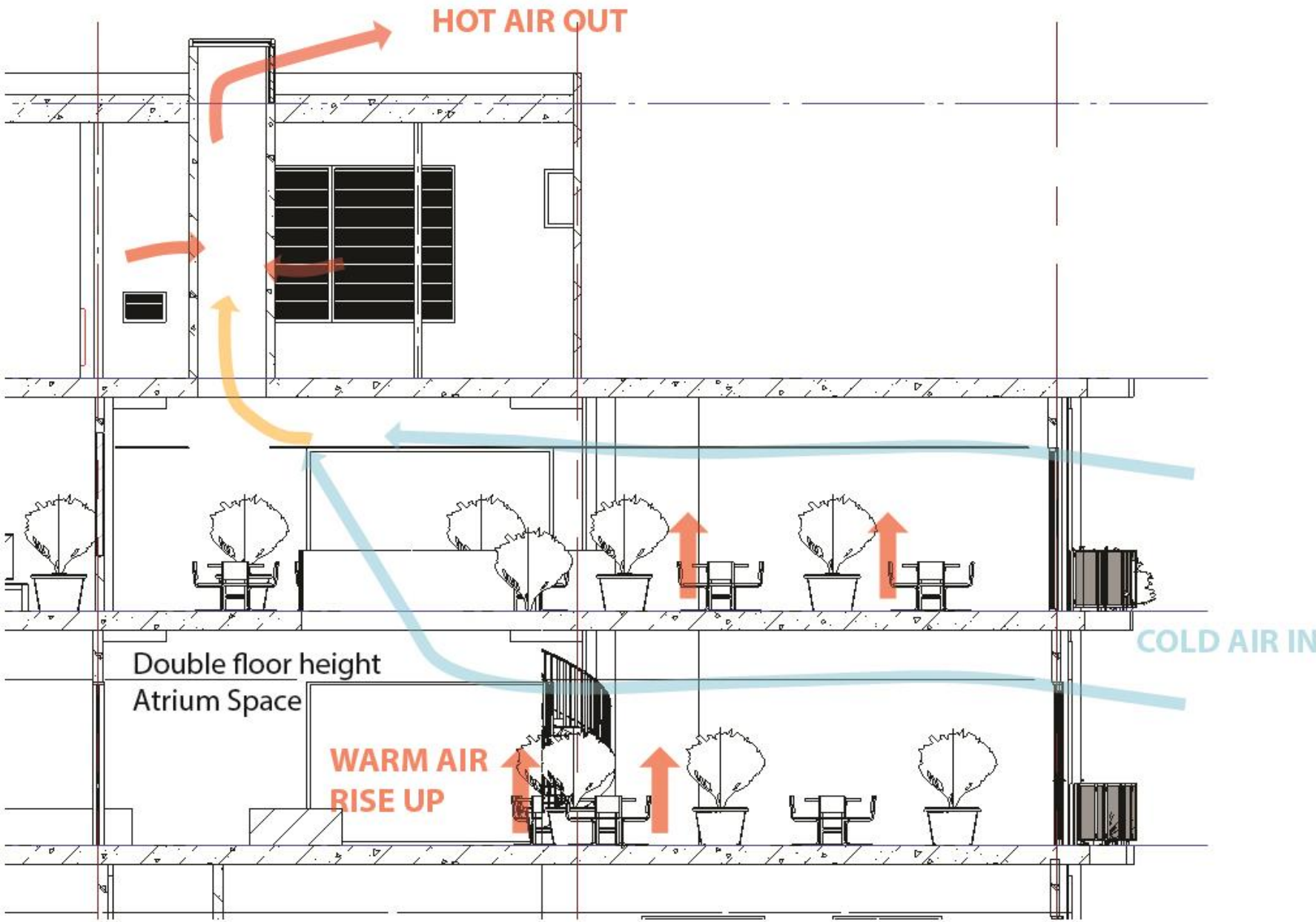
ENVIRONMENTAL FEATURES

Schüco Ventilation System VentoFrame

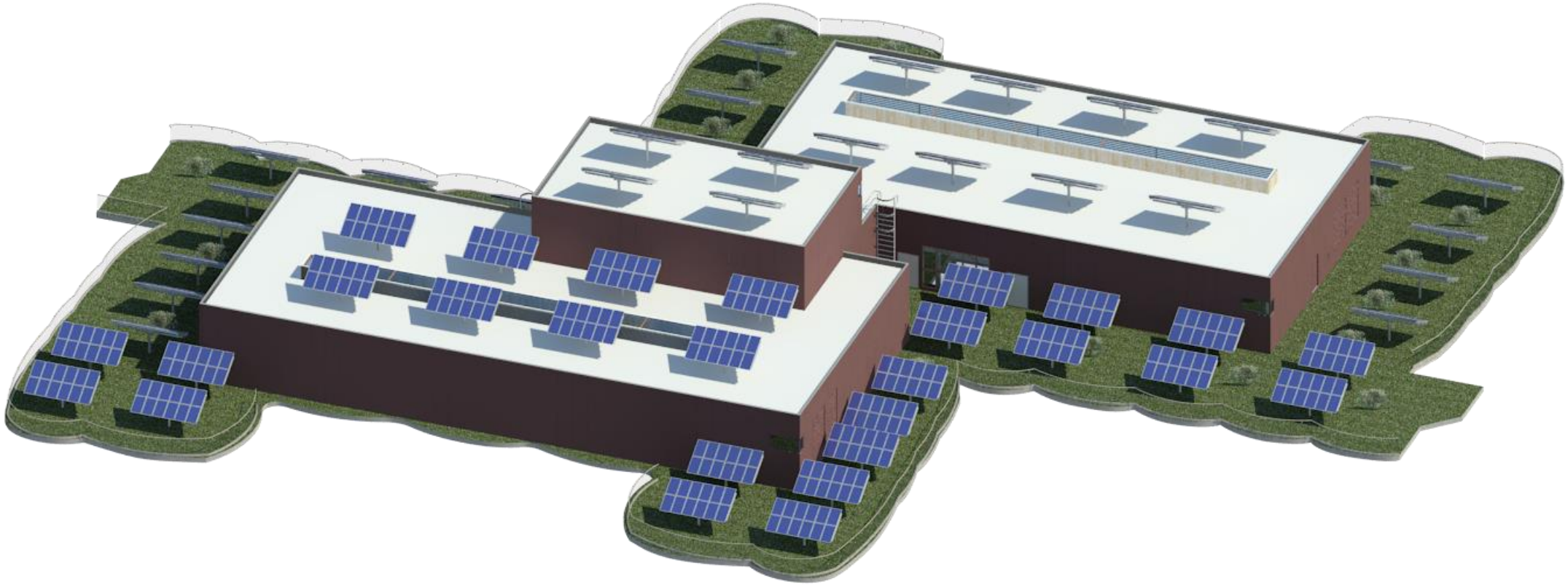
Natural Ventilation Flow on NE &SW facing facade(Patient Rooms)



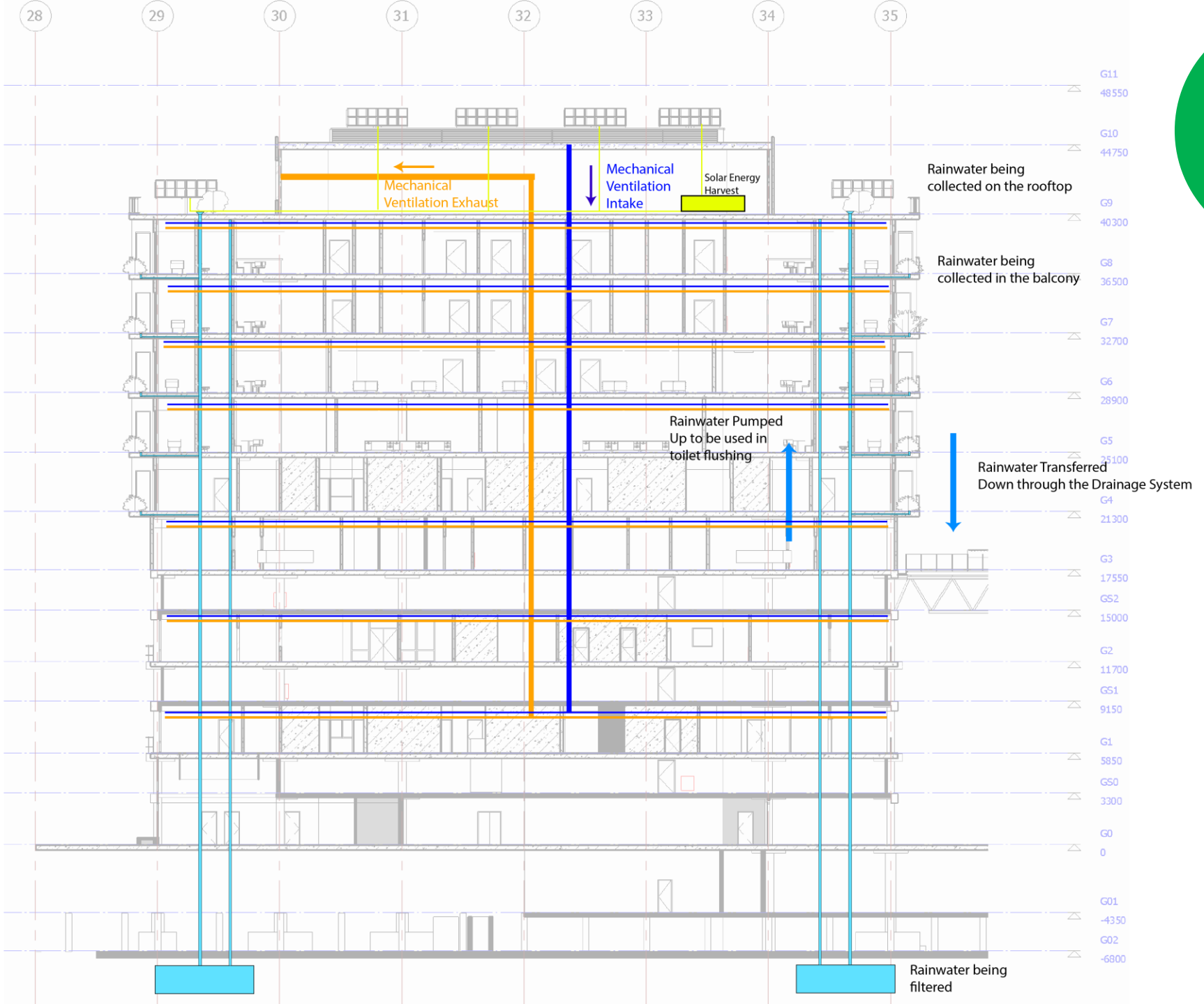
Natural Ventilation Flow on North West facing facade(Double Floor Height Atrium Space)



Solar Panel installed on the rooftop to generate renewable energy



PLACE-BASED RELATIONSHIPS




Biophilic Design will become the best investment in future architecture industry