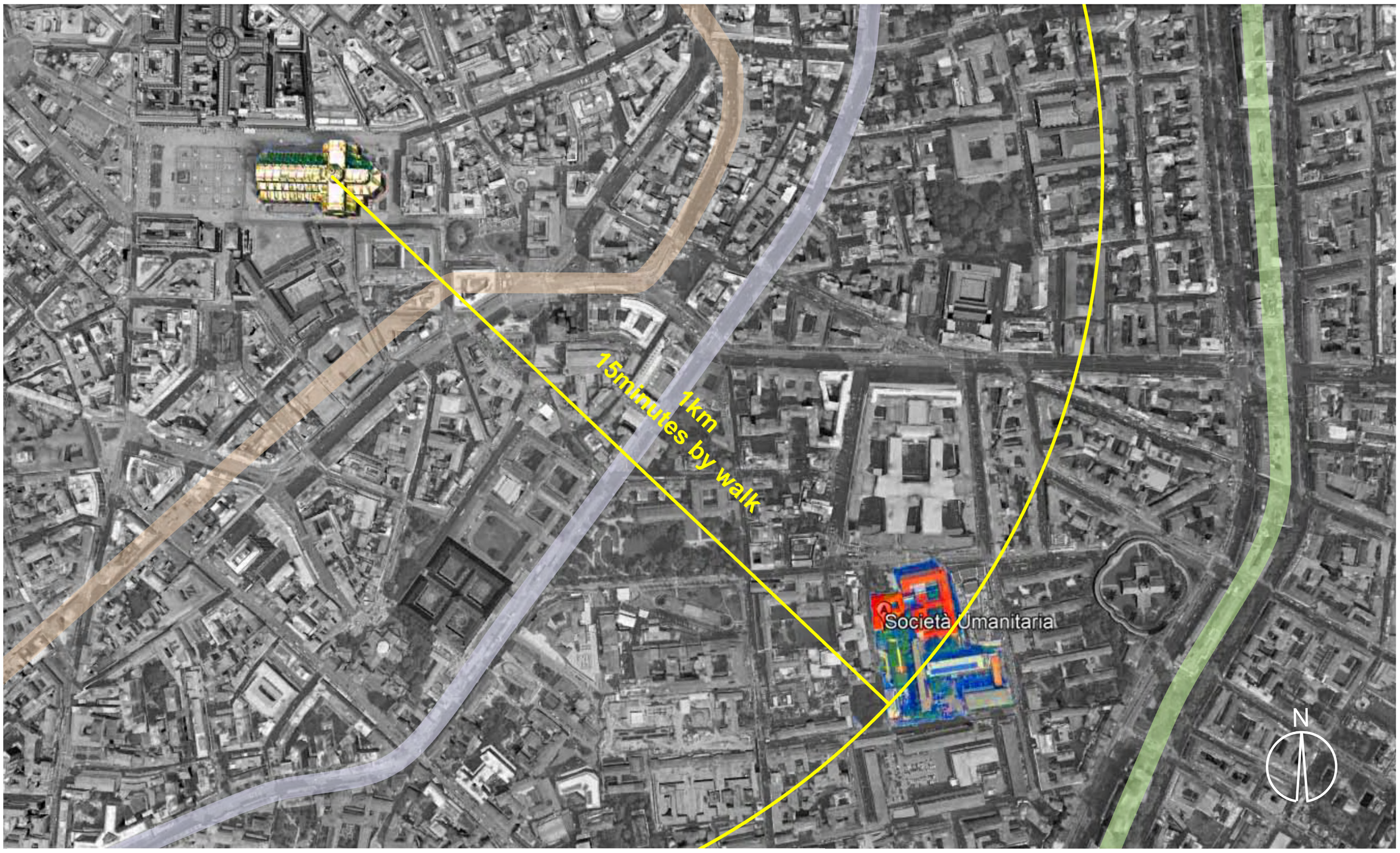
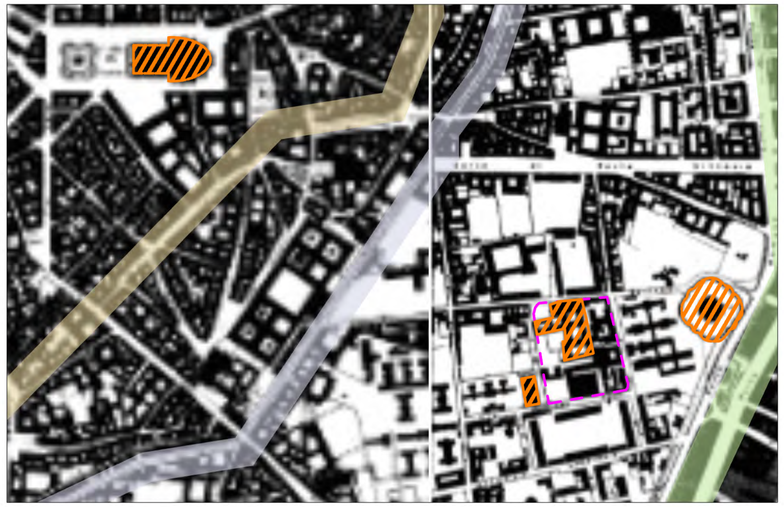


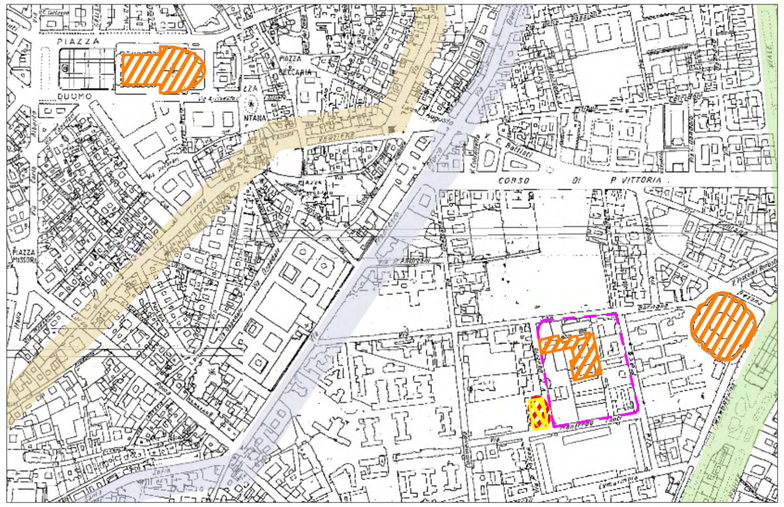
Roman Wall Medieval Wall (12c) Spanish Wall (16c)

Duomo and Umanitaria

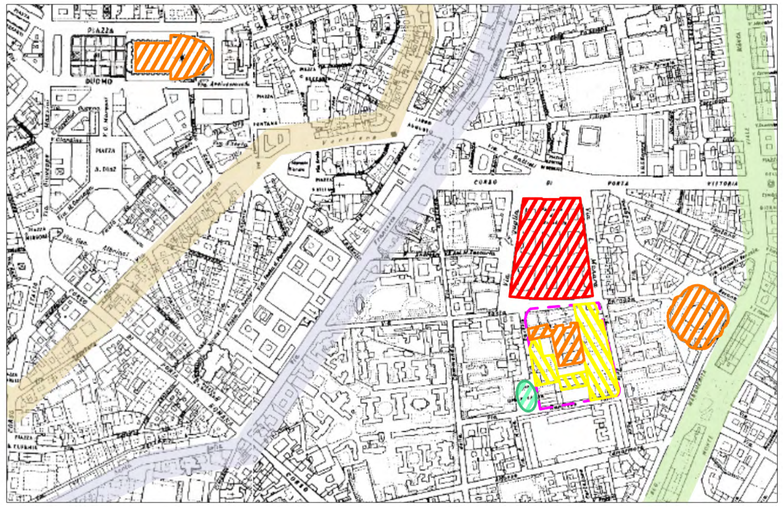
Project Site and Historical Building (Convitto)



1910, PRG, Comune di Milano

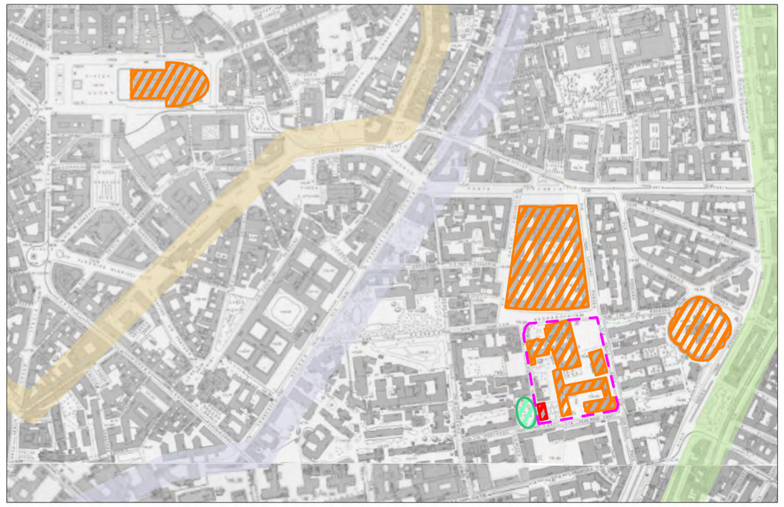


1930, CTC, Comune di Milano



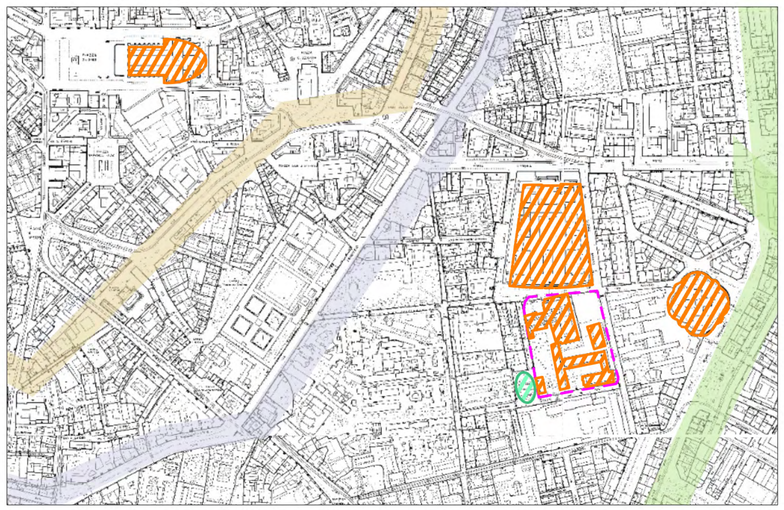
1946, CTC, Comune di Milano

1956, PRG, Comune di Milano

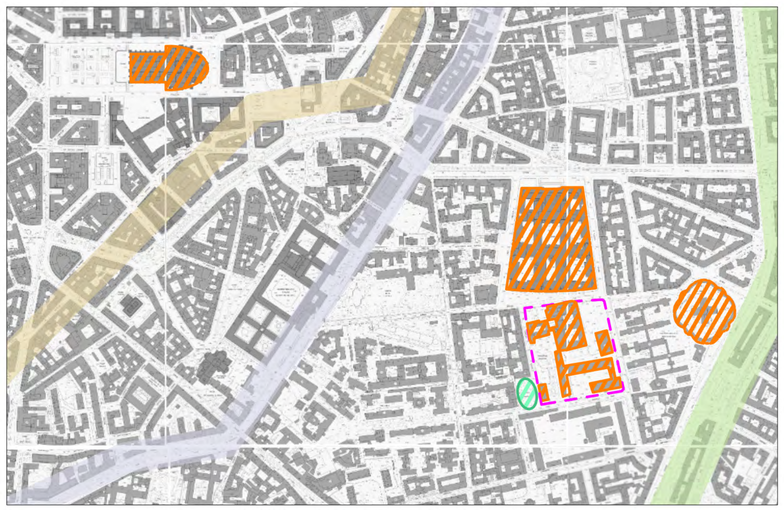


1965, PRG, Comune di Milano

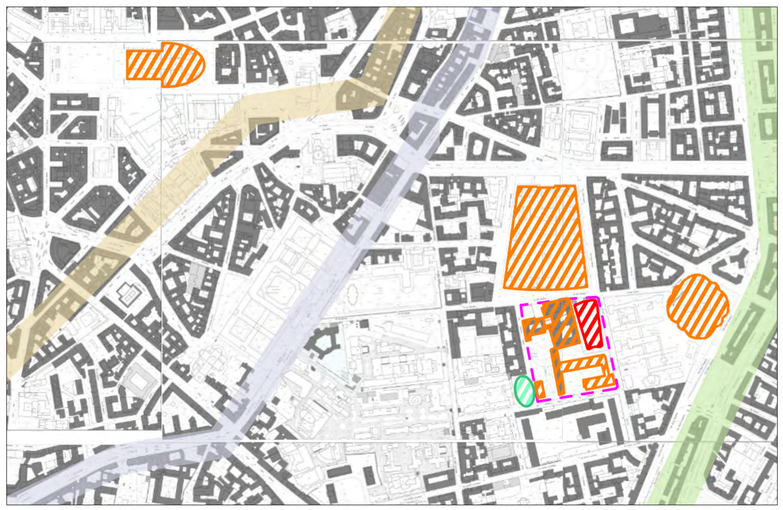
1972, PRG, Comune di Milano



1990, PRG, Comune di Milano



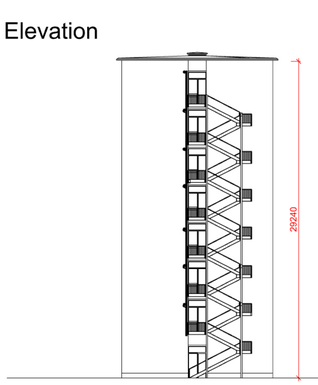
2006, PRG, Comune di Milano



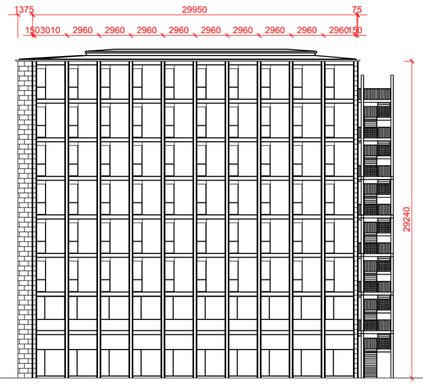
2012, PRG, Comune di Milano

Legend : Project Site : Notable Existing Element : Notable Demolished Element : Notable New Element : Piazza Umanitaria Roman Wall Medieval Wall (12c) Spanish Wall (16c)

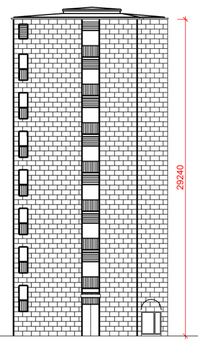
Elevation



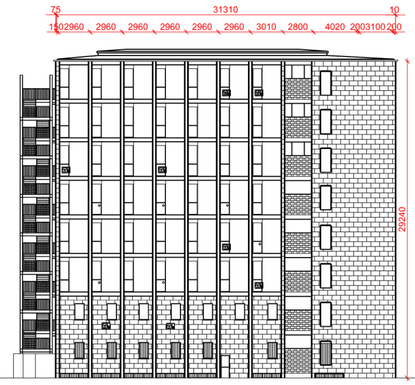
North



East

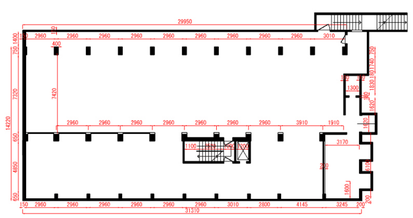


South

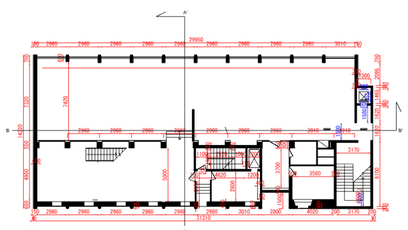


West

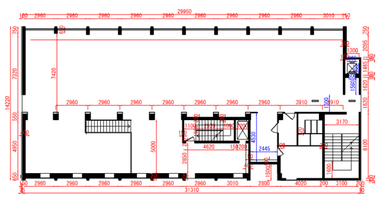
Plan



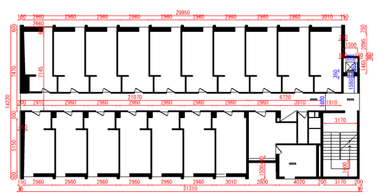
Underground floor



Ground Floor



First Floor



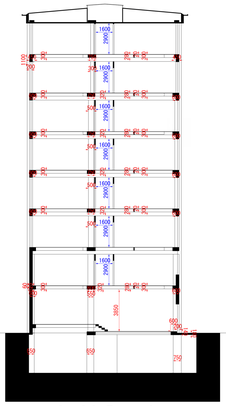
Typical floor

Legend

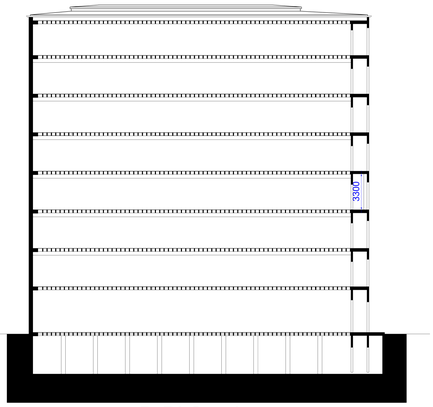
1800 Measured from survey

1800 Measured from drawing

Section

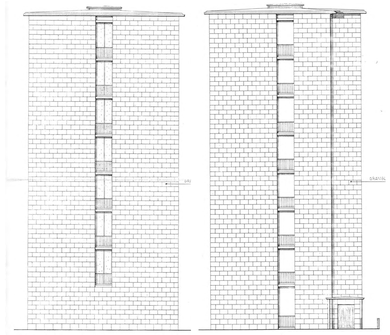


A-A' Section

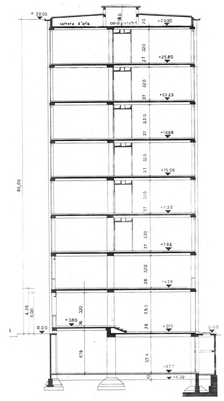


B-B' Section

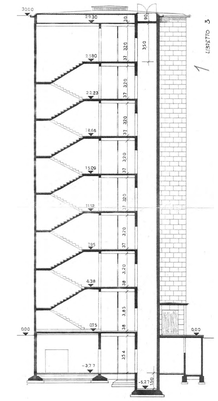
Original Drawing



North/ South Elevation

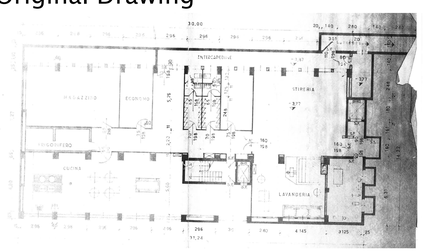


Section

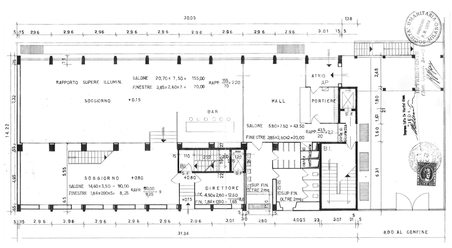


Section

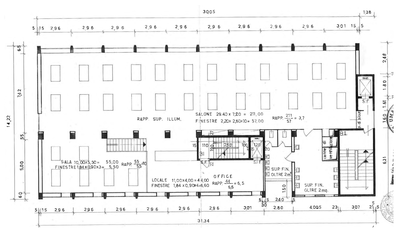
Original Drawing



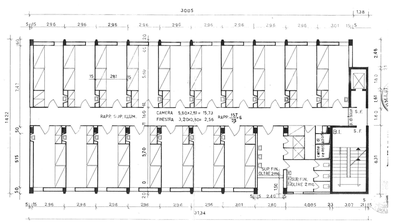
Underground floor



Ground floor

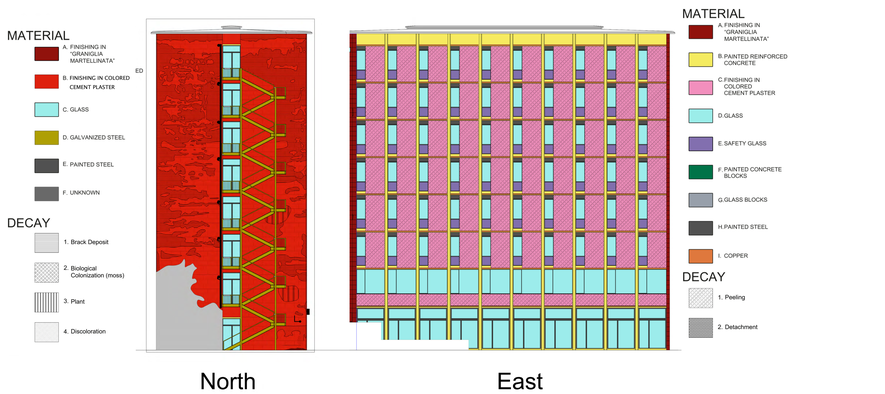


First floor

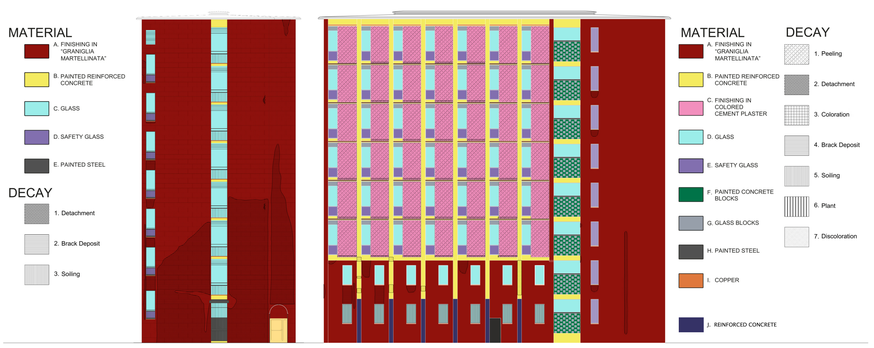


Typical floor

Material and Deterioration Mapping



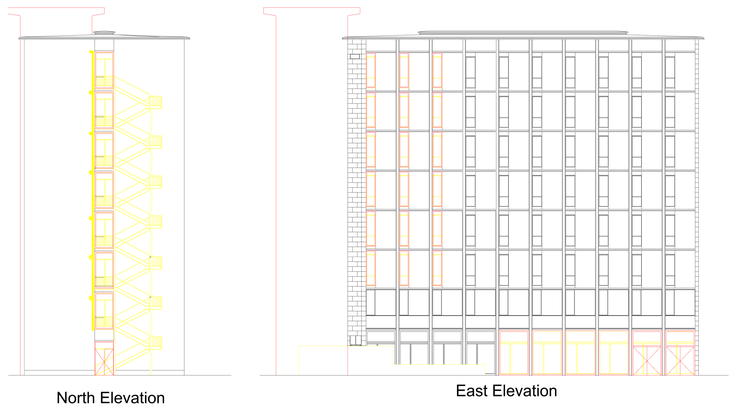
North East



South West

Photographic Legend: Material

Elevation: Demolition and Construction



North Elevation East Elevation

South Elevation West Elevation

Photographic Legend: Deterioration

Peeling Detachment Discoloration Biological Colonization (moss) Black Deposit Soiling Coloration Plant

Intervention

North
Comment
North Facade is one of most visible facade for students, but is spoiled by staircase. Plus, original drawing indicates this wall should be rendered by tile or stone tiles, however, now now it is simply painted.

Putting tiles might be one of choises to intervene this side. However, I could not conclude to the question that What Kind of Reconstruction Should be Executed and Why.

As an "invader" of this historical building,I admid my limit, and decided to implement conservative simple intervention towards this side.

Problem
1. Visible Facade But Spoiling The Value By Staircase
2. Biological colonization
3. Discoloration
4. Black Deposit

Intervention
1. Remove Staircase
2. Remove Plants
3. Remove Unusuful Machines
4. Replace Door, Insert Fixed Glass
5. Replace Door with new one
6. Clean wall with Nebulized Water
7. Paint with similar color to original by using compatible material

EAST
Comment
East Facade is not so visible to the people throughout this project, however, it is this side that is affected severely by new buildings, from material, and spacial point of view.

As the left part of this side will be shaded by new volume,
vertical windows of first to third row from the left will be replaced, in oder to improve the lightness of Common Space.

Several doors on GF will be replaced according to the change of function of GF.

Problem
1. Peeling of Plaster
2. Difficult to observe the situation correctly
3. Facing new volume
4. Micro Climate might change

Intervention
1. Clean general parts
2. Clean carefully plaster parts
3. Attach the detached plaster with compatible one
4. Coating with silica

5. Painting Pillar

6. Replace windows
7. Replace doors

South
Comment
Basically, this facade is not very dirty such as North facade, however black deposits are found on certain area of this wall.

Most important thing to be mentioned is that the the rebar of the RC wall is exposed to external air.

When the intervention of filling the detached part with mortar, the compatibility should be checked.

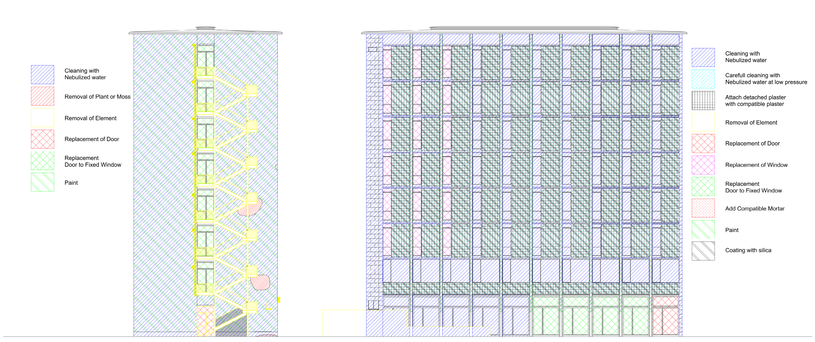
Problem
1. Black Deposit
2. Rebar is exposed to outside air

Intervention
1. Remove existing door and its roof
2. Clean wall with Nebulized Water
3. Clean the detached part with Nebulized Water at low pressure
4. Add Compatible Mortar

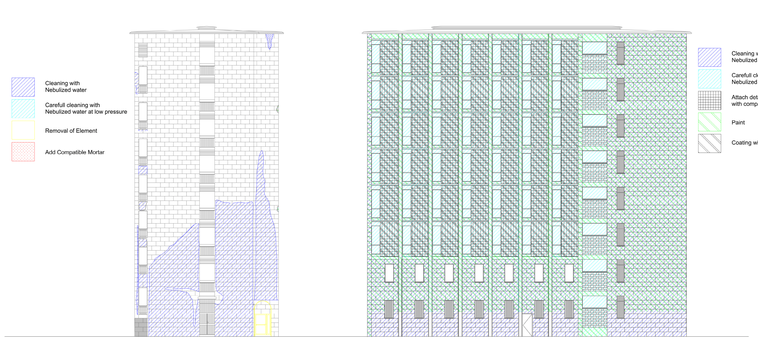
WEST
Comment
West is the best side to recognize the nice facade design of this historical building. Thus, the intervention should be considered very carefully.

For instance,
Discoloration of the painted pillars can be found only part of them, however, I decided to pain them from certain line to the top continuously. If only parts of them are painted, the vertical design would be spoiled. Therefore, in oder to maintain the vertical impression, it should be painted continuously.

Problem
In East Part, most parts are 1. Peeling of Plaster
Cleaned with Nebulized Water 2. Discoloration and Soiling
(not at low pressure), and only
limited parts pf them are Cleand Intervention
at Low Pressure carefullym in 1. Clean carefully at low pressure
oder to underline the impotance 2. Attach the detached plaster
of the treatment of Plaster part. with compatible one
3. Coating with silica
However in this side, most
of parts are Cleaned at low 4. Painting Pillar (not only discolored part)
pressure carefully, because this 5. Painting Wall (not only discolored part)
is the most important historical facade of this project.



North Facade East Facade



South Facade West Facade

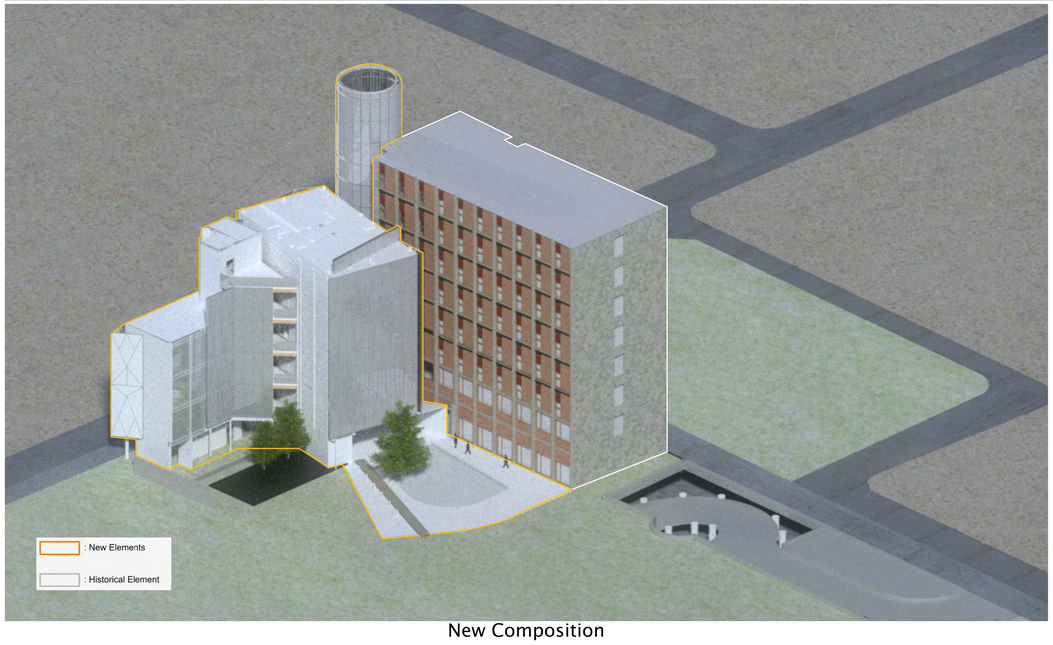
Detail from Existing to Project

After the survey and intervention, new facade gets simple and clean.

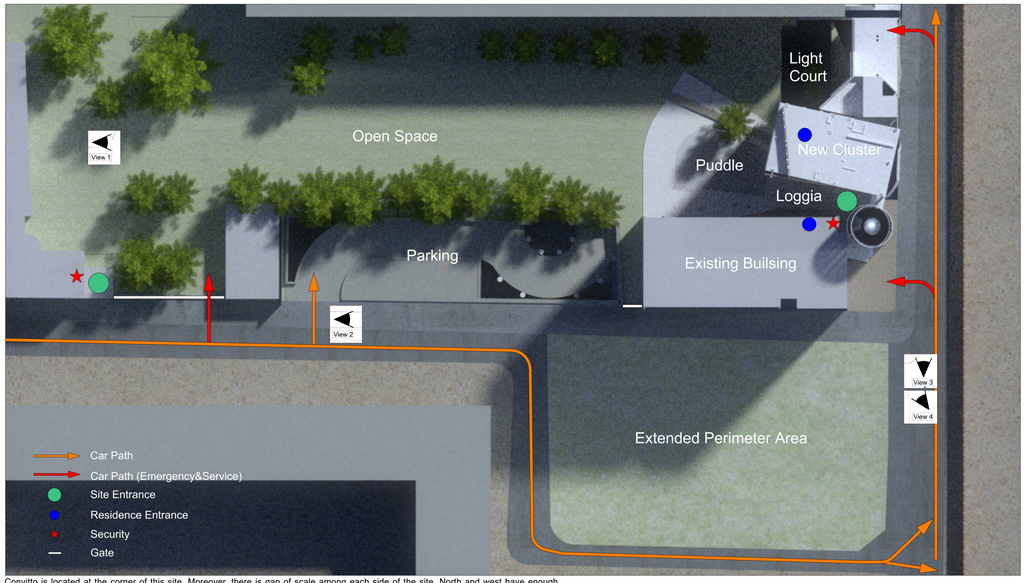
The big difference is the removal of staircase and replacement of the door, and change it to fixed glass.

In East Facade, only several widnows are replaced.

In this elevation, the difference of the intervention against existing window is found.



New Composition



Convitto is located at the corner of this site. Moreover, there is gap of scale among each side of the site. North and west have enough distance to see the tall buildings, on the contrary, East and South side has less. Therefore, the key of this project is to solve the complexity of this heterogeneous given condition.

Site Plan

View 1

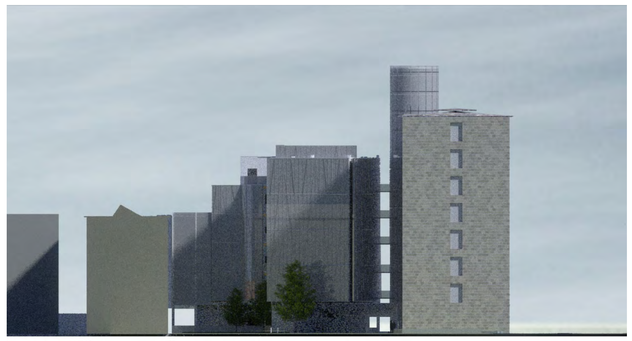
View 2

View 3

View 4

Elevation

South Elevation



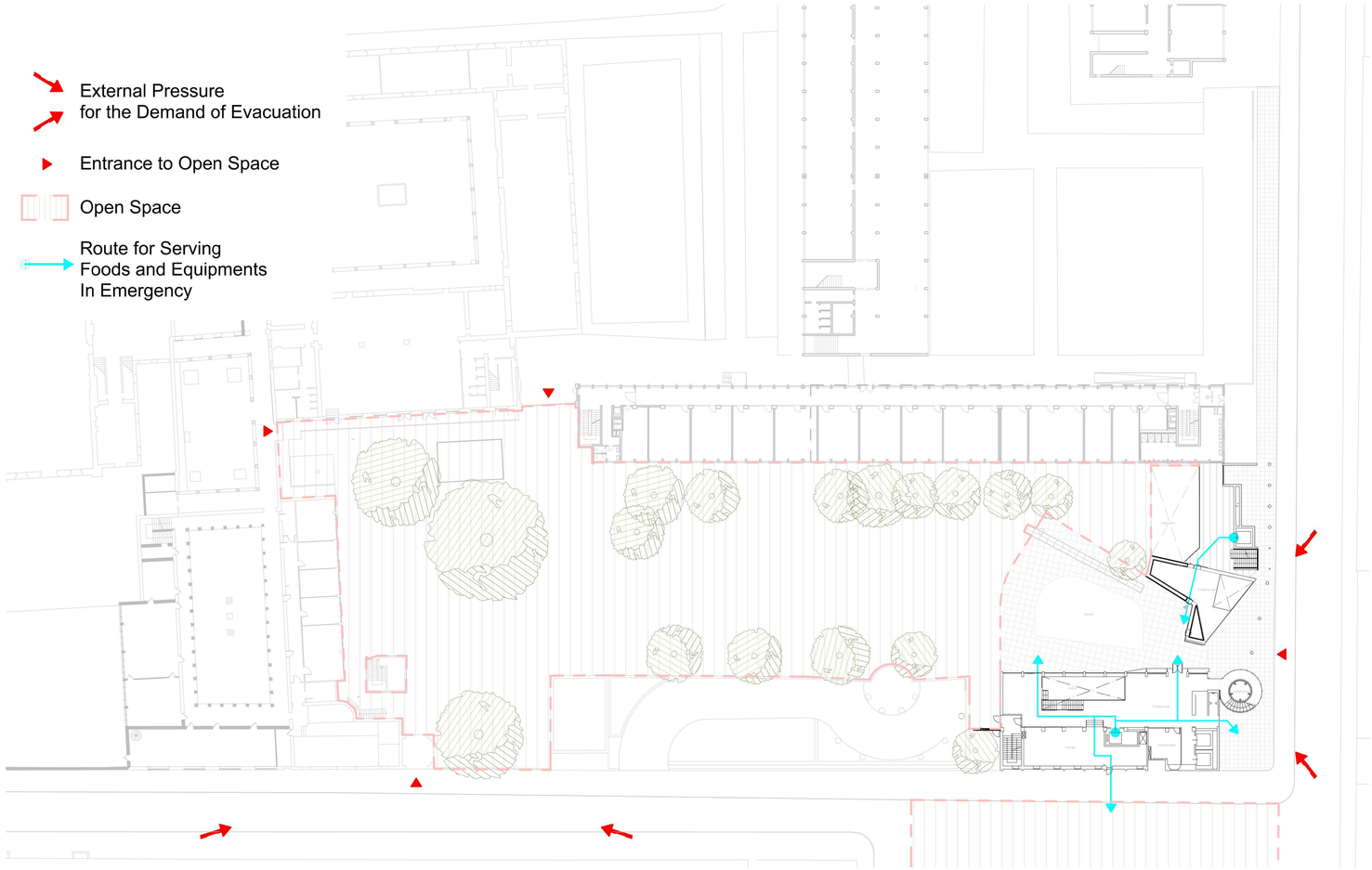
North Elevation

East Elevation

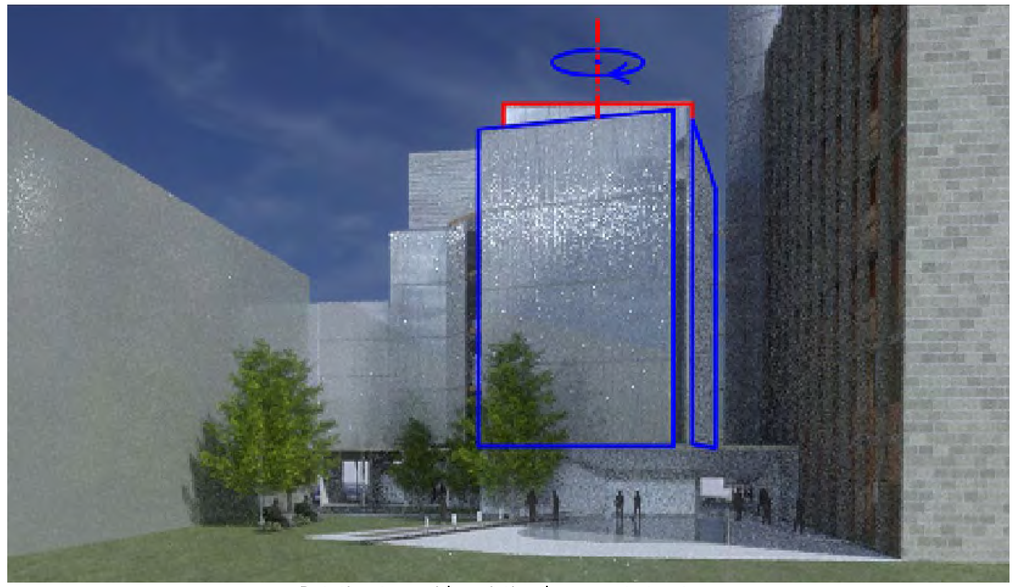
West Elevation

Urban Section

Site Plan

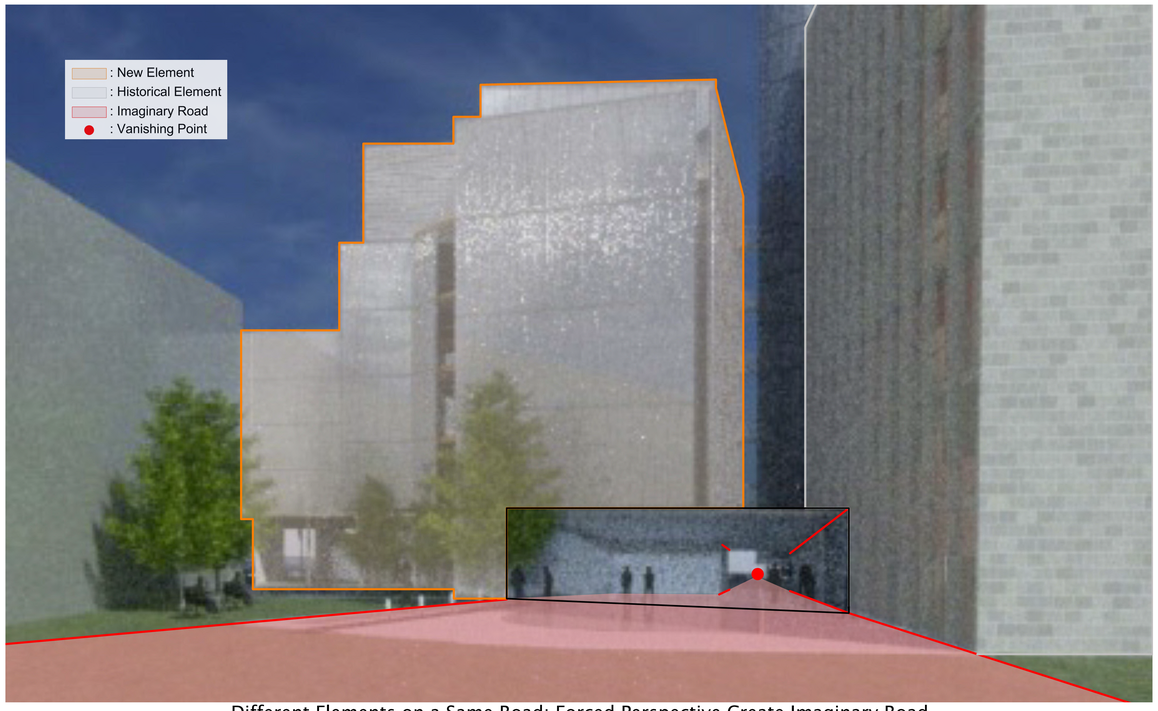


Design Approach: Avoide Existing Structure of Underground Prking Lot by Rotation



Rotation to avoide existing basement structure

Design Approach: Create Imaginary Road by Forced Perspective

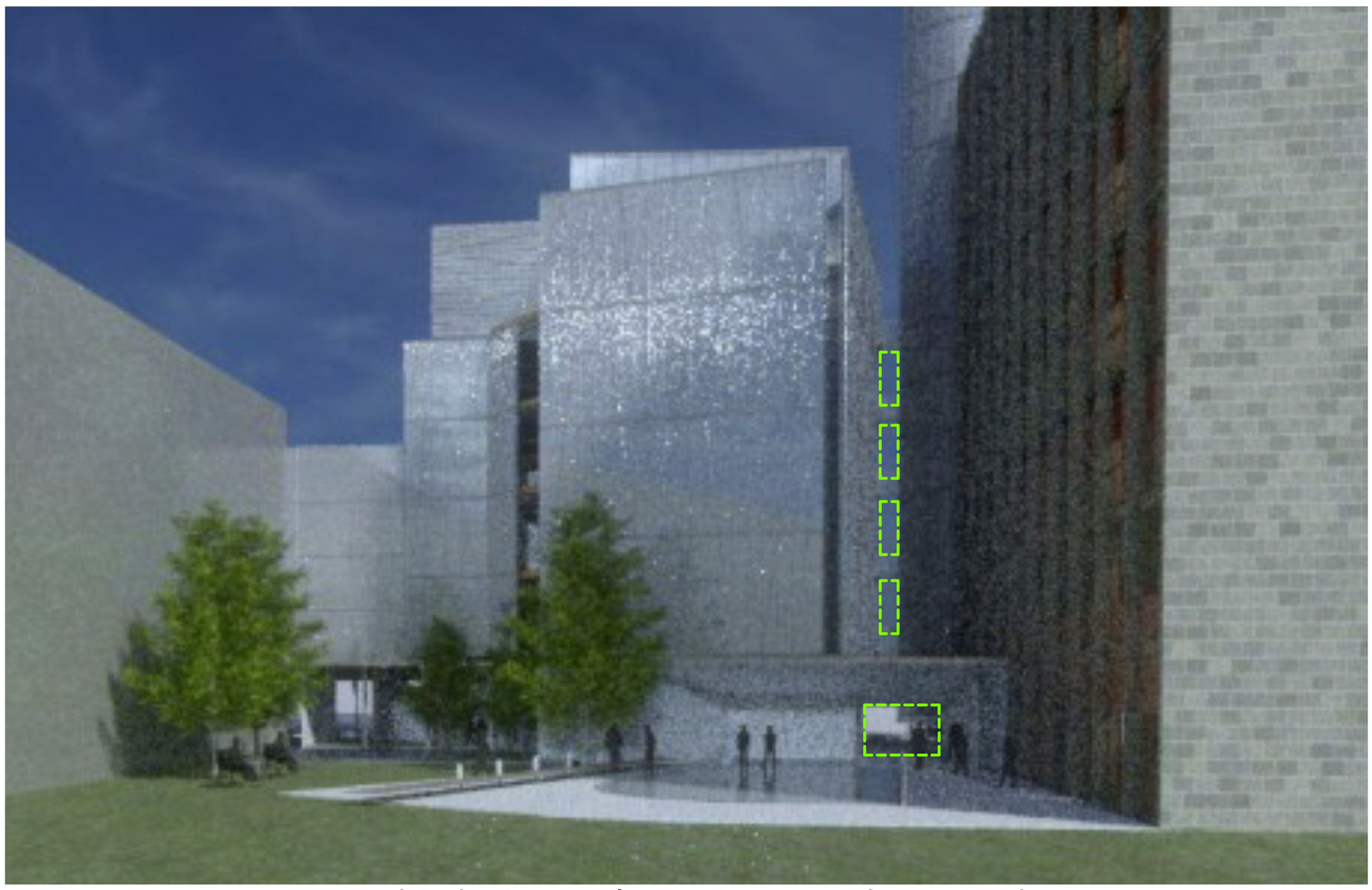


Different Elements on a Same Road; Forced Perspective Create Imaginary Road

Road leads to Future

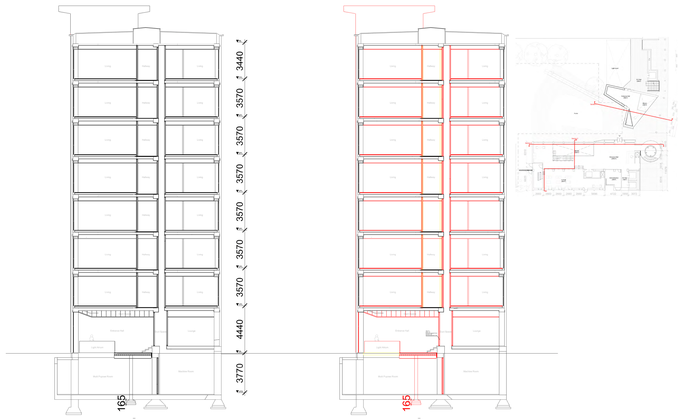
New and Historical : Distinguishable Profile

New and Historical : New Volume Covers a Part of Historical Building

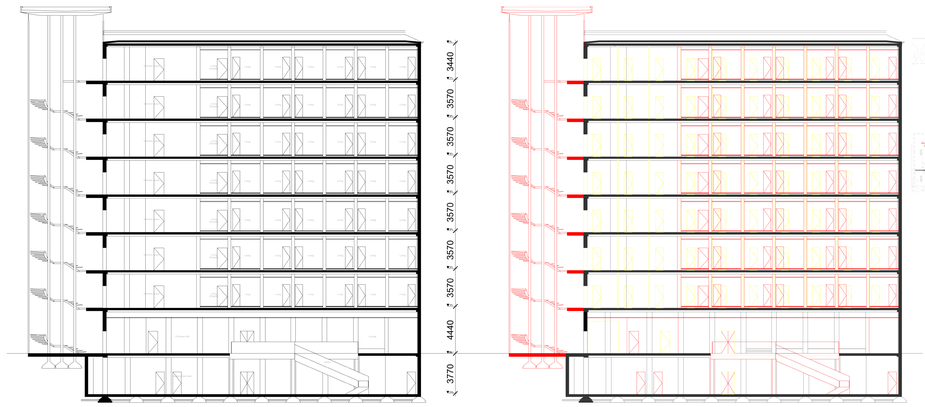


Wind Path : Micro-Climate Does Not Change Much

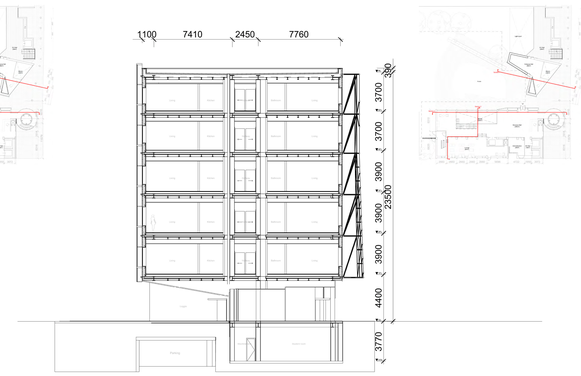
Section



5. Existing Section2 (+Demolition/Construction)

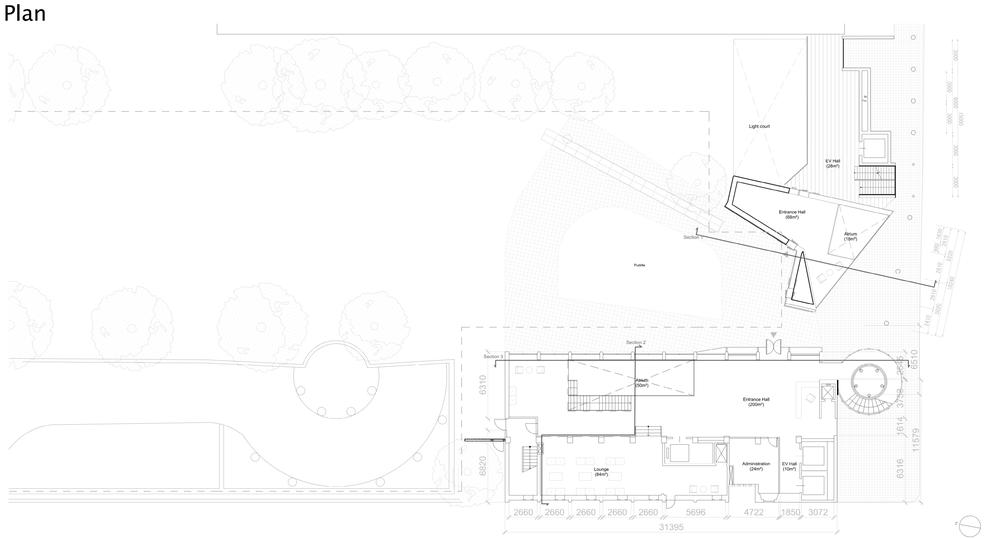


5. Section3 (+Demolition/Construction)

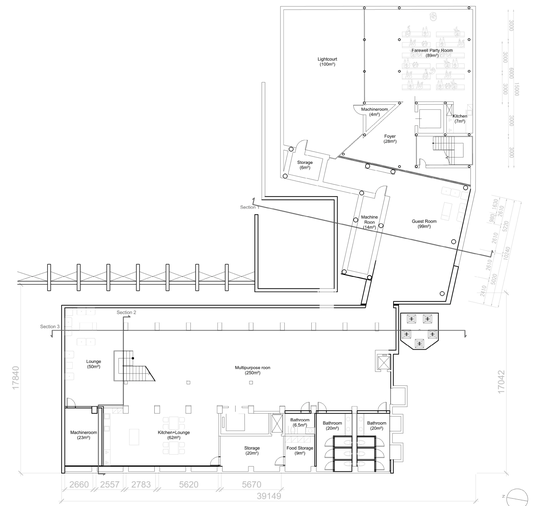


5. Section1

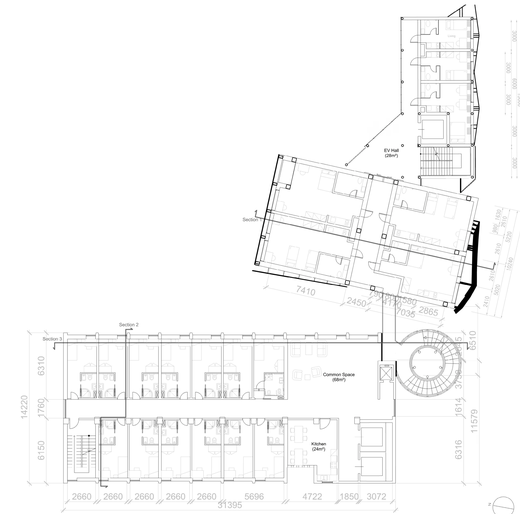
Plan



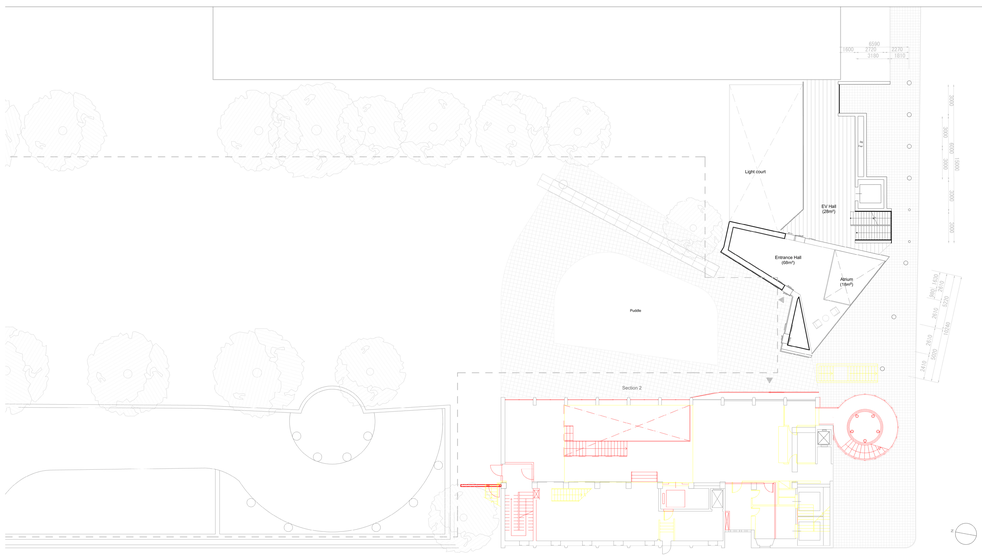
1. GF Plan



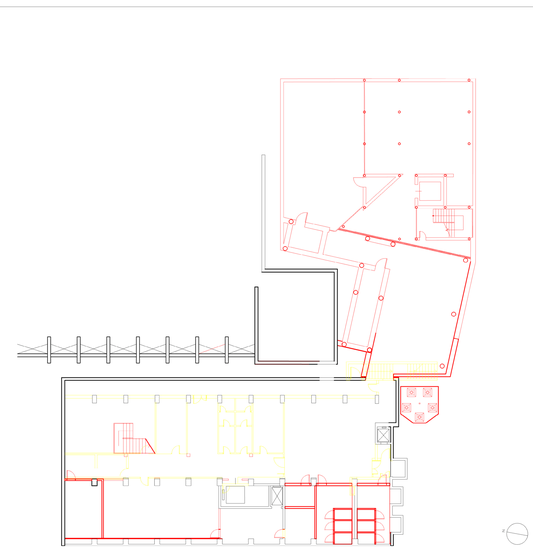
2. UGF Plan



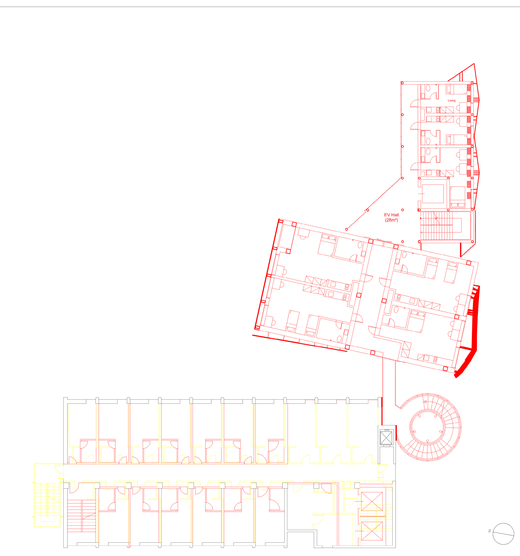
3. Typical Floor Plan



1. GF Plan (Demolition/Construction)

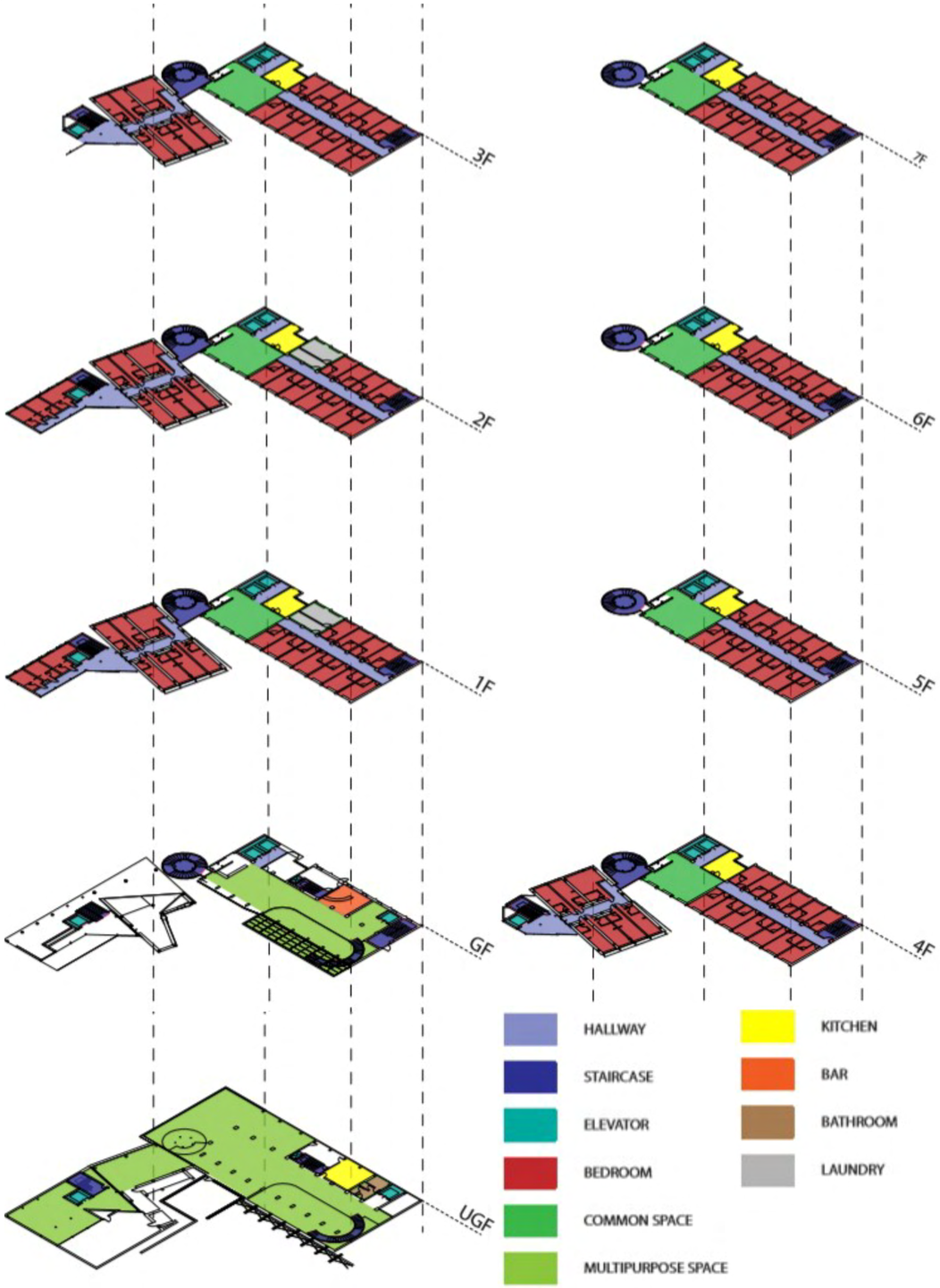


2. UGF Plan (Demolition/Construction)



3. Typical Floor Plan (Demolition/Construction)

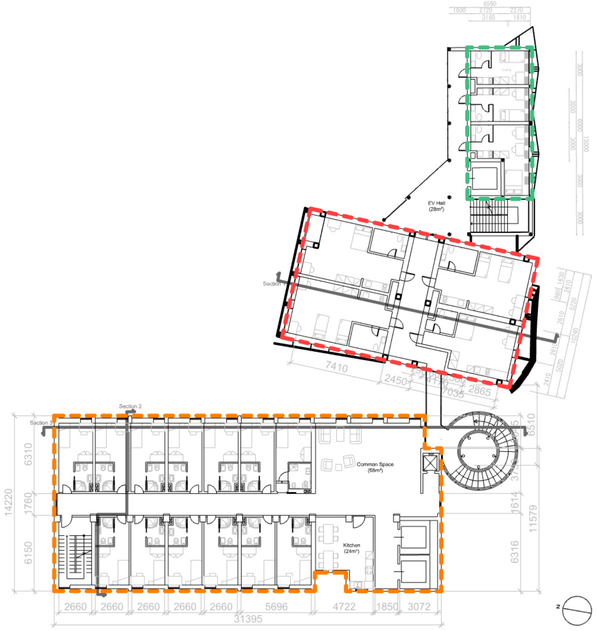
Program

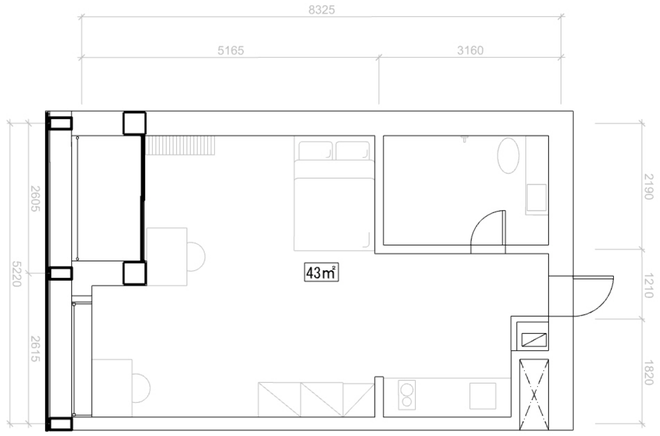


Type	Common Space	Residence	Service	Public
%	47%	35%	2%	16%
Total Area	6494. 8 ㎡			
Total Increase	2566 ㎡			
Total Bed	137 (149)			

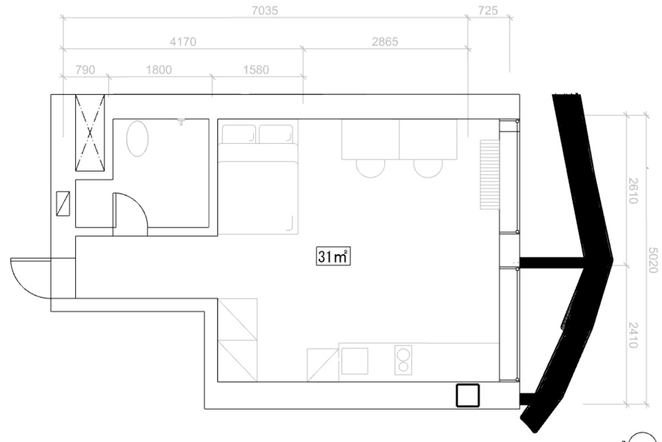
Standard Rooms

Type1(Left): Single Room without Kitchen
Type2(Right): Universal Single Room

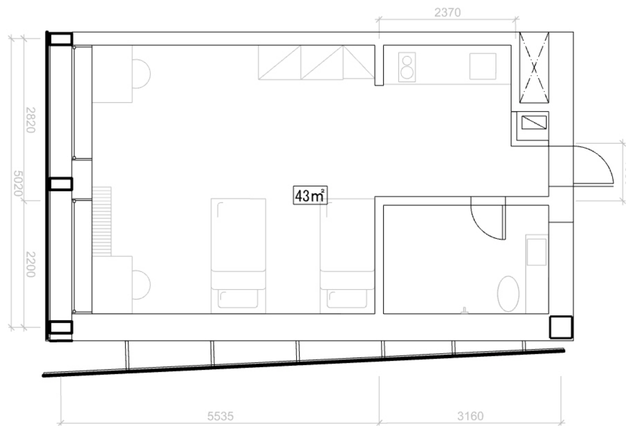




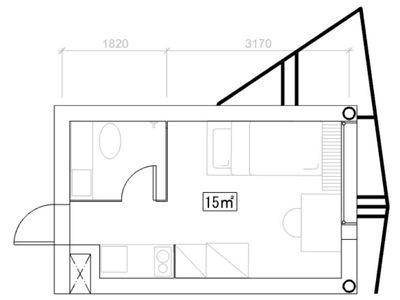
Type3: Double Room with Balcony



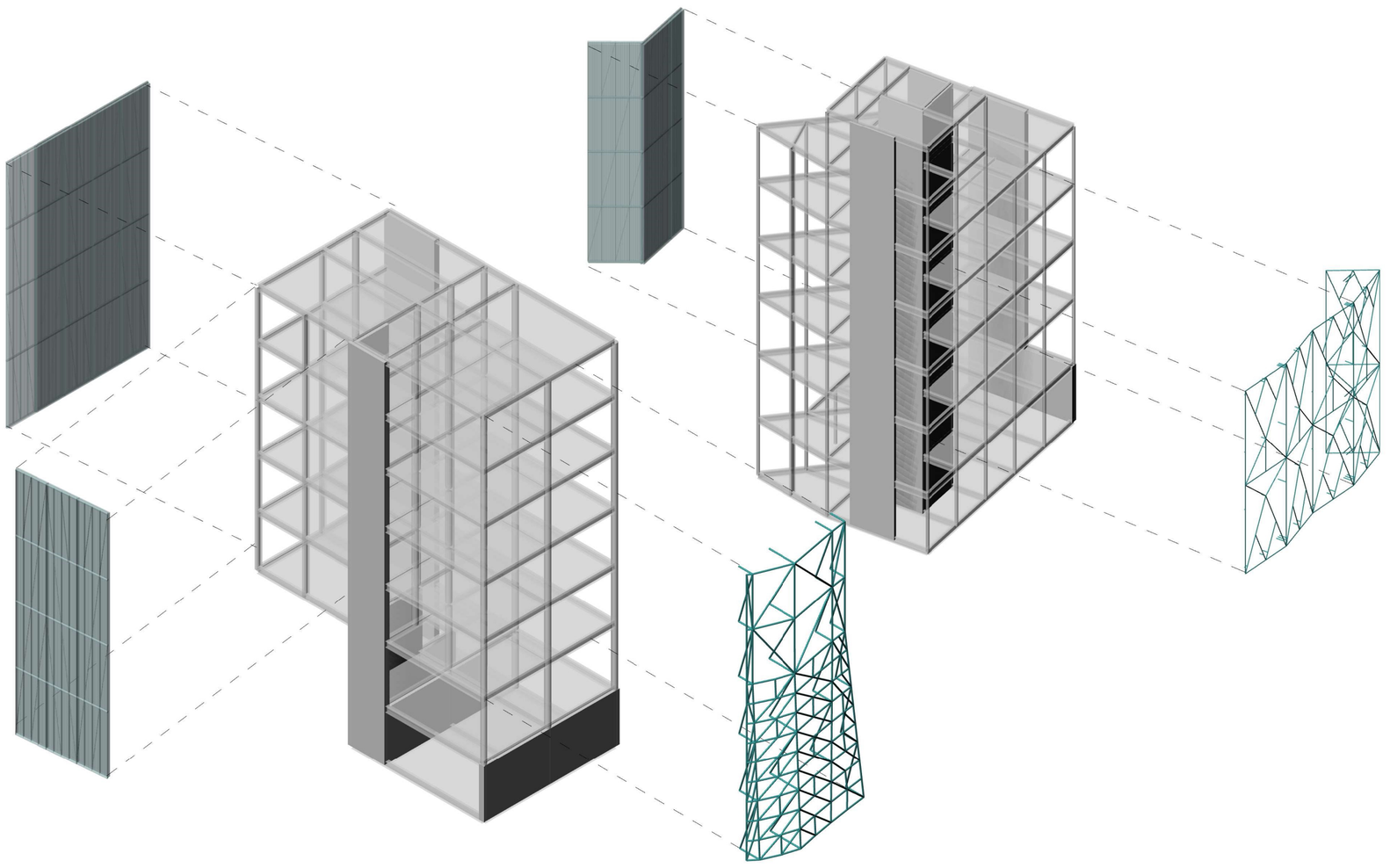
Type5: Double Room with Larger Kitchen



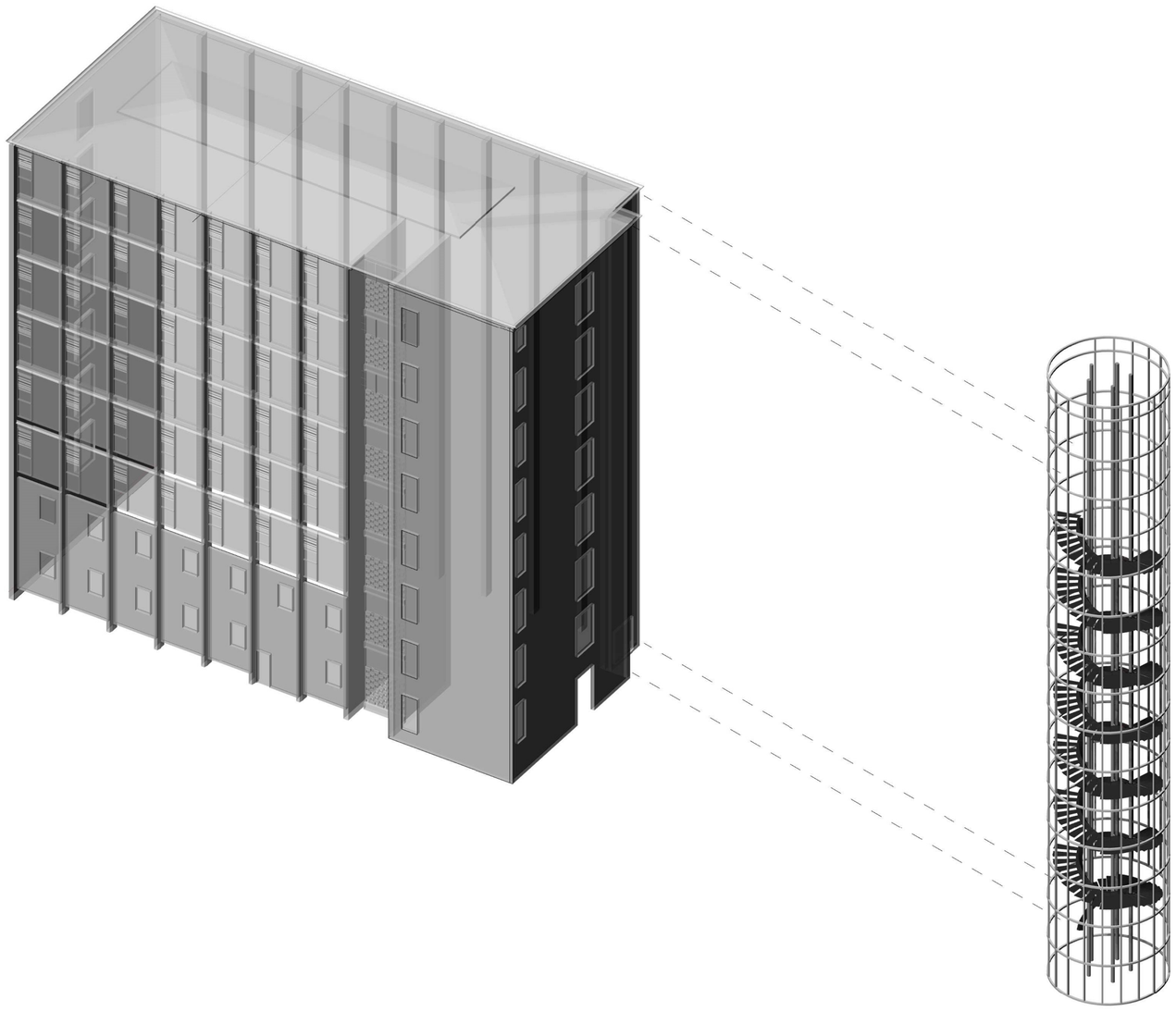
Type4: Double Room



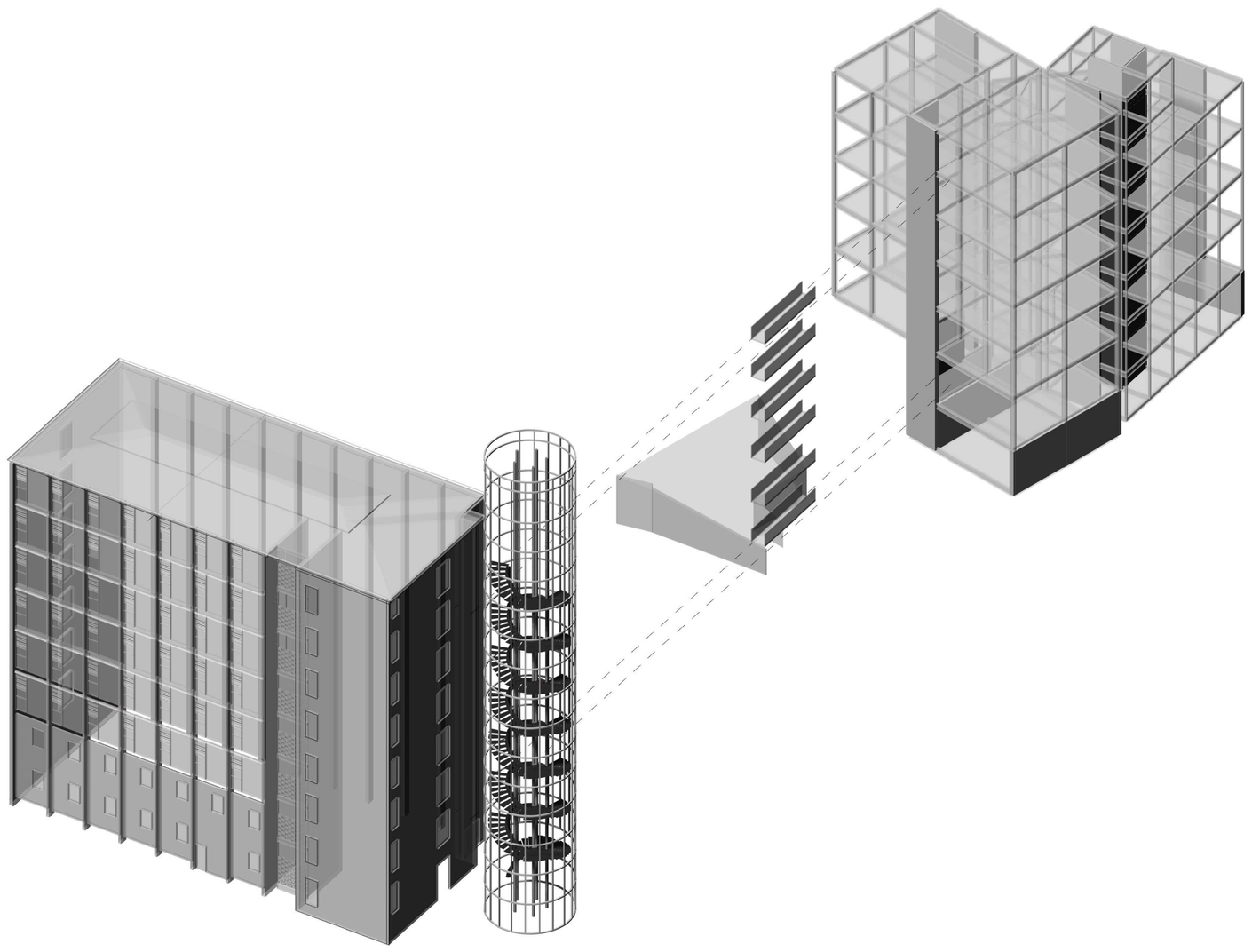
Type5: Single Private Room with Kitchen



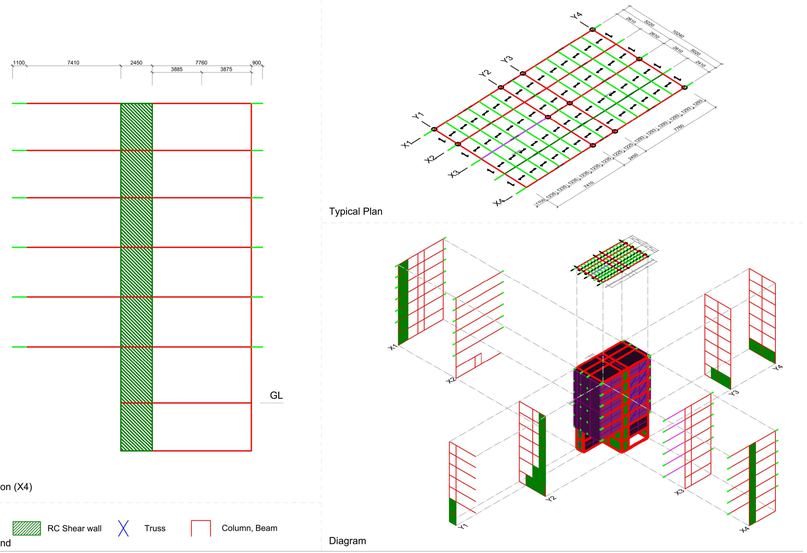
Structure System



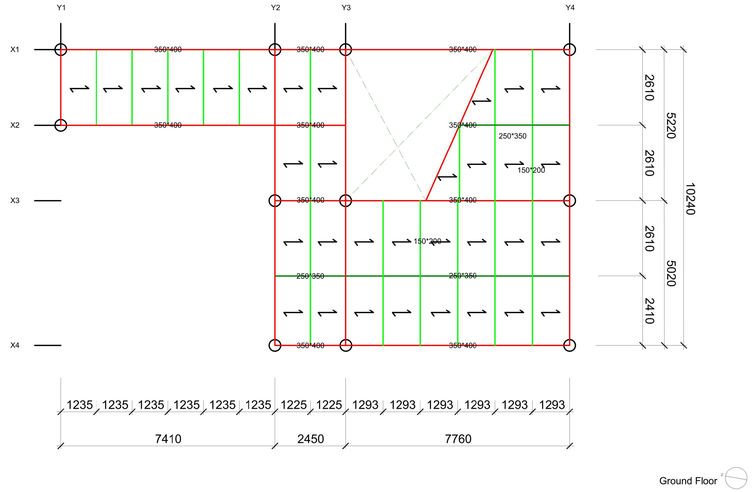
Structure System



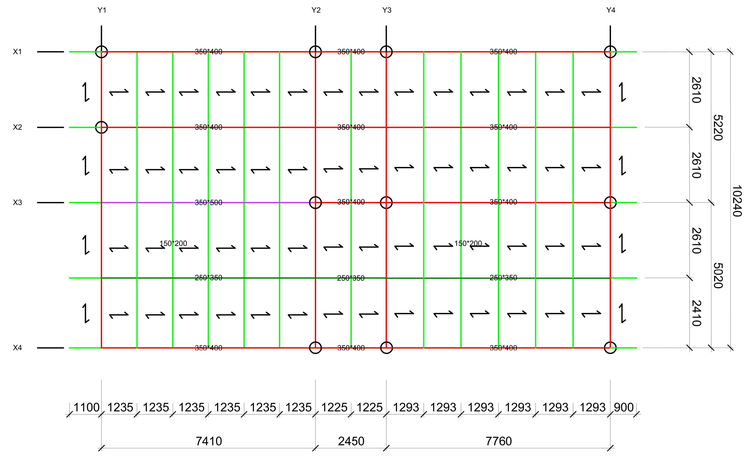
Structure System



Structure System (Vertical Building)



GF Structure Plan (Vertical Building)



Typical Structure Plan (Vertical Building)

Material
In this simulation, SS400 is selected for steel structure, RC(Fc39) is chosen for concrete wall, Light Wight Reinforced Concrete is applied to slab.
Acceptable stress of JIS SS400 is 235 [N/mm²].

Load
DL: Dead Load
The following value of dencity will be used to calculat the Dead Load on Midas,
with the definition of Thickness and the area of the Plate on the software.

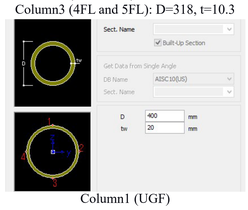
SS400 is about 7.97[g/cm³]
RC is around 2.5 [g/cm³]
LWRC is around 1.8 [g/cm³]
Non structural Internal Wall is 0.124 [g/cm³] as it contains thick insulation
Non Structural External Wall is 0.124 [g/cm³]

LL: Live Load
As the program of this building is residential use, the room is furnished,
1.1[N/mm²] is chosen for the Live Load.

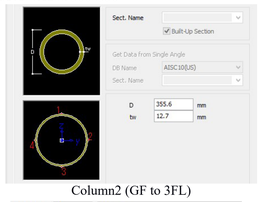
Dead Load					
Inner Wall (between rooms)			Exterior Wall		
	Thickness[mm]	Weight [N/mm3]		Thickness[mm]	Weight [N/mm3]
Finishing	–	–	Finishing	–	–
Plaster	12.5	6.99x10e−6	ALC Panel	150	6.5x10e−6
Lead sheet	1	1.14x1−e−4	Insulation	150	1x10e−8
Insulation	300	1x10e−8	Air	20	–
Lead sheet	1	1.14x1−e−4	Plaster	20	6.99x10e−6
Plaster	12.5	6.99x10e−6	Finishing	–	–
Finishing	–	–	–	–	–
Total		1.24x10e−6	Total		3.48x10e−6
Live Load					
0.01 [N/mm2]					

Material and Load (Vertical Building)

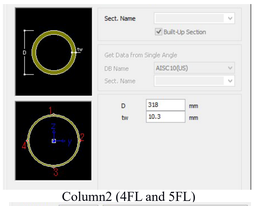
Section
Mainly, there are three types of sections for Columns.
The columns get slender as the level gets heigher, same principal is applied to beam. The specification is described below.
Column1 (UGF): D=400, t=20
Column2 (GF to 3FL): D=356, t=12.7
Column3 (4FL and 5FL): D=318, t=10.3
Primary Beam: 400x350
Secondary Beam: 200x150
Cantilever Beam: 500x350



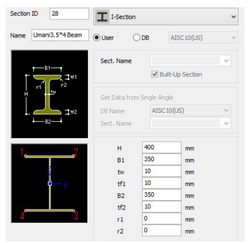
Column1 (UGF)



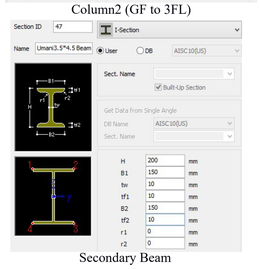
Column2 (GF to 3FL)



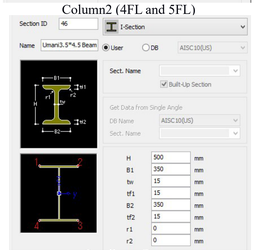
Column2 (4FL and 5FL)



Primary Beam



Secondary Beam



Cantilever Beam

Section (Vertical Building)

Boundary condition and Beam end release
Fix system was chosen for the boundary condition, basically.
Dimention of each element
Inner Wall Thickness: 200 [mm]
Exterior Wall Thickness: 400 [mm]
Slab: 200 [mm]

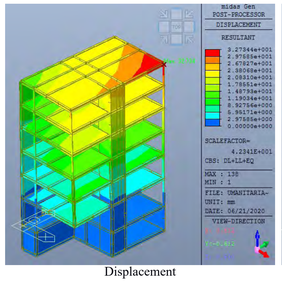
Horizontal forces
This building will be constructed in Milan, and earthquake should be considered. 1.0 coefficient is used.
In addition to earthquake, the effect of wind can not be ignored.
However, in this simulation, it was assumed that both earthquake and strong wind would not

Calculation

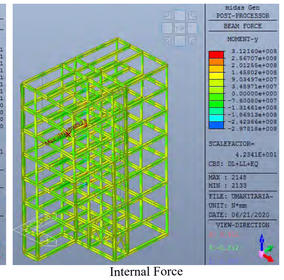
DL+LL+EQ
Allowable displacement value; 7760/200 = 38.8 [mm]
Maximum displacement value; 32.8 [mm] < 38.8 [mm]

Maximum internal forces (M); 312.2 [kN*m]
minimum internal forces (M); -297.8 [kN*m]

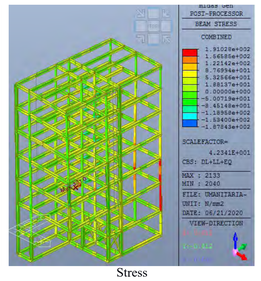
Allowable stress value;
Maximum beam stress; 191.0 [N/mm²] < 235 [N/mm²]
minimum beam stress; -187.8 [N/mm²]



Displacement

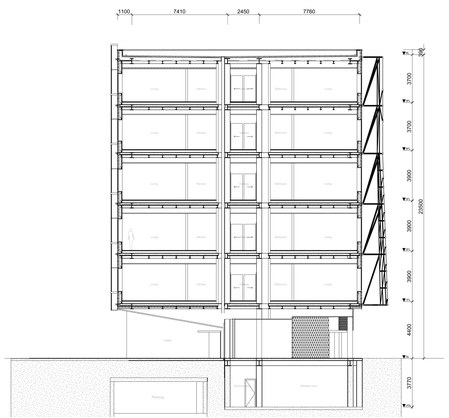


Internal Force



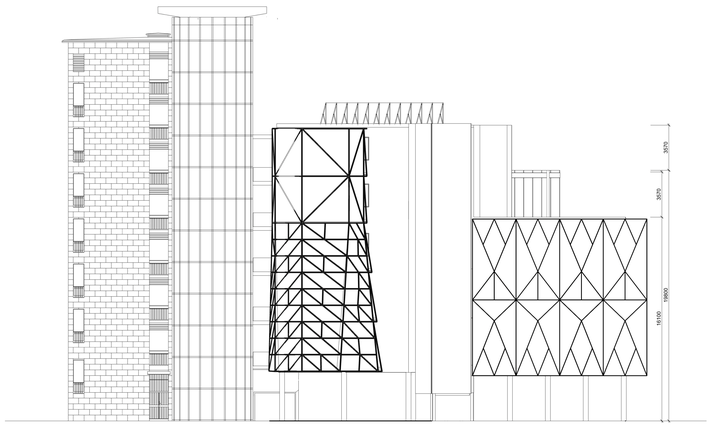
Stress

Structure Analysis (Vertical Building)

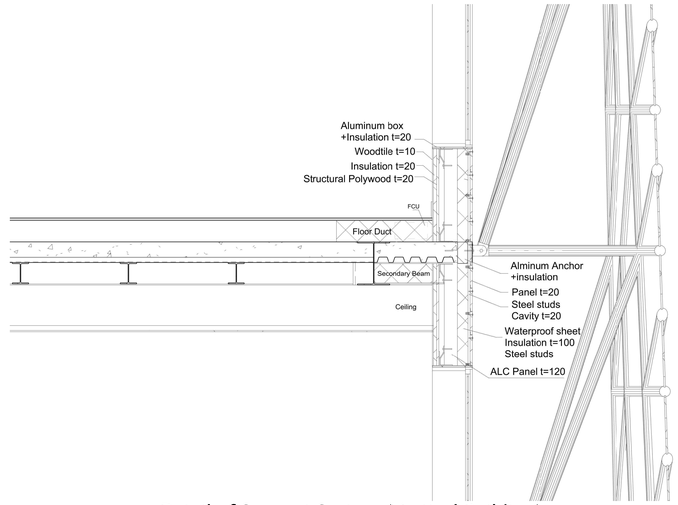


Section (Vertical Building)

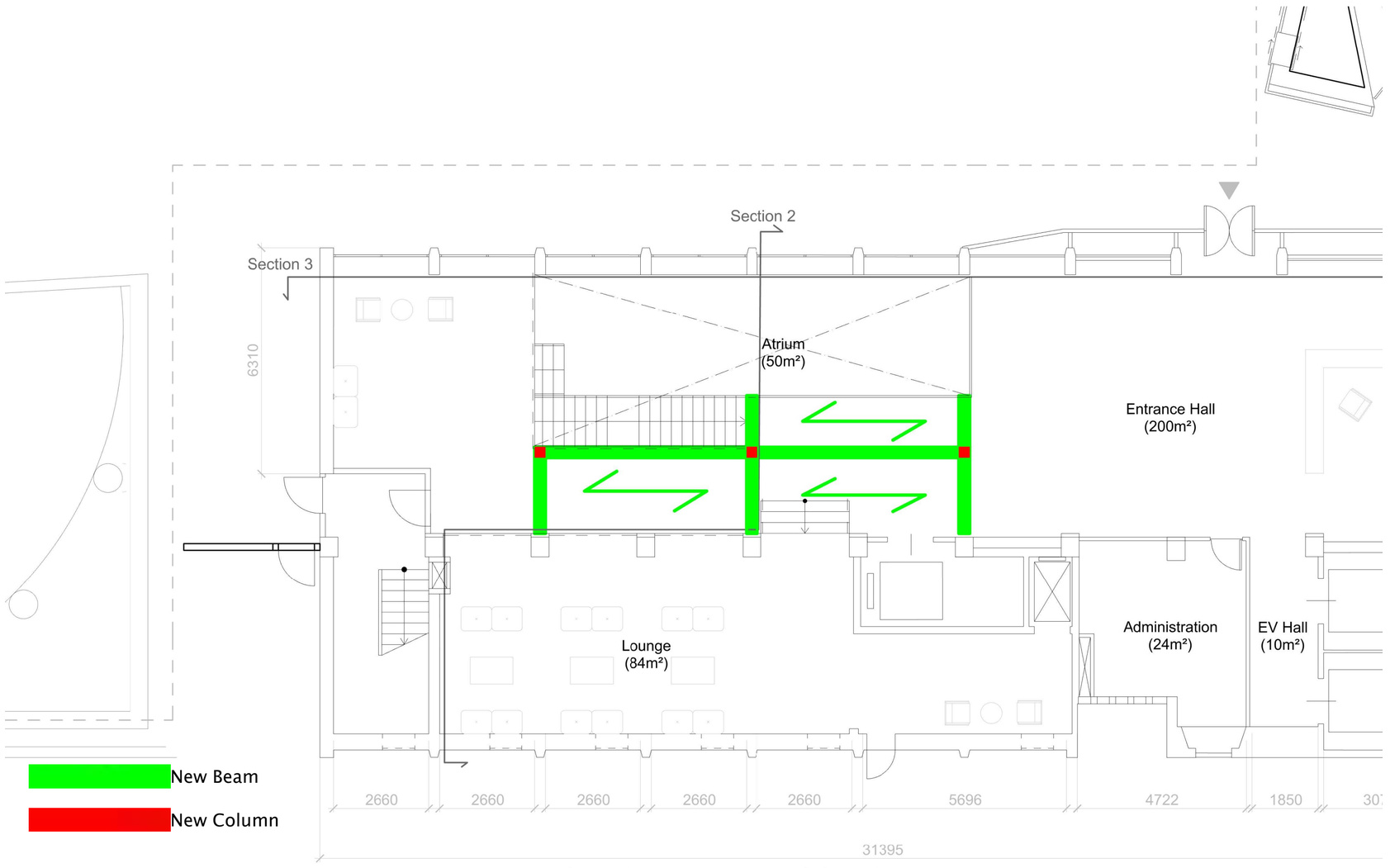
South Elevation



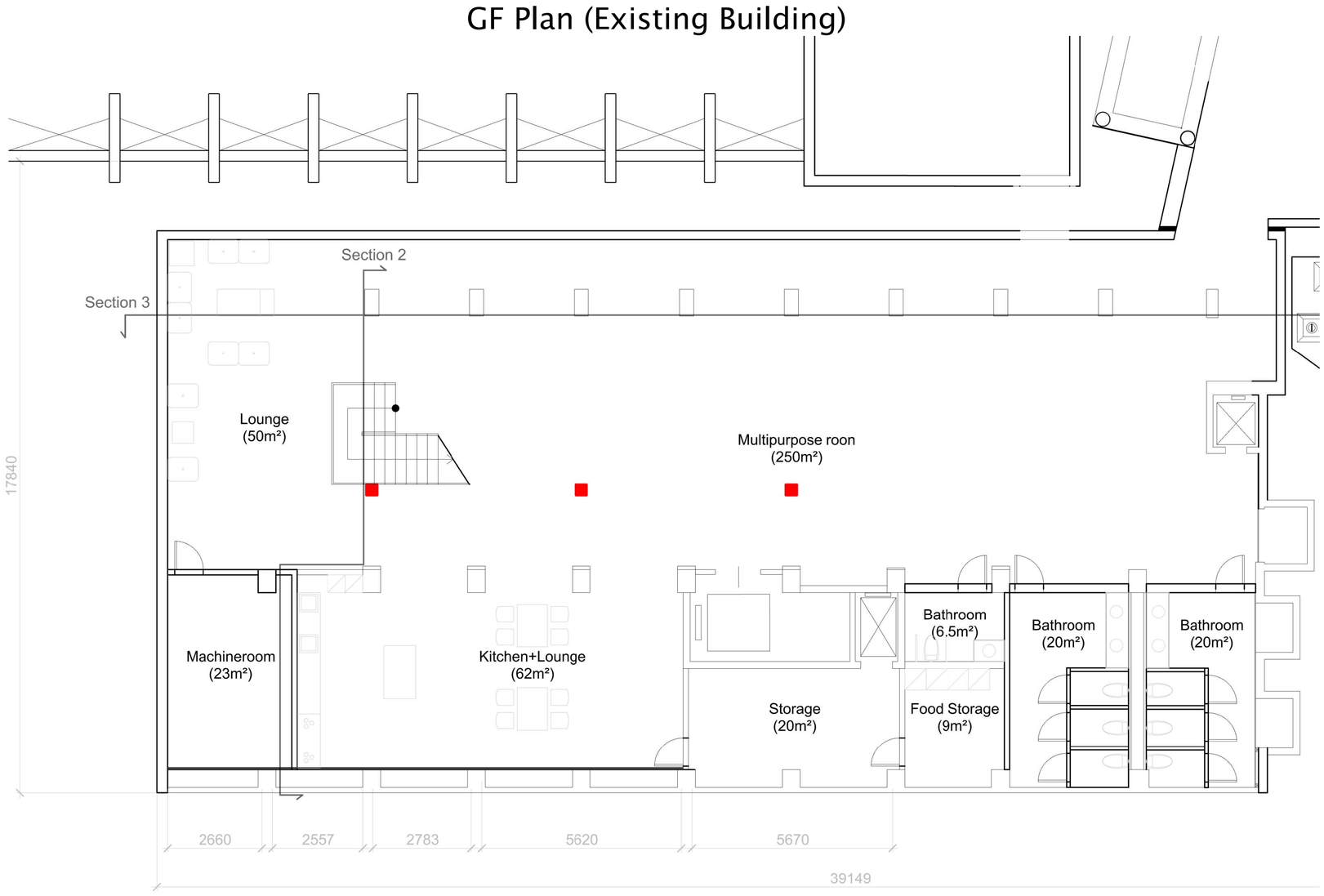
South facade (Vertical Building)



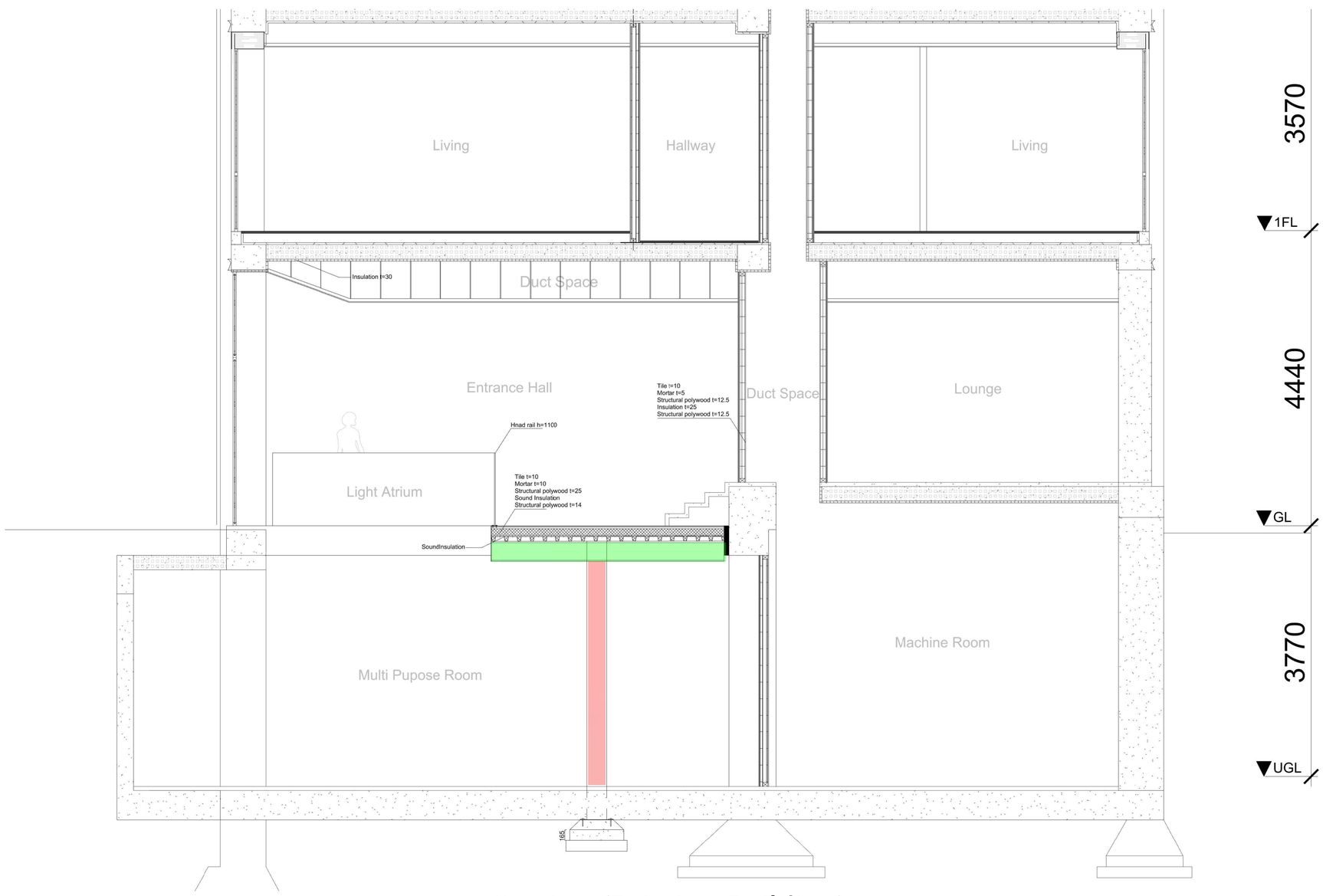
Detail of Support System (Vertical Building)



GF Plan (Existing Building)

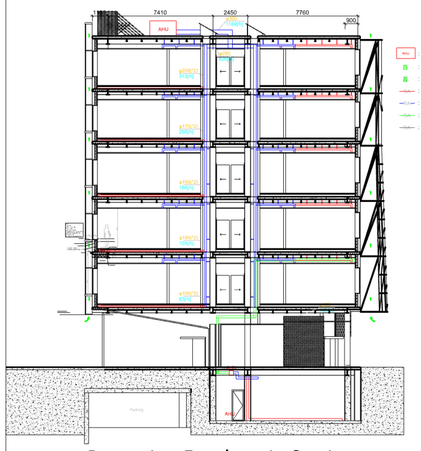


UGF Plan (Existing Building)

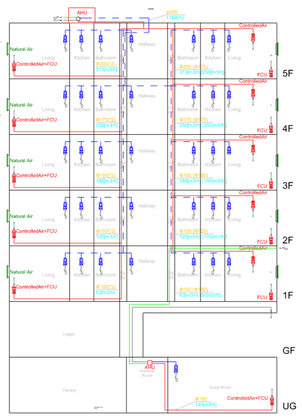


Section (Existing Building)

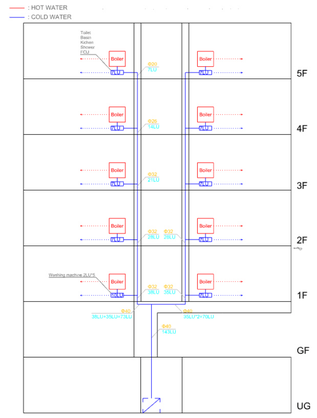
1. New Vertical Building



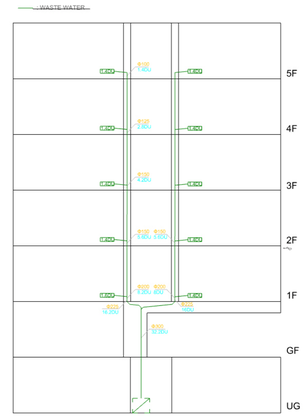
Protection Envelope in Section



Air Flow Distribution

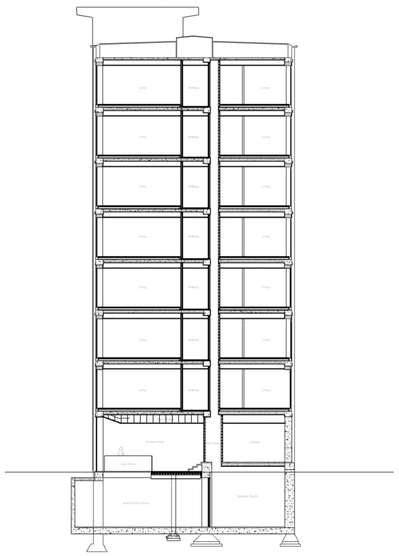


Cold and Hot Water Flow

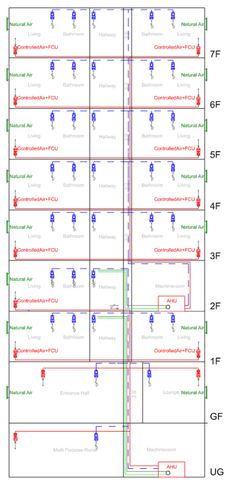


Waste Water Flow

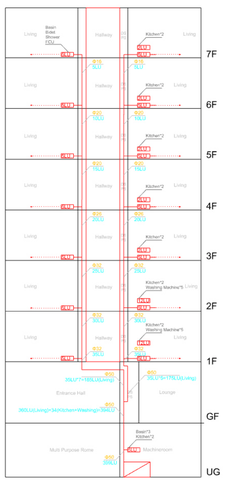
2. Existing Building



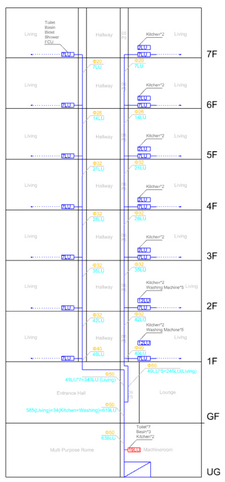
Section



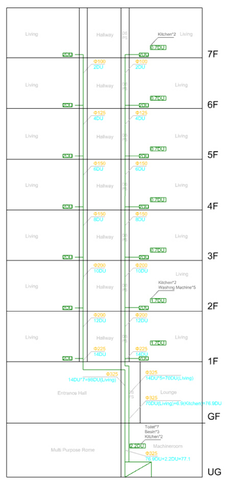
Air Flow Distribution



Hot Water Flow

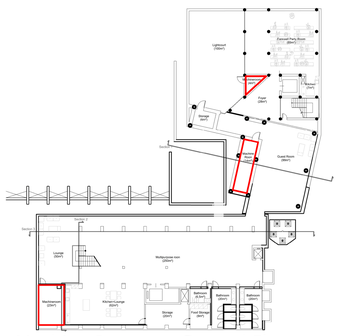


Cold Water Flow

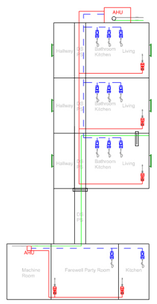


Waste Water Flow

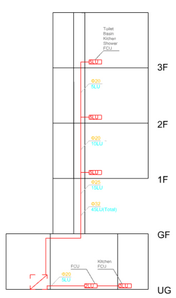
3. New Horizontal Building



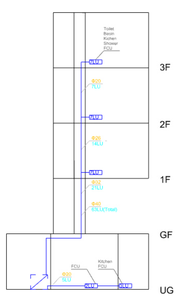
Machine Room on Ground Floor



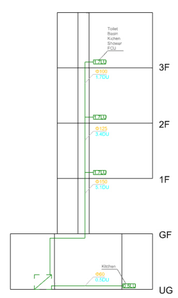
Air Flow Distribution



Hot Water Flow

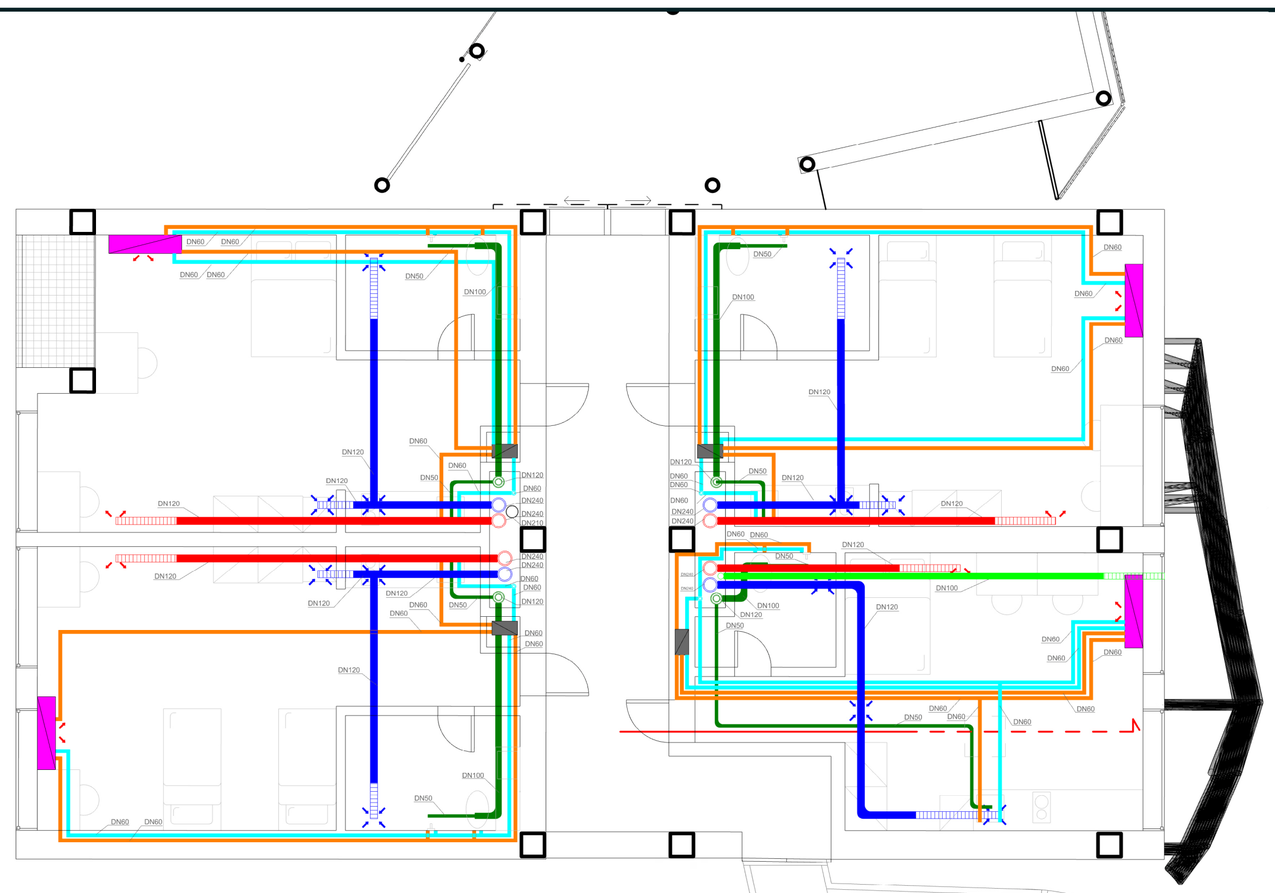


Cold Water Flow

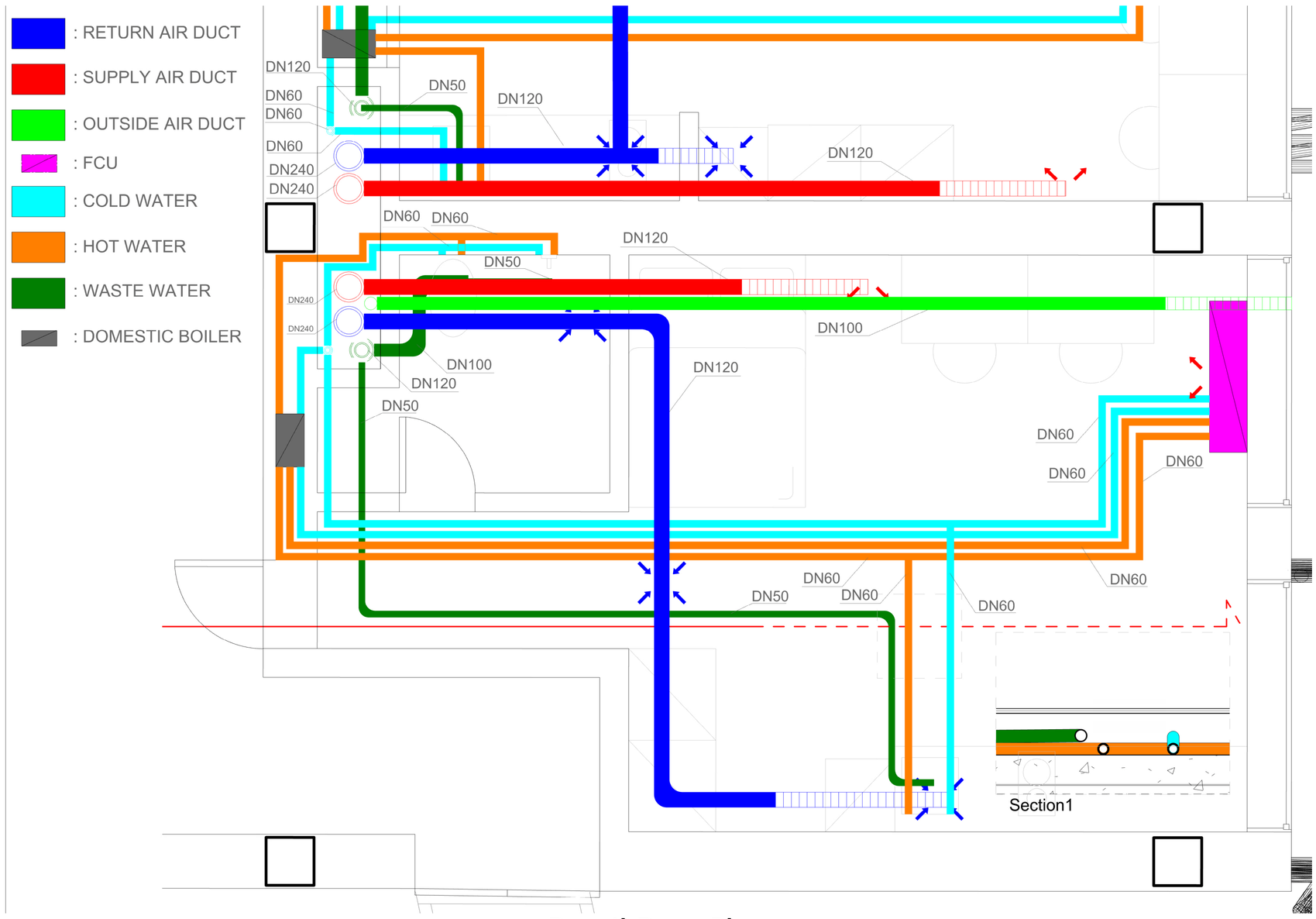


Waste Water Flow

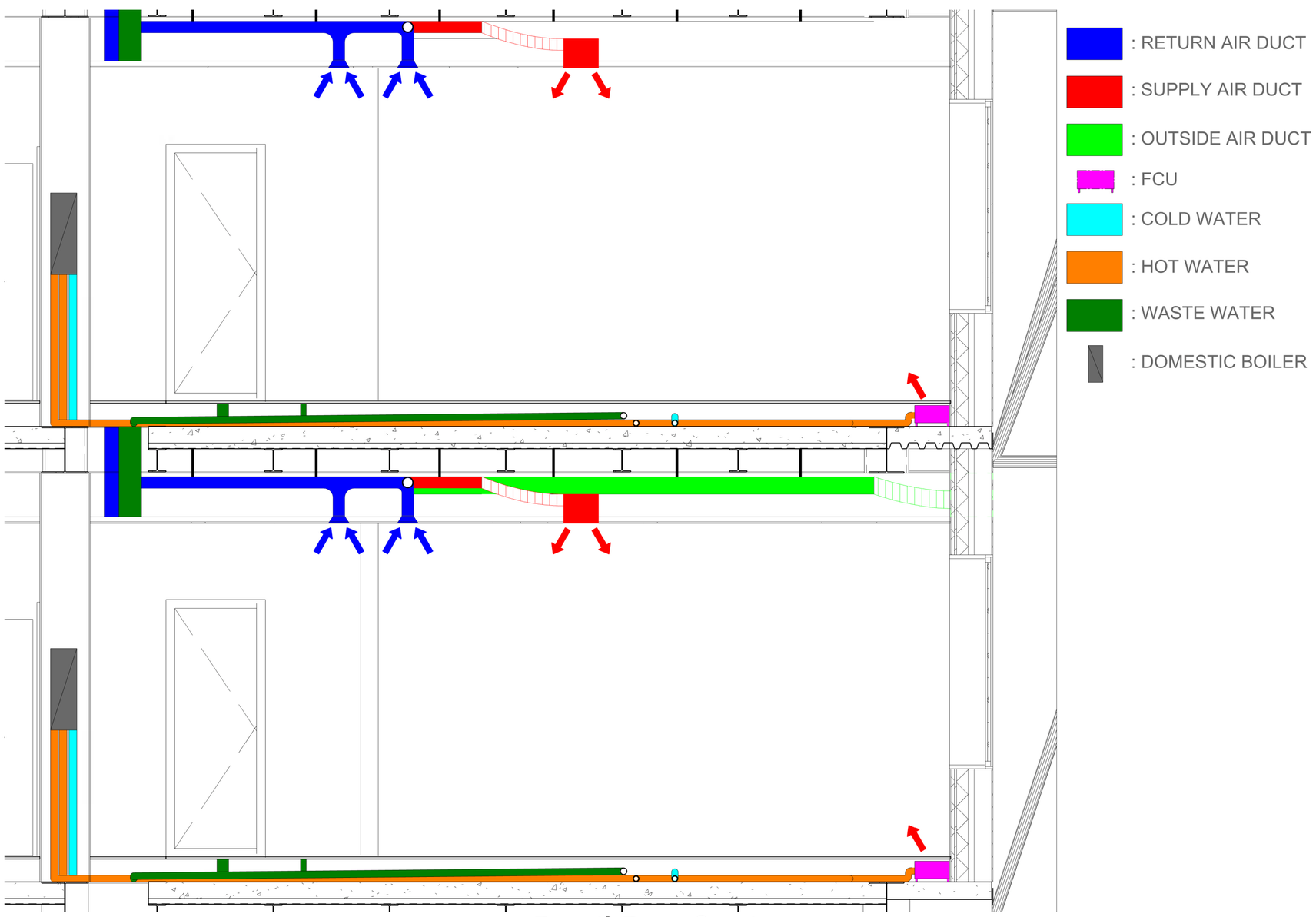
: RETURN AIR DUCT
: SUPPLY AIR DUCT
: OUTSIDE AIR DUCT
: FCU
: COLD WATER
: HOT WATER
: WASTE WATER
: DOMESTIC BOILER



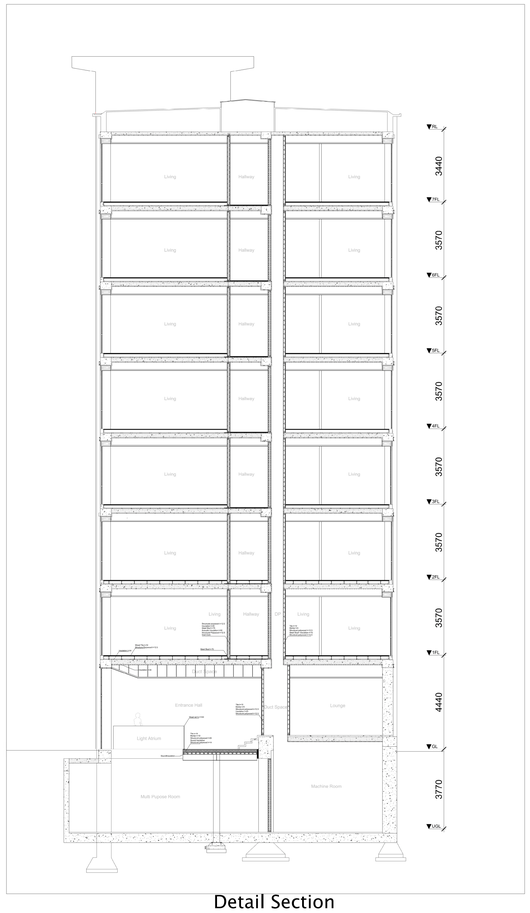
General Duct Plan



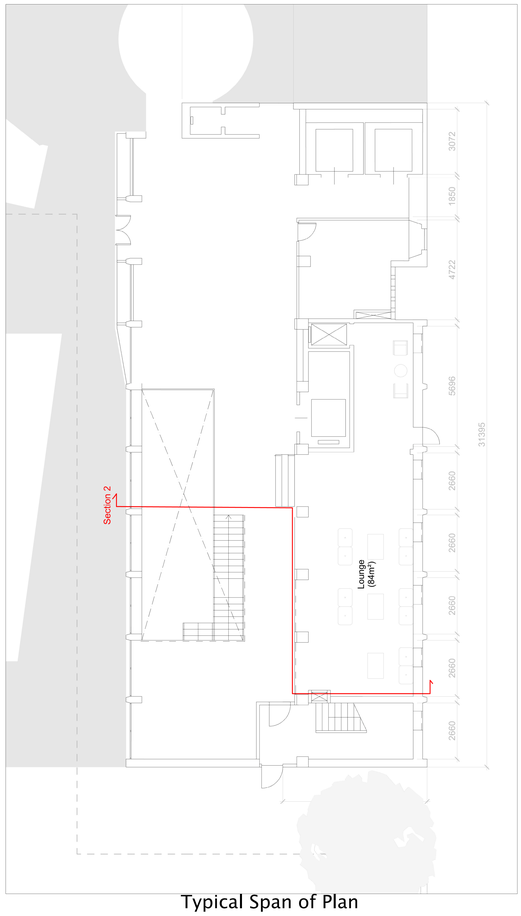
Detail Duct Plan



Detail Duct Section

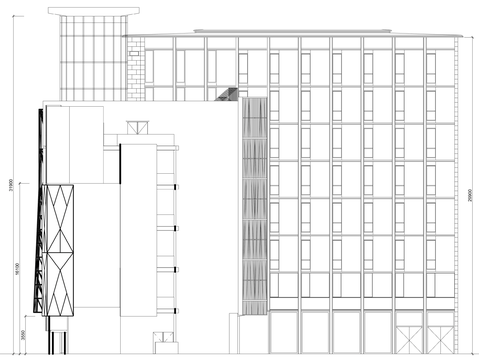


Detail Section

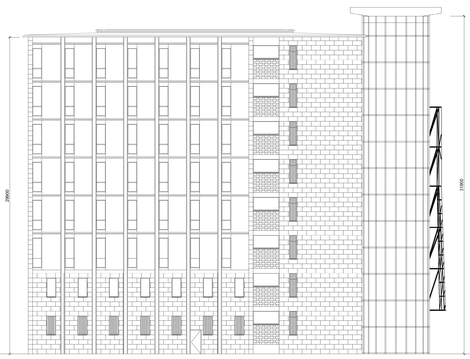


Typical Span of Plan

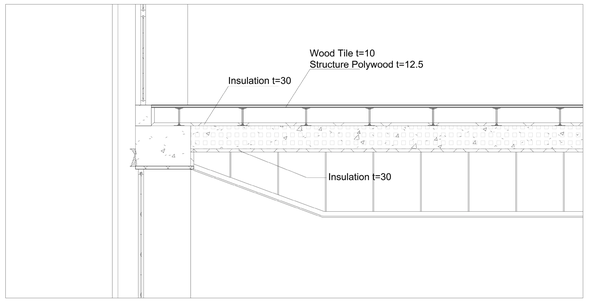
East Elevation



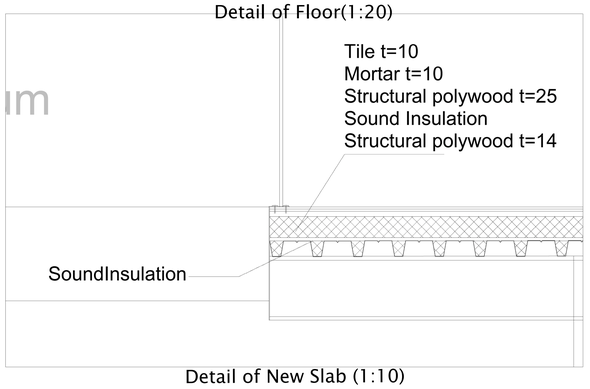
West Elevation



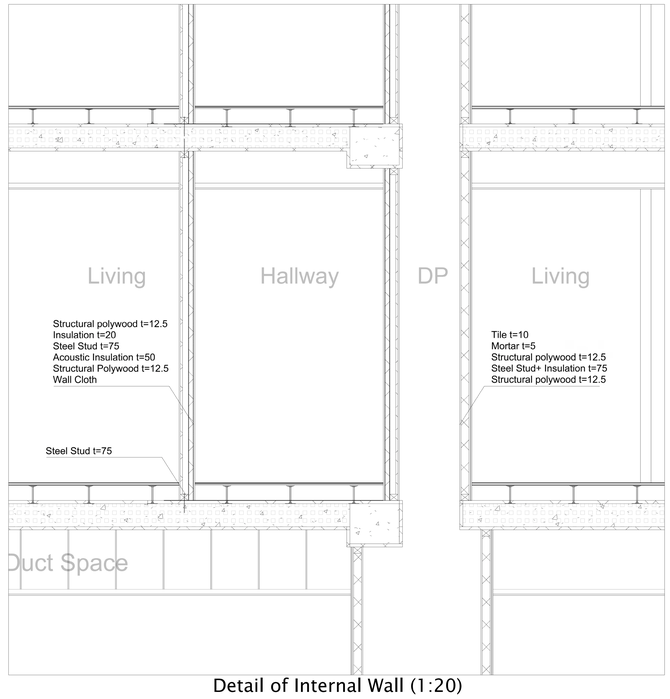
Typical Span of elevation



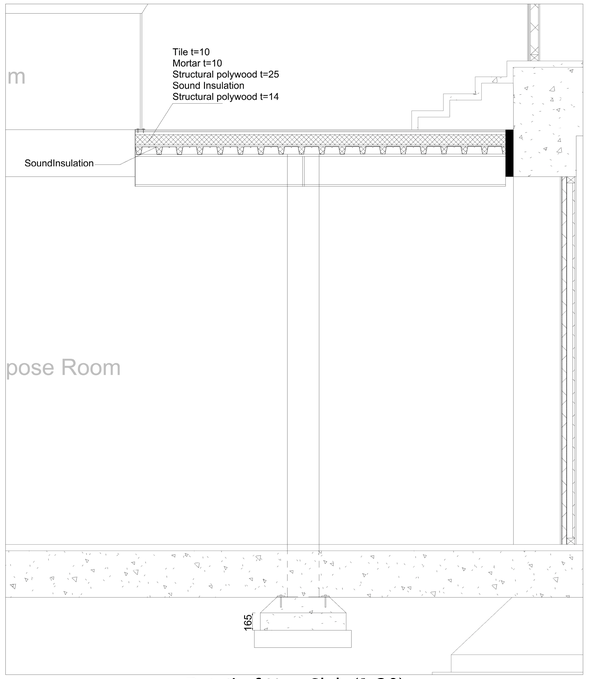
Detail of Floor(1:20)



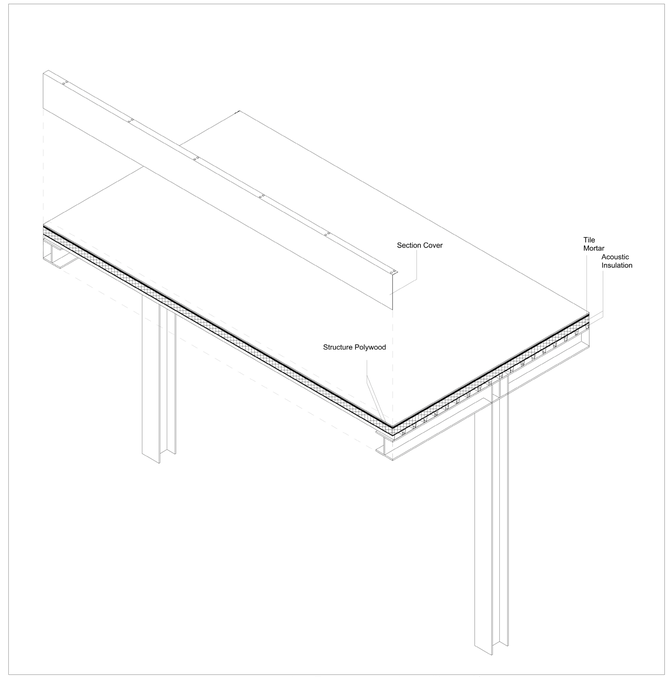
Detail of New Slab (1:10)



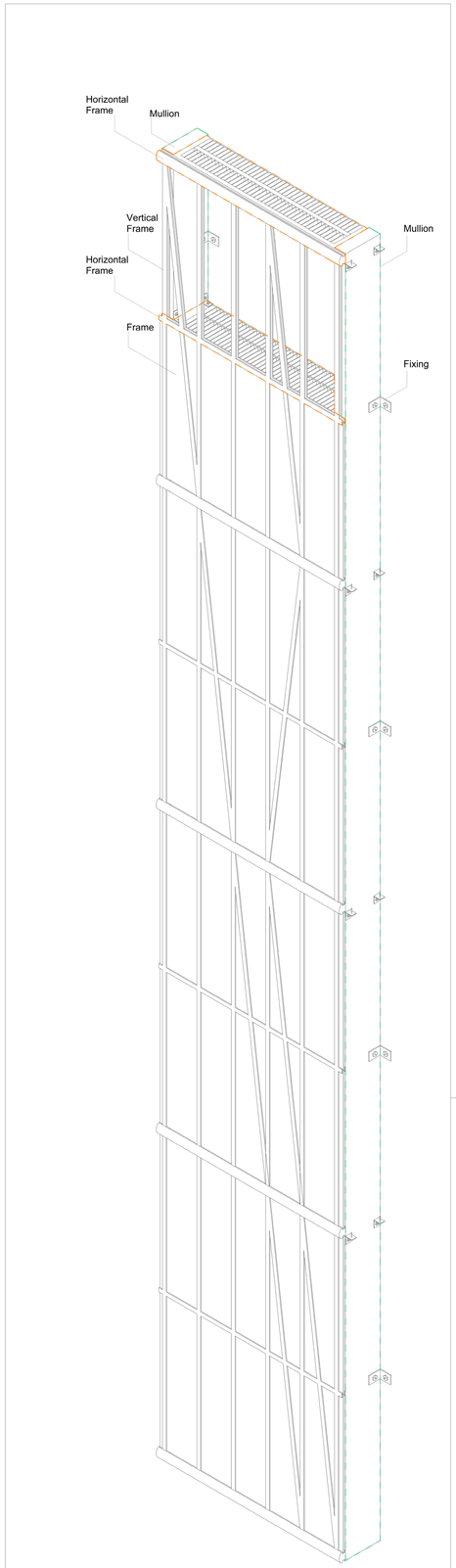
Detail of Internal Wall (1:20)



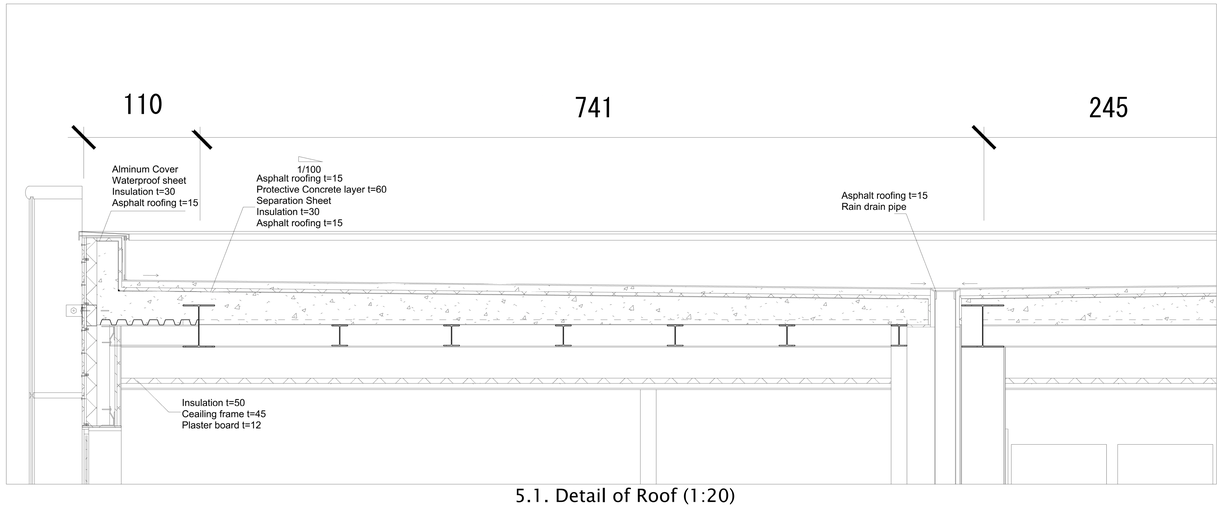
Detail of New Slab (1:20)



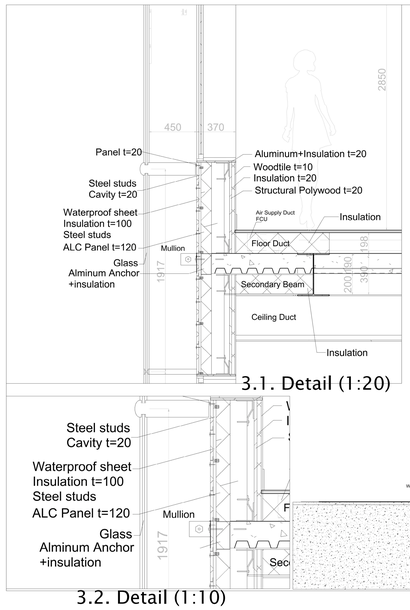
Axonometric Construction Detail



4. Axonometric Detail of North Envelope

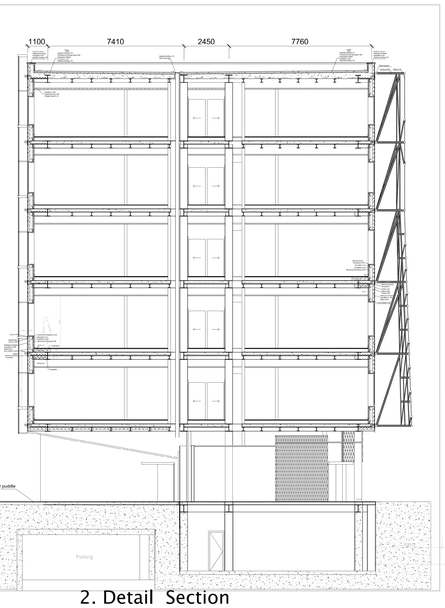


5.1. Detail of Roof (1:20)

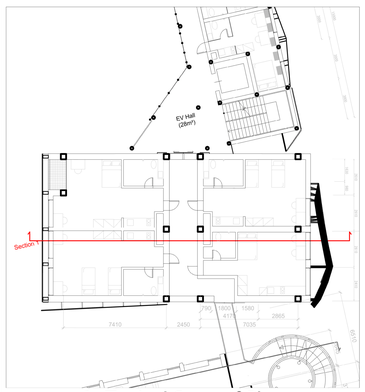


3.1. Detail (1:20)

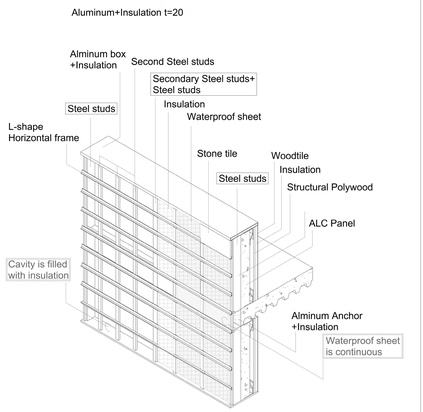
3.2. Detail (1:10)



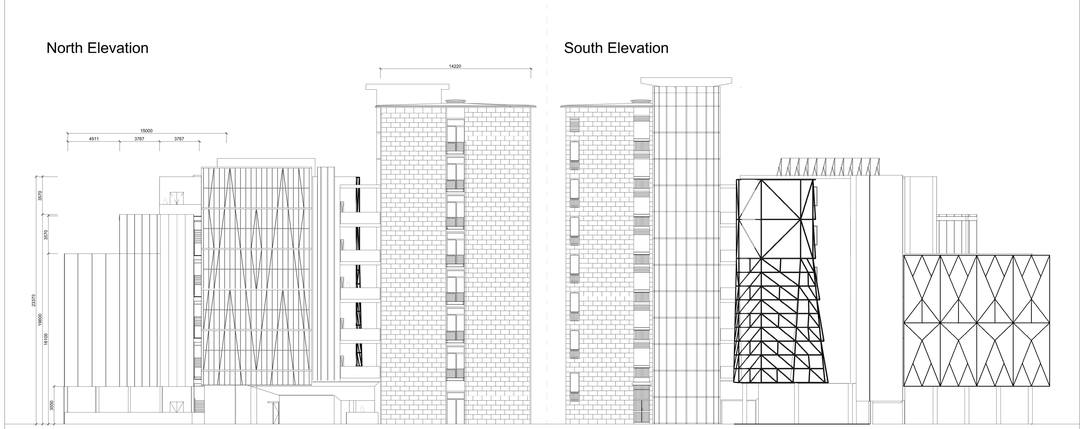
2. Detail Section



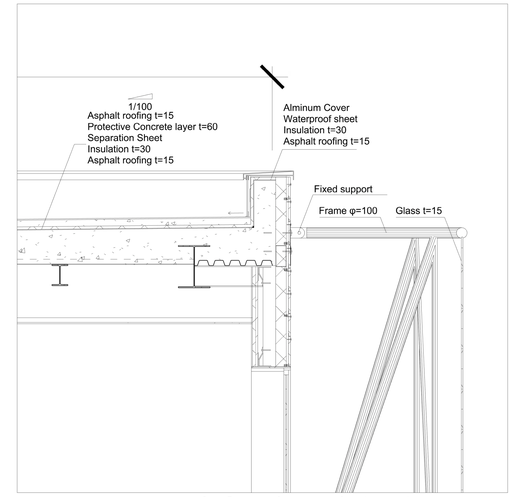
1. Typical Span of Plan



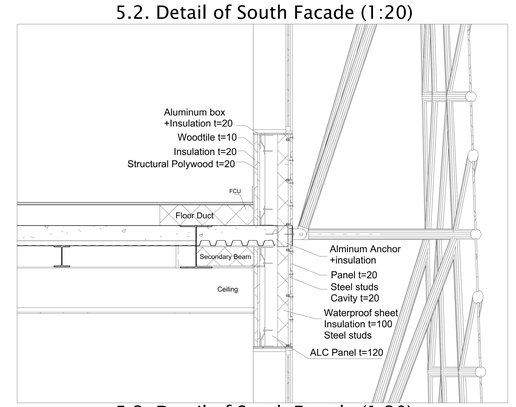
3.3. Axonometric Detail of North Wall



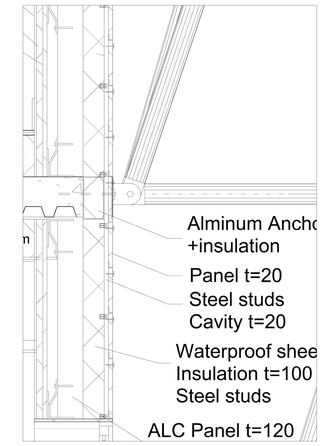
6. Typical Span of Elevation



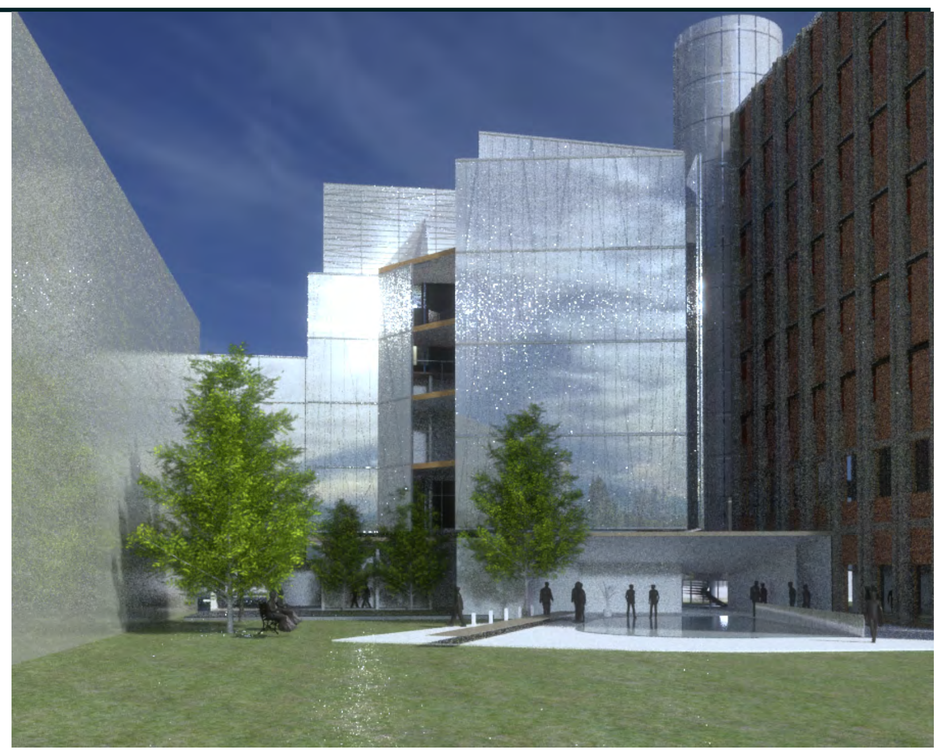
5.2. Detail of South Facade (1:20)

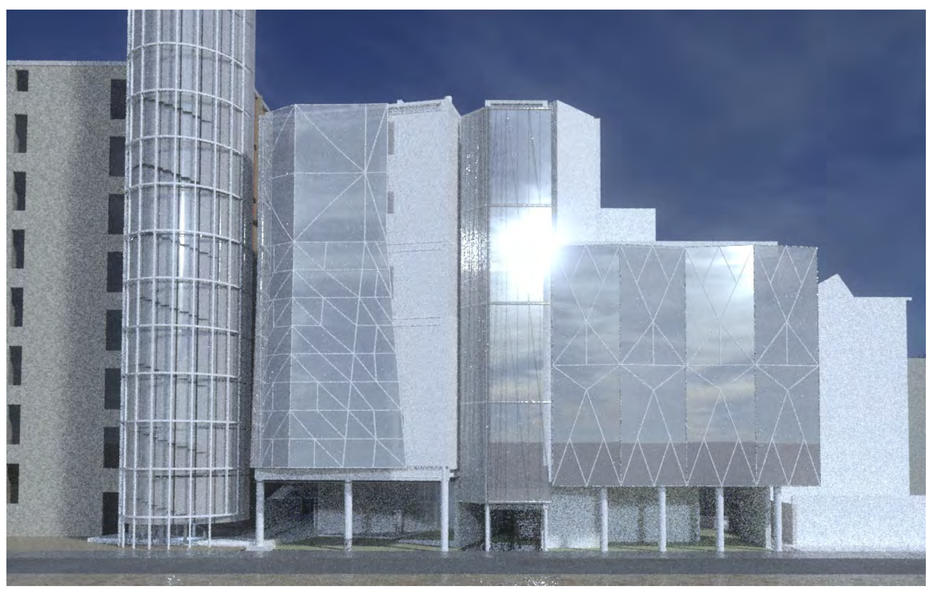


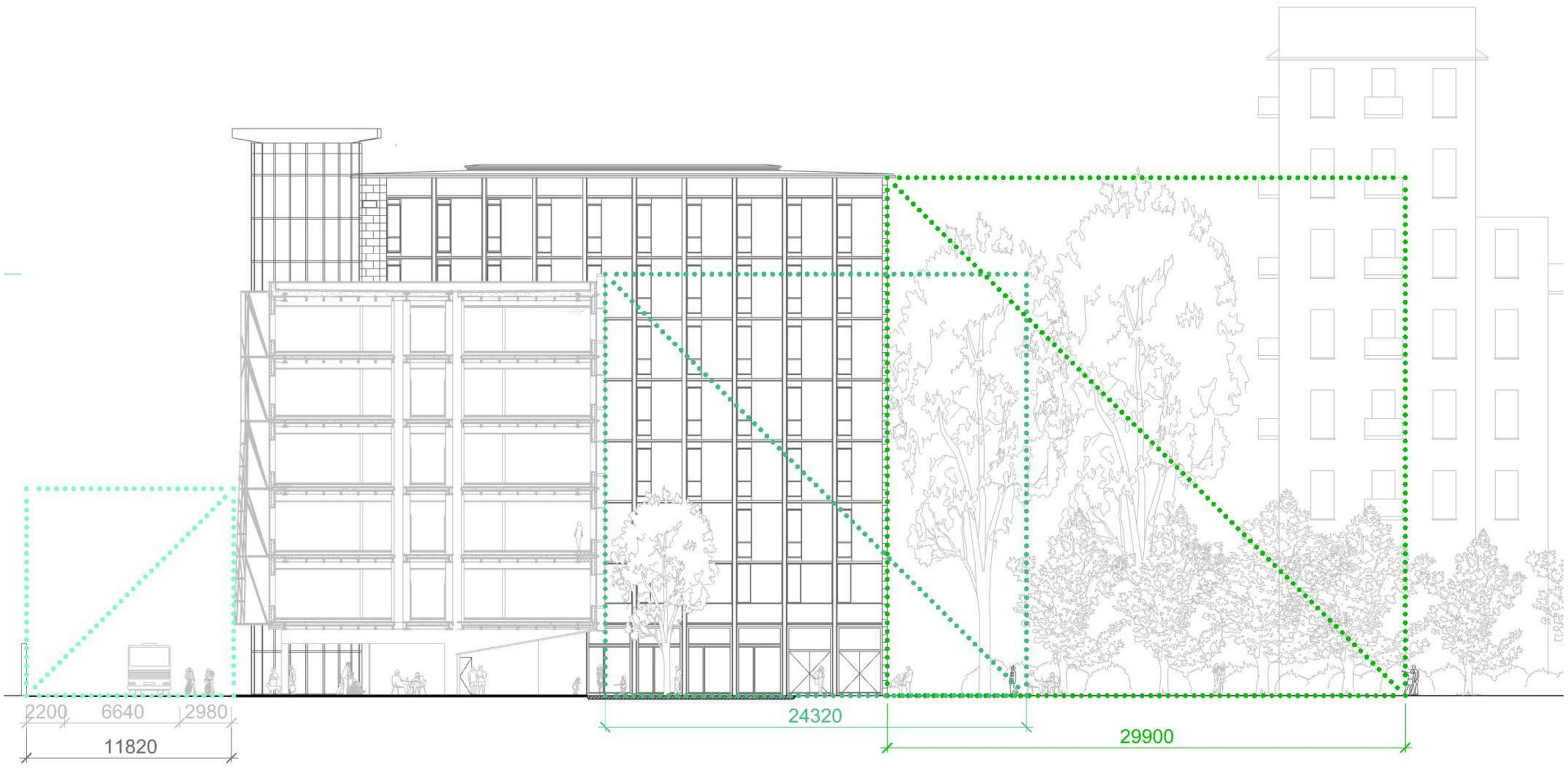
5.3. Detail of South Facade (1:20)



5.4. Detail of South Facade (1:10)



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