

# 1

## OVERVIEW

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The project is termed as an eco-forest in between Concrete Jungle. Building with sustainability is what the future demands. Idea of Net Zero Building is rapidly evolving and with advancement of technology, sustainability of buildings is advanced. We propose the entire building as a CLT building which itself is a carbon negative material. Analyzing present condition of the structure CLT is suggested, as it is 5 times lighter than concrete and very easily constructible on site with very fast process and zero pollution. The panels are pre-fabricated according to structural member requirements and are just framed in site, which is very fast as compared to concrete with noise less construction. Keeping the sub structure intact and using the present foundation new super structure is designed with 5 times less load than present load giving it higher life span.



# 2

## LOCATION

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# 3

## SITE ANALYSIS NEIGHBORHOOD CONTEXT



1. RESIDENCE OF PRESIDENT OF SLOVAKIA



2. GOVERNMENT OFFICE OF SLOVAKIA



3. FREEDOM SQUARE



4. SLOVAK RADIO TOWER



5. NATIONAL BANK OF SLOVAKIA



6. BLUMENTAL CHURCH

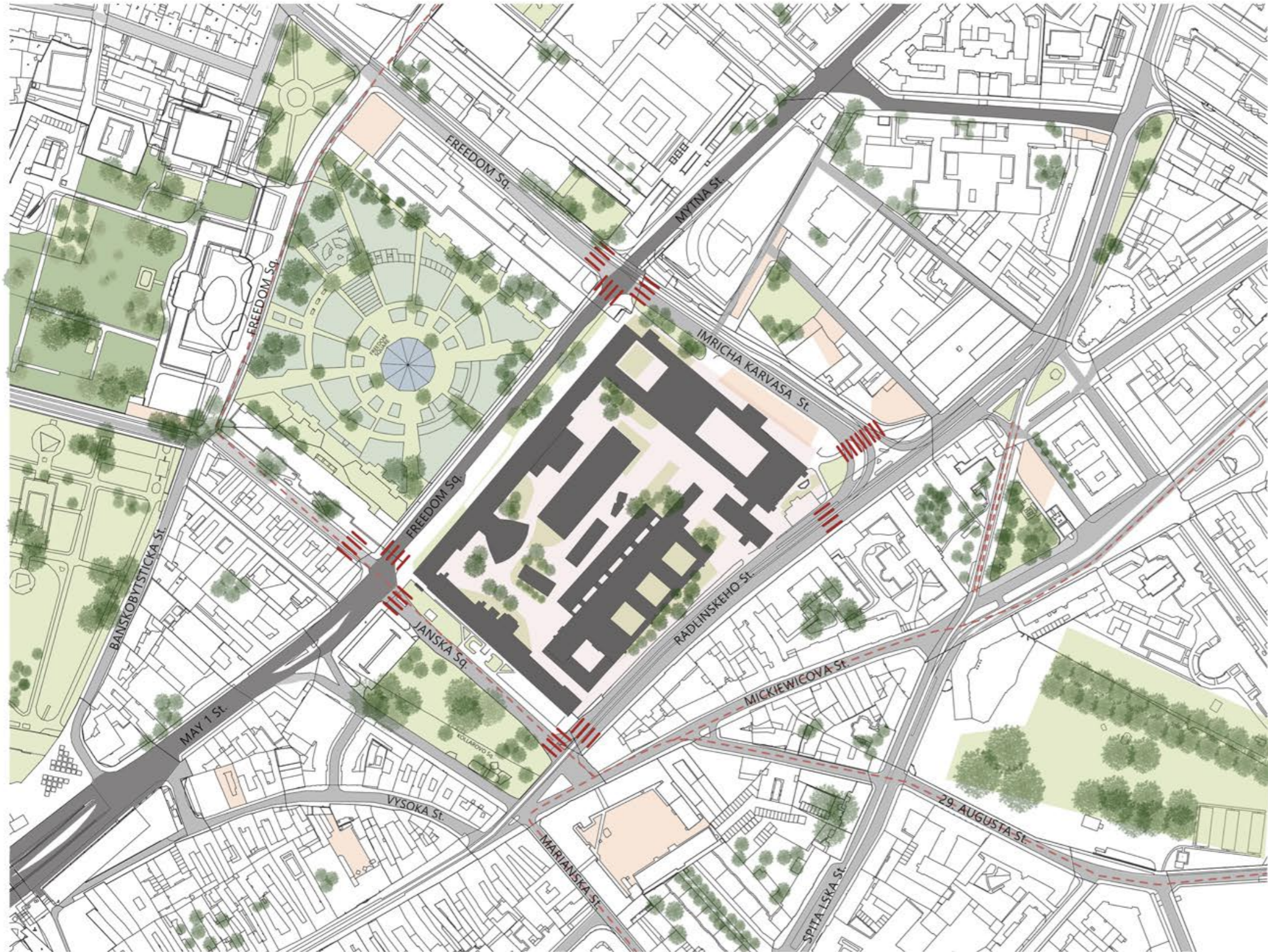


7. MEDICAL GARDEN



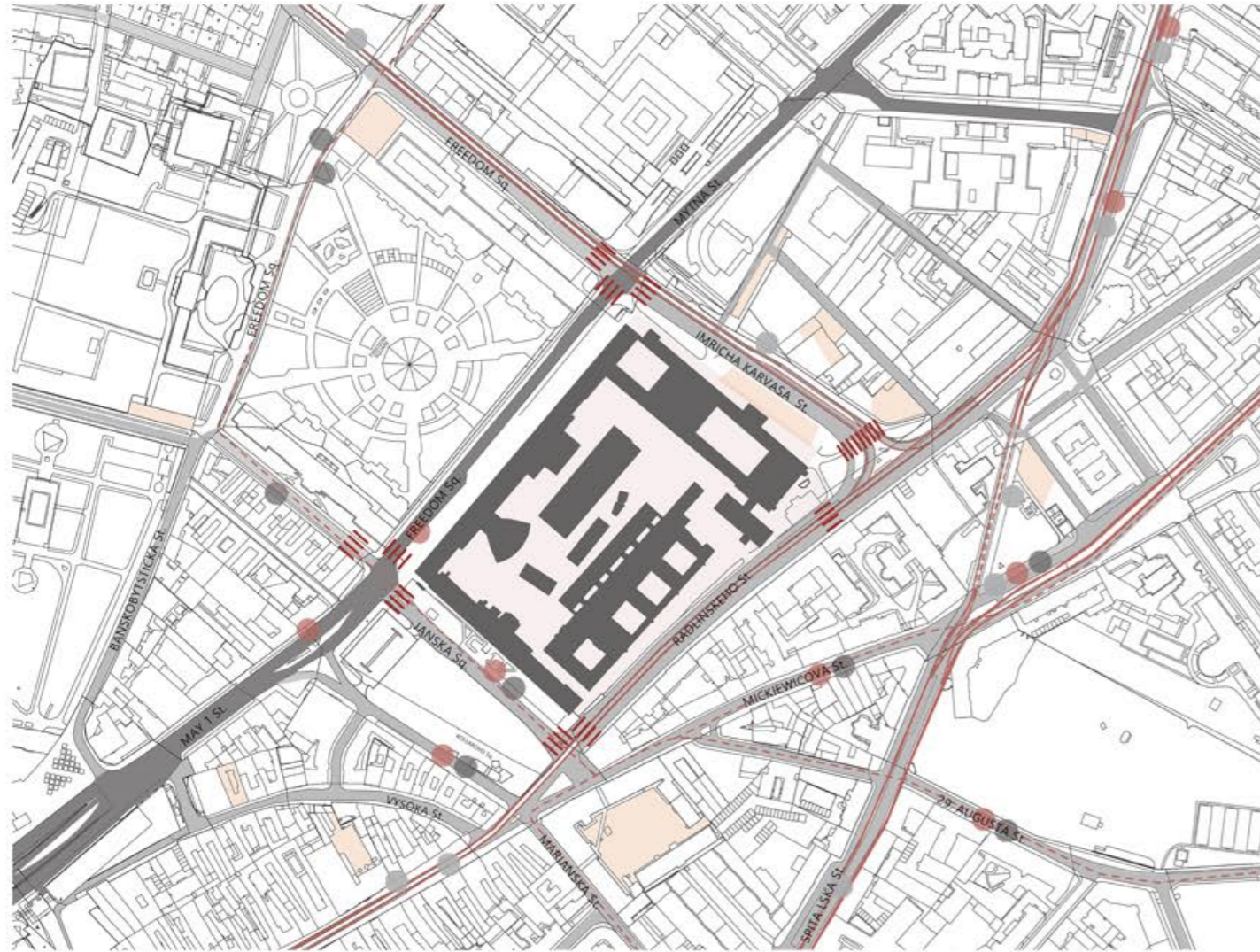
8. BRATISLAVA CASTLE


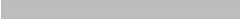


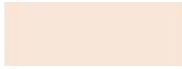

# SURROUNDING VEGETATION



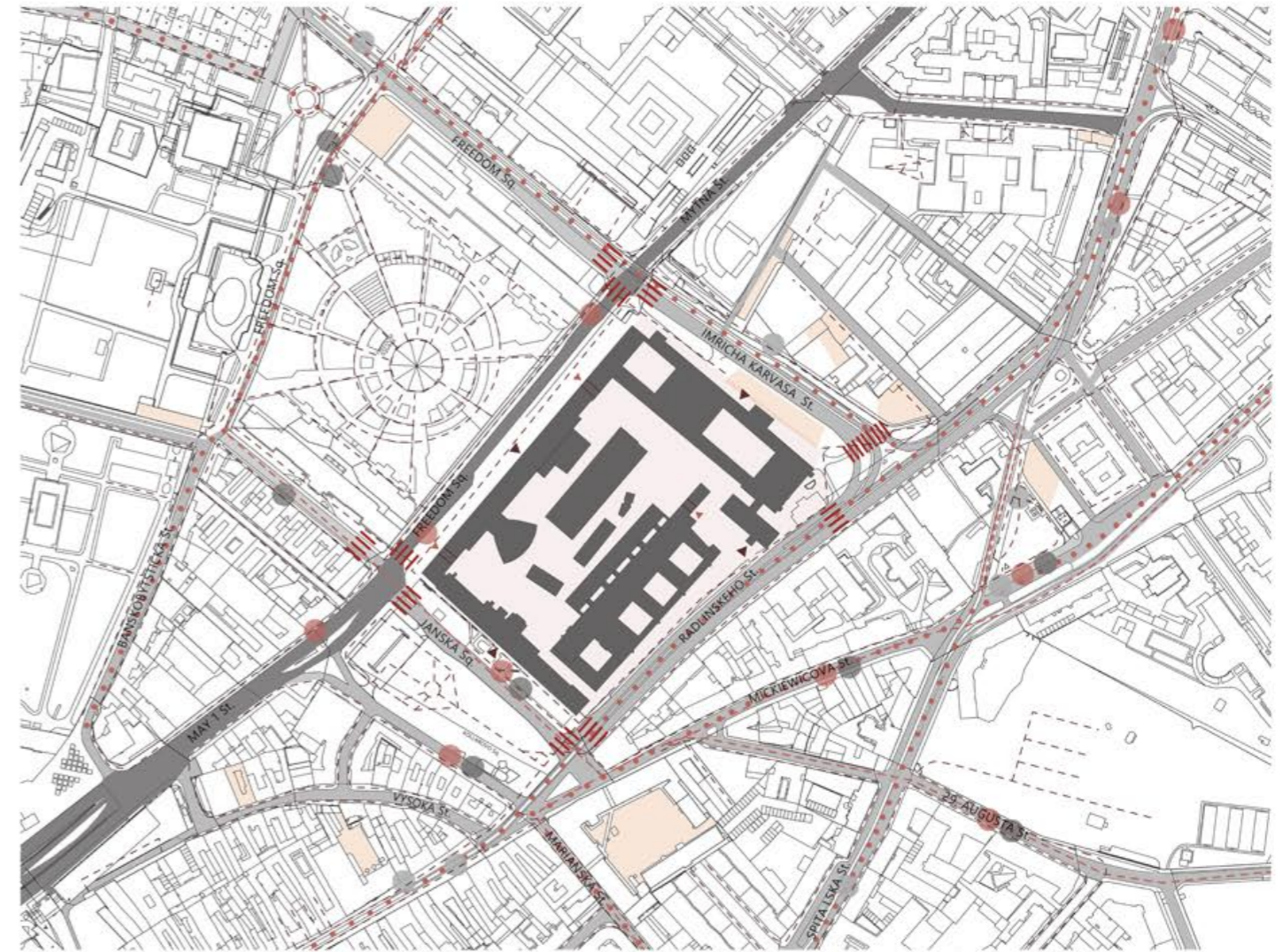
- COLLECTIVE COMMUNICATION
- SERVICE COMMUNICATION
- PARKING
- STU CAMPUS PREMISIS
- PARKS
- RESERVED GREENARY
- FOUNTAIN

# TRAFFIC ROUTES



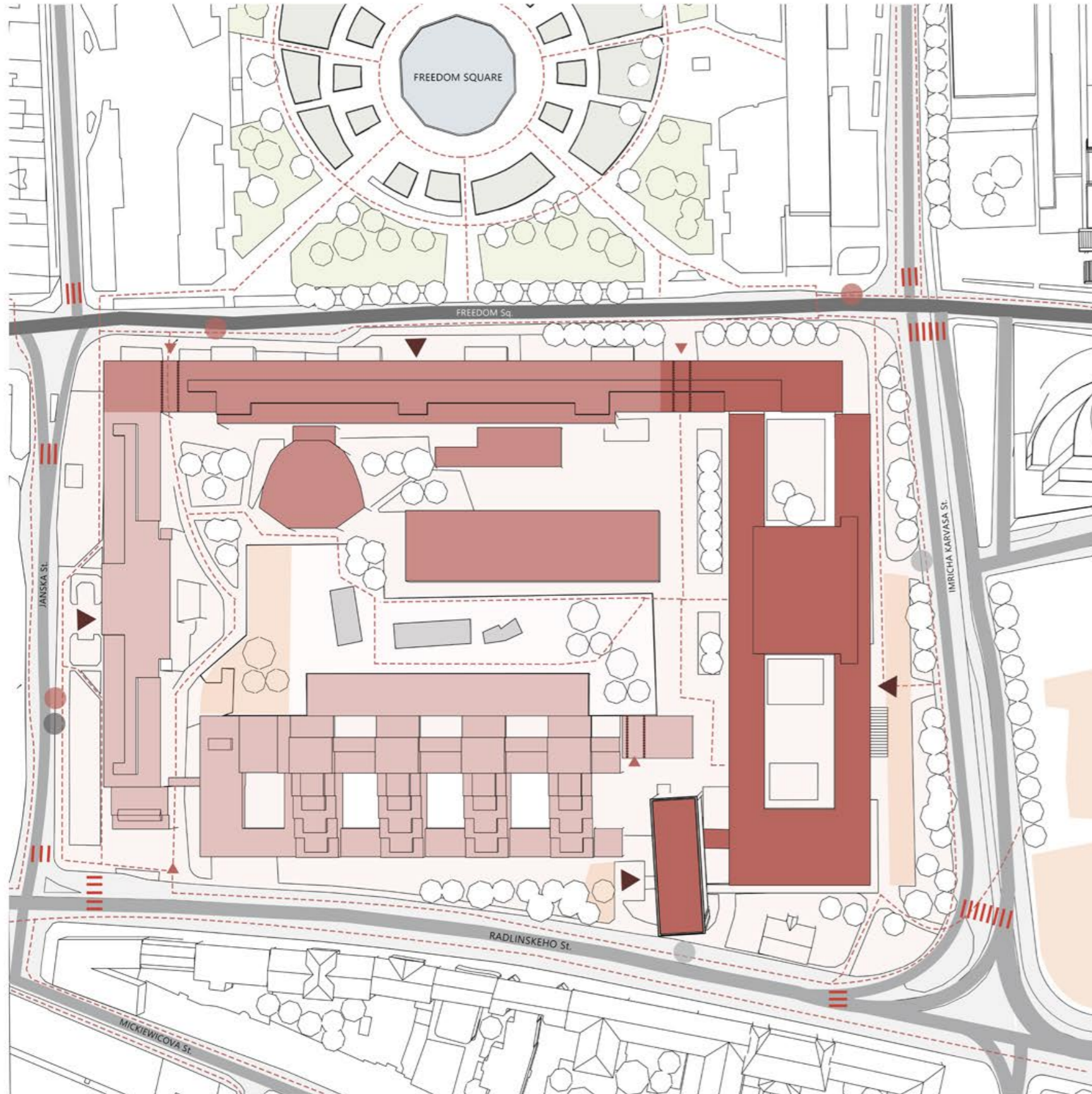
-  COLLECTIVE COMMUNICATION
-  SERVICE COMMUNICATION
-  TRAMWAY
-  TROLLYBUS
-  PARKING
-  STU CAMPUS PREMISIS













# WALKING ROUTES



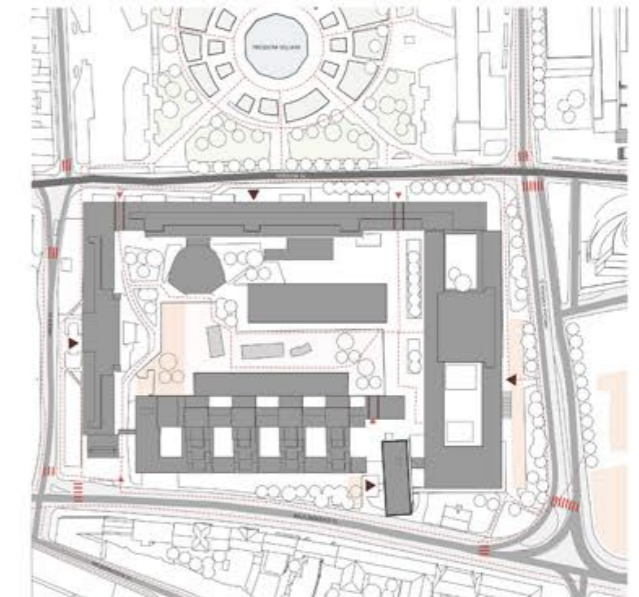
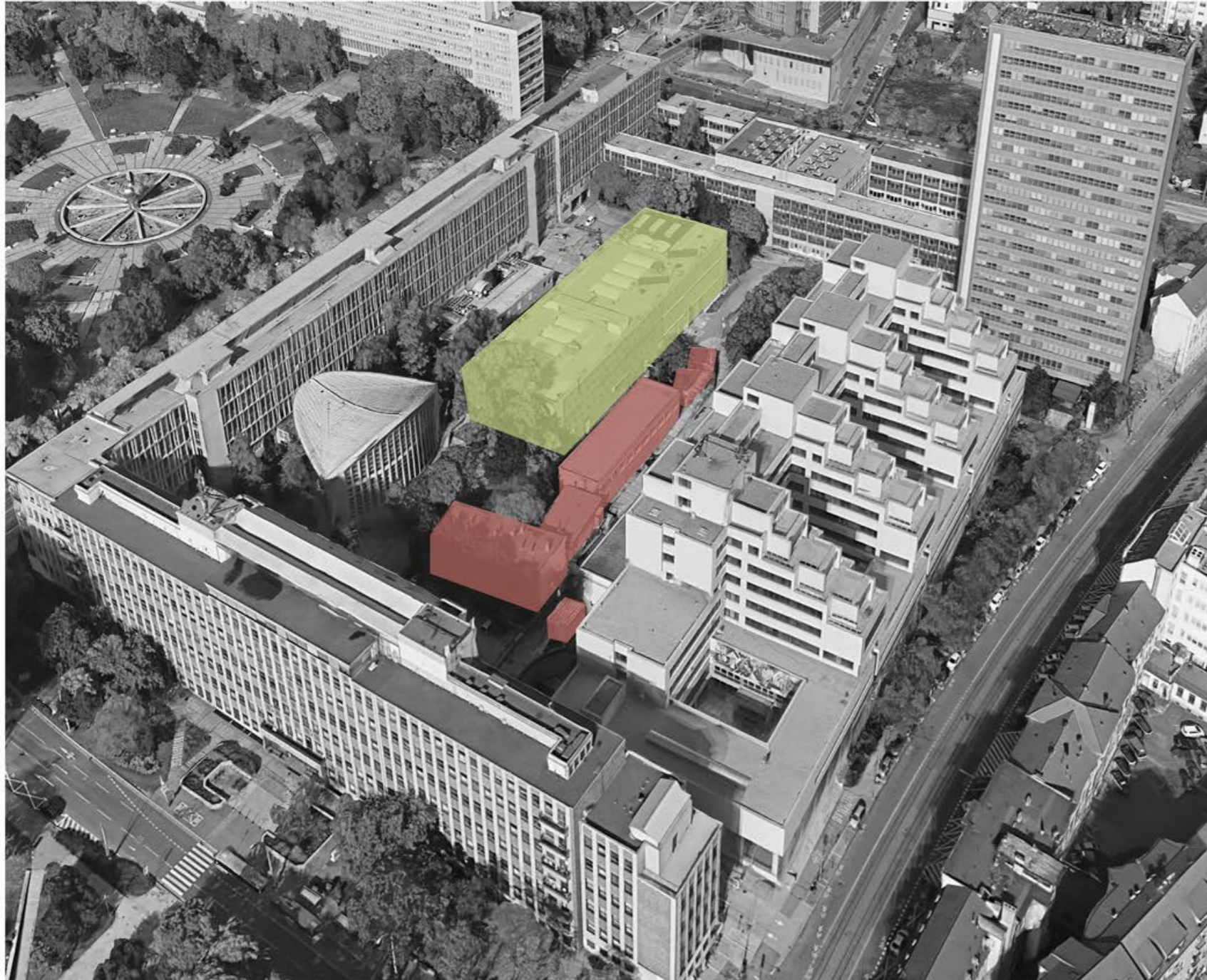
-  BUS STOPS
-  PUBLIC TRANSPORT STOPS
-  TRAM STOPS
-  PEDESTRIAN PATHWAY
-  WALKING ROUTES

# MAIN ENTRANCES TO THE FACULTIES & COURTYARD

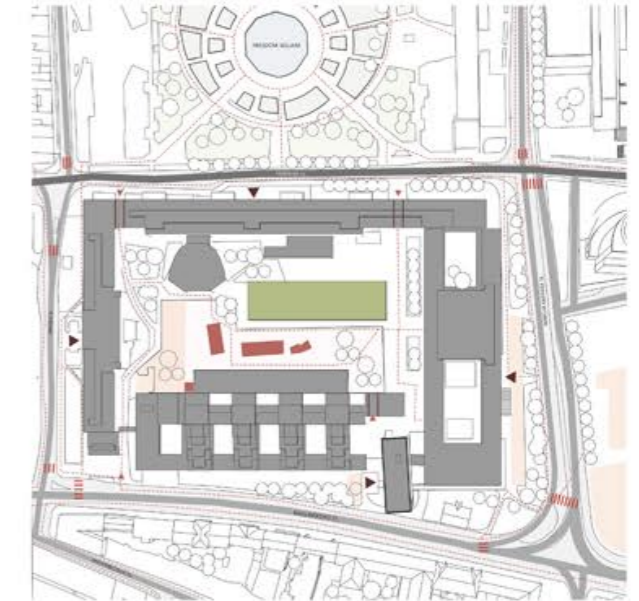


-  COLLECTIVE COMMUNICATION
-  SERVICE COMMUNICATION
-  PARKING
-  BUS STOPS
-  PUBLIC TRANSPORT STOPS
-  TRAM STOPS
-  MAIN ENTRANCE TO THE BUILDING
-  ENTRANCE TO THE COURTYARD
-  FACULTY OF CIVIL ENGINEERING
-  FACULTY OF MECHANICAL ENGINEERING
-  FACULTY OF FOOD AND CHEMICAL TECHNOLOGY
-  TEMPORARY STRUCTURES

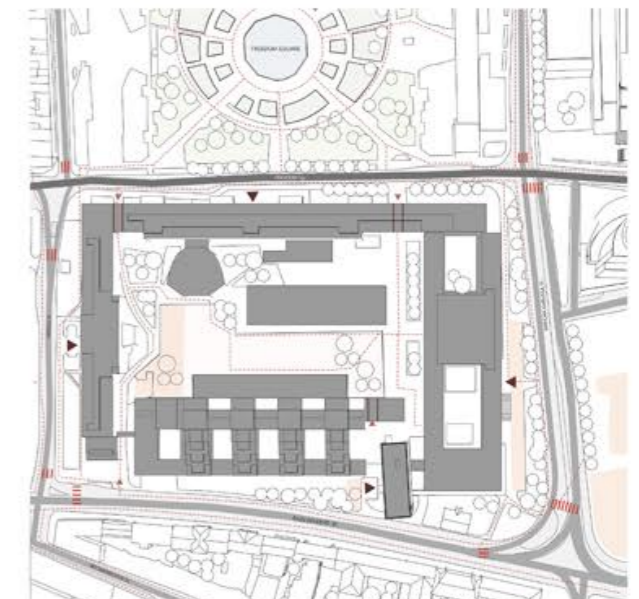
# 4 DEMOLITION ANALYSIS



EXISTING BUILDING FOOT PRINTS



BUILDS ALTERED FOR COURTYARD DEVELOPMENT



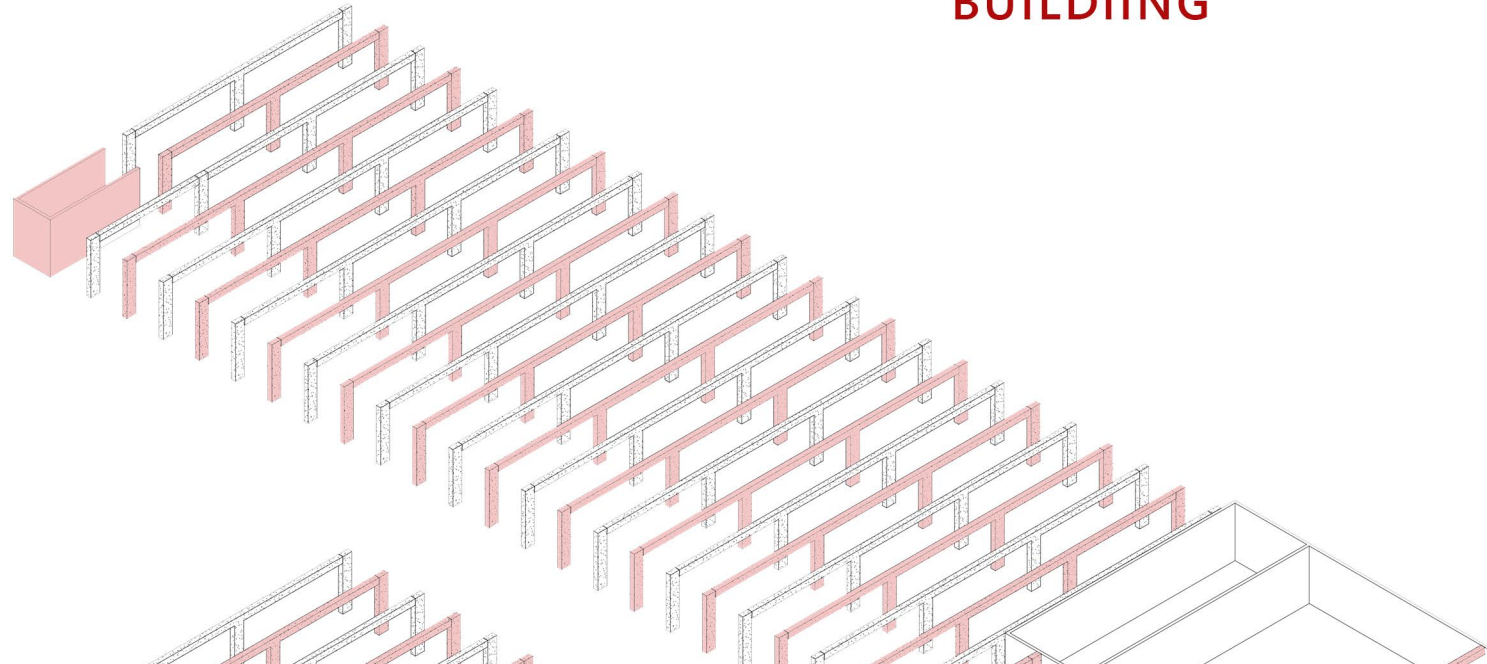
FINAL SPACE FOR COURTYARD DEVELOPMENT

For an ideological design elaboration of the transformation of STU campus courtyard few temporary structures were fully removed from the central open space with the vision of having an open interactive ambiance at the central courtyard that is visually connected to all the building blocks of the campus around it. The existing heavy laboratory building is transformed keeping intact the foundation and structural support upto plinth level and building the superstructure altering the internal layout implementing suitable sustainable techniques.

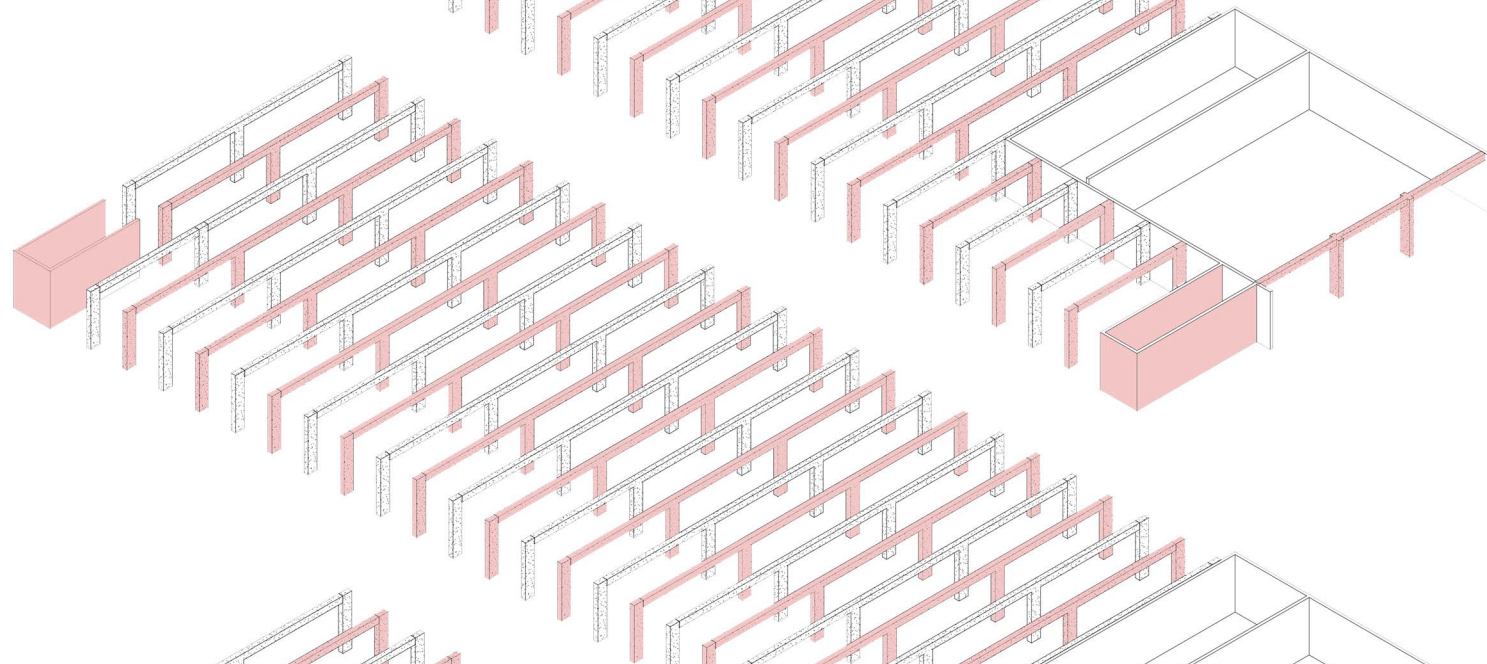
■ COMPLETE DEMOLITION     
 ■ USE EXISTING FOUNDATION, GRID AND STRUCTURAL SYSTEM UPTO PLINTH LEVEL

# EXISTING SUPPORTING SYSTEM OF THE BUILDING

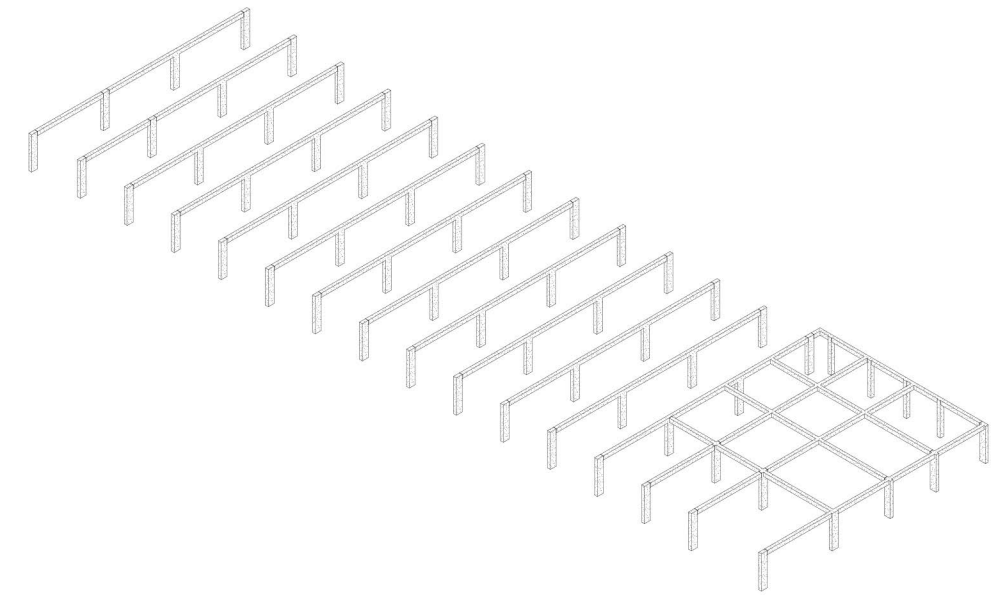
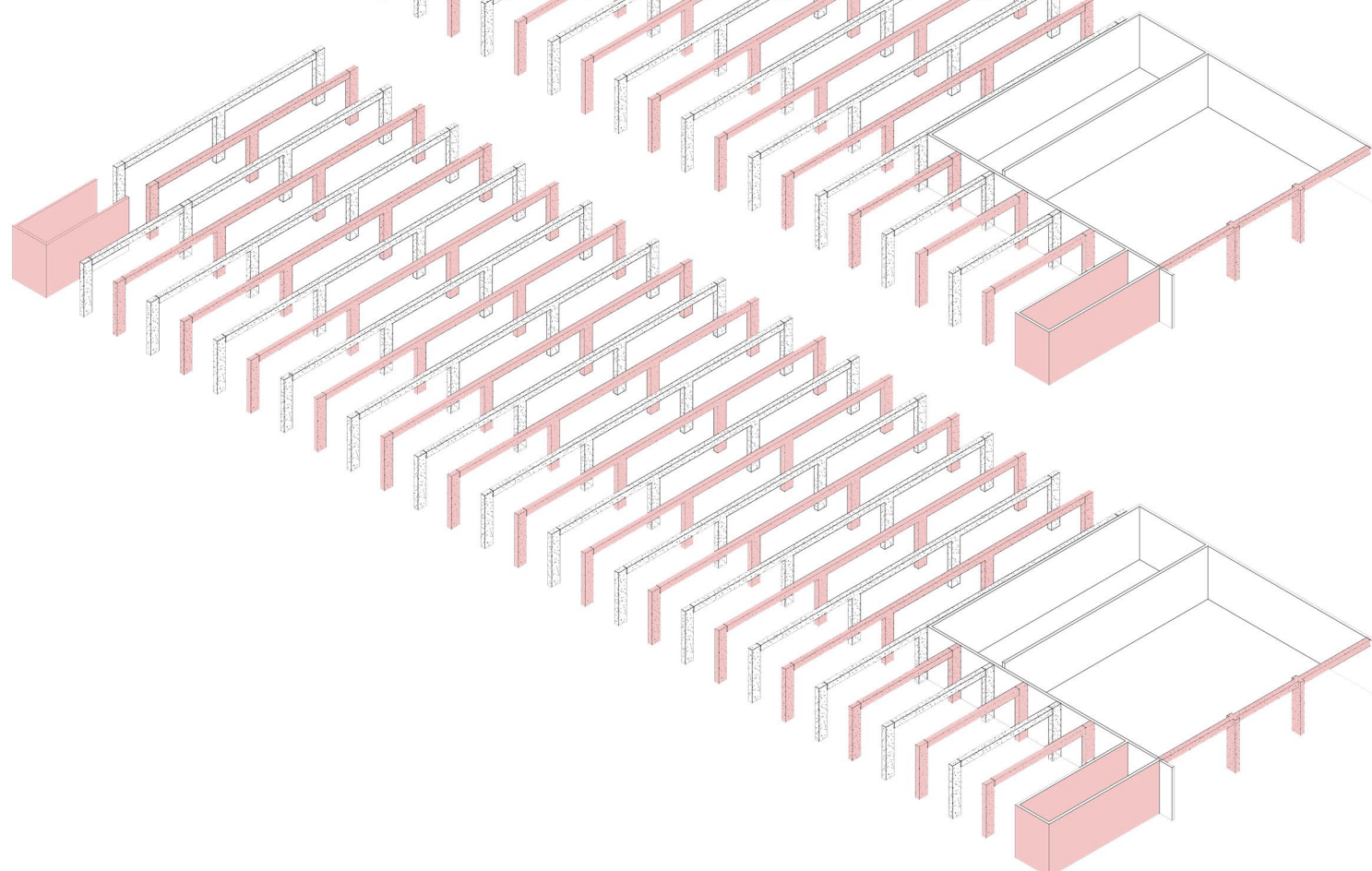
SECOND FLOOR



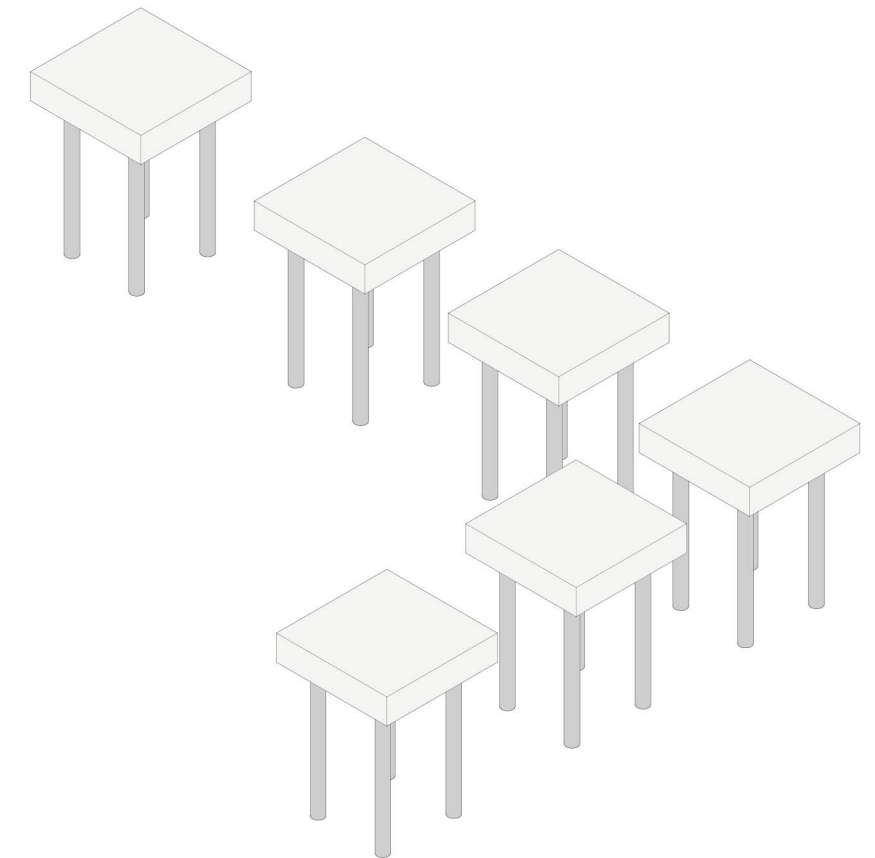
FIRST FLOOR



SUB LEVEL 1

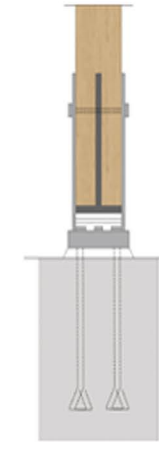
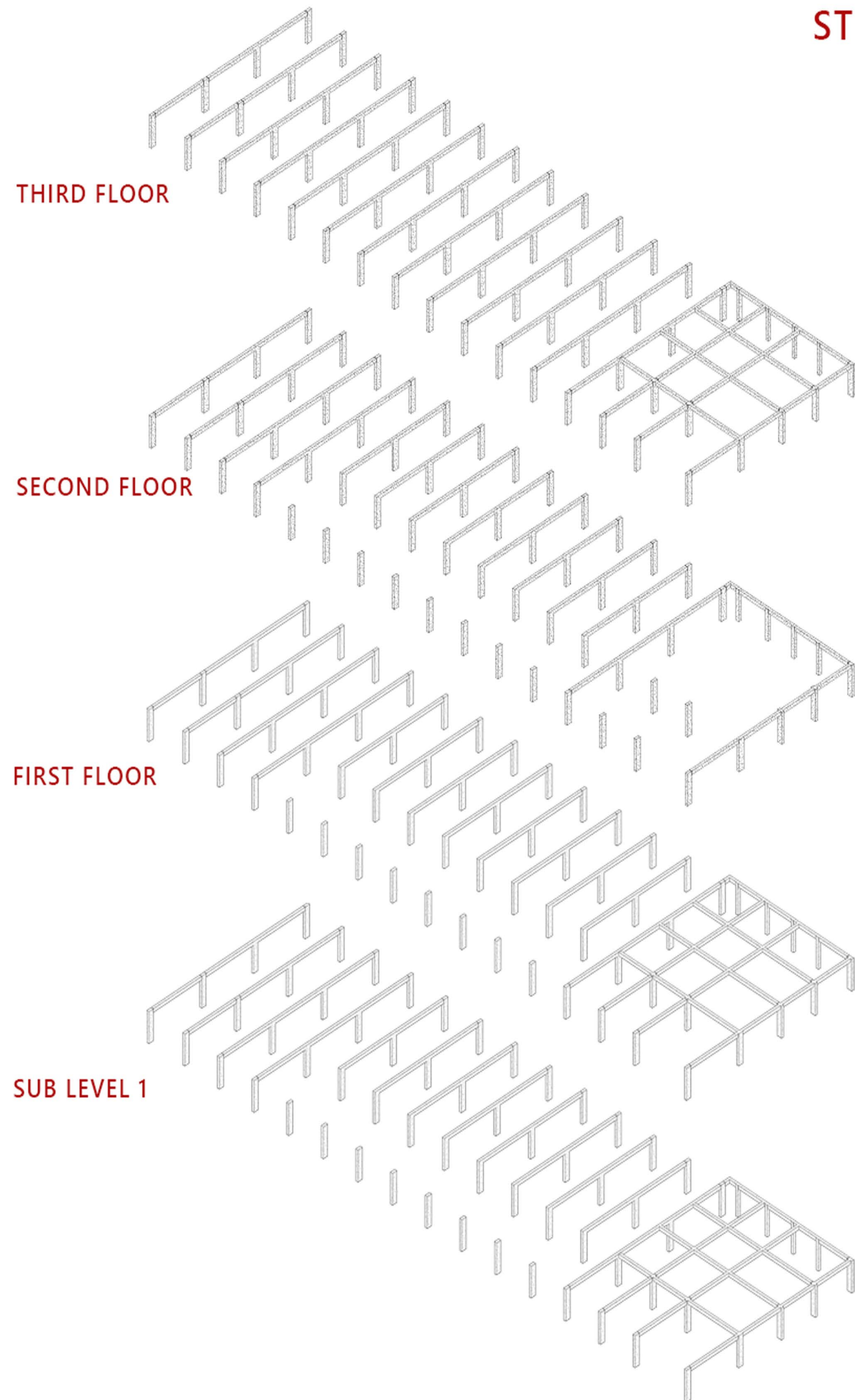


PRESERVING THE EXISTING STRUCTURAL SUPPORT AND MODIFIED AS PER NEW DESIGN USING THE EXISTING FOUNDATIONS

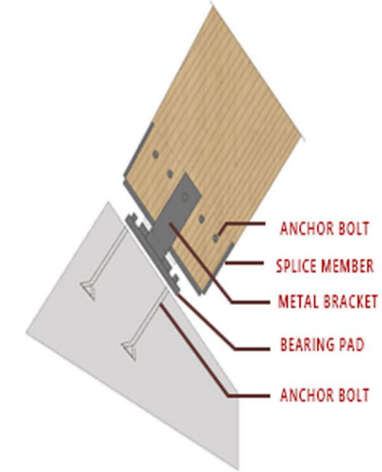


EXISTING SUBSTRUCTURE IS PRESERVED AND THE GRID OF 6X8 IS DEVELOPED USING GLULAM COLUMNS AND BEAM LOWERING THE OVERALL LOAD ON FOUNDATION

# STRUCTURAL FRAME



GLULAM COLUMN CONNECTED WITH CONCRETE FOUNDATION



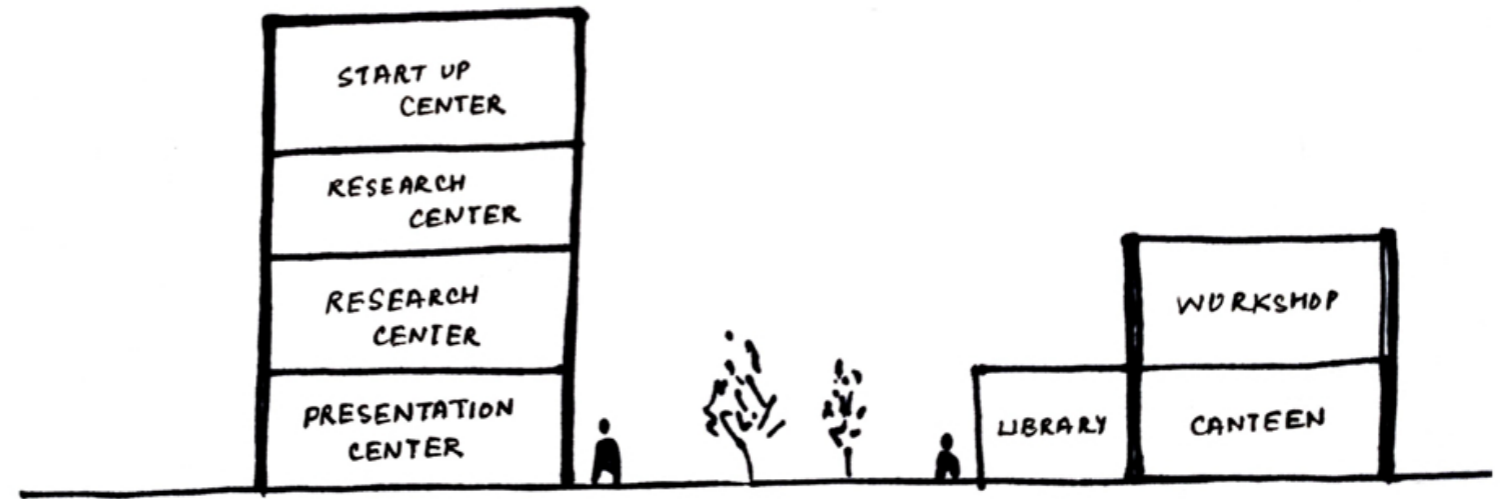
## Structural Analysis

Keeping intact the sub structure new super structure is designed with 5 times less load comparable to steel and concrete on foundations with less structural support making less cost of foundation and more life of structure.

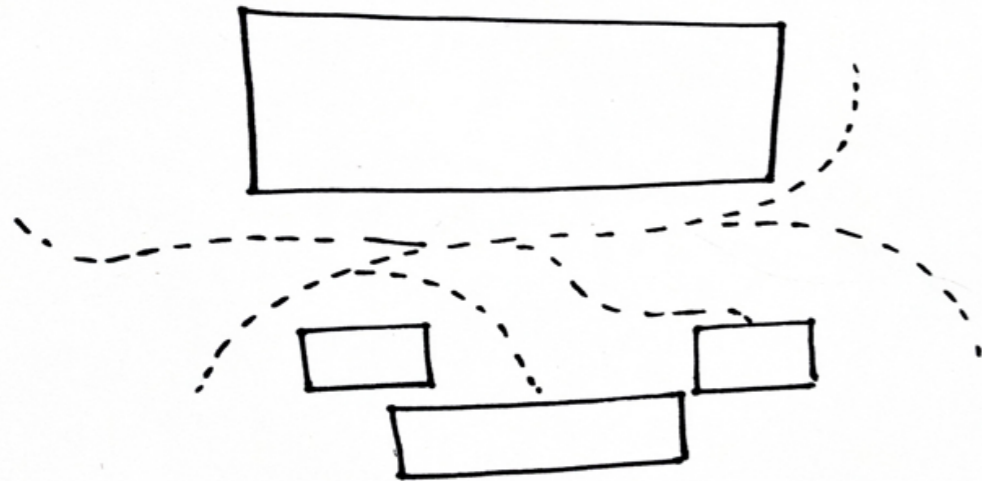
Glulam Beam and column is designed in the same grid as present condition with connection to the foundation and efficient load transfer with less support saving the overall construction cost.

# 6 CONCEPT

With rapid global change and climate issues, today it has come in major concern and as architects, we are responsible for it. Our concept evolved from nature itself. Building forest in concrete jungle is something that we believe the future and one of the only possible way to build sustainably. We planned to design a fully net zero building starts with manufacturing of the materials to its execution on site. The building is planned to use optimum natural ventilation and illumination. The central courtyard plays an important role in controlling the microclimate of the zone. The placement of the blocks is done according to the solar incidents and to cut off the glare to get glare free interiors for study, meeting, leisure etc. Studying the sciography of the courtyard the placement of library, workshop and canteen block is done to remain in shade in have least heat gain and function with passive strategies. Vertical & horizontal louvers are designed to cut south sun and all the service core are kept on south façade to reduce heat gain inside.



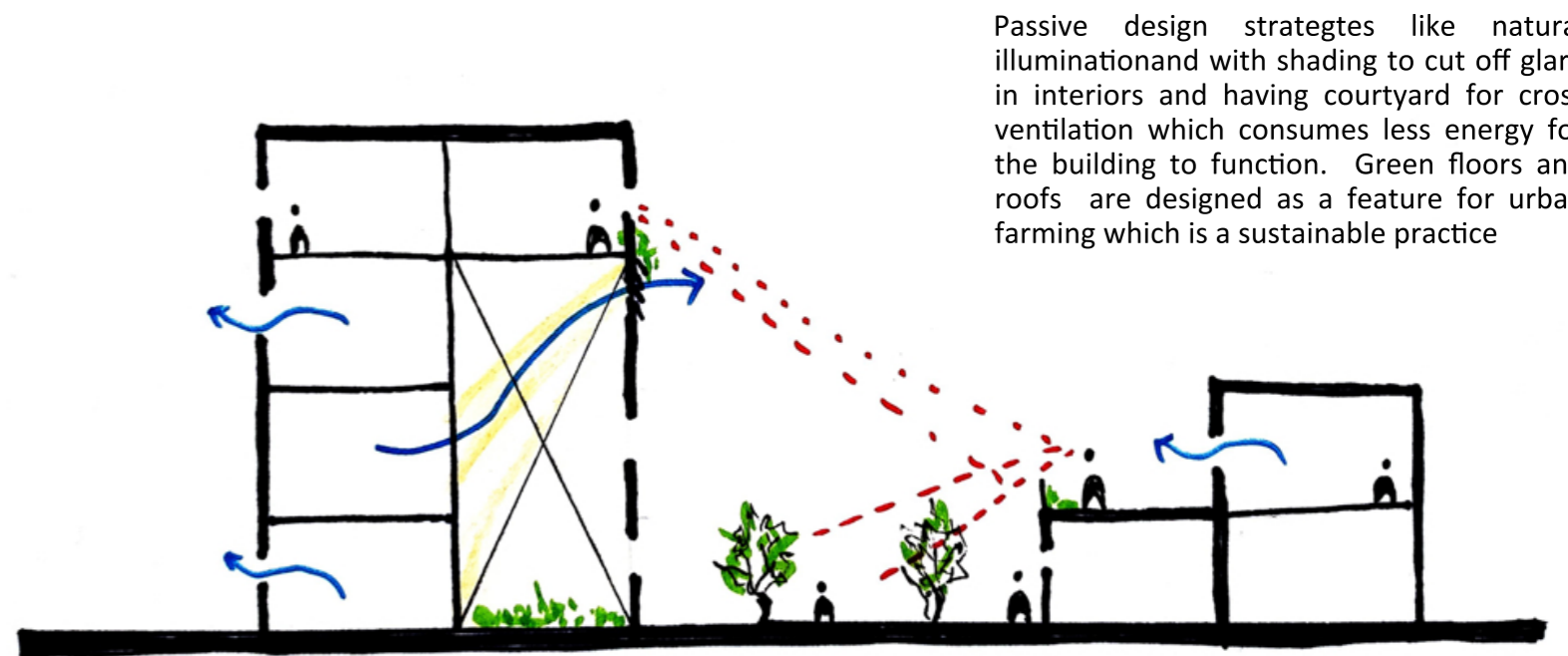
VERTICAL STACKING ACCORDING TO FOOTCANDLE AND FUNCTION



ORGANIZED CIRCULATION AND INTERACTIVE SPACE

Blocks are designed with intermediate green spaces which allows more area of the blocks to have visual connection to outside and more surface area for natural illumination in the interiors.

Blocks are placed adjacent to the existing building - Faculty of food and technology building studying the sciography to reduce heat gain from southern facade and are kept lower in height.

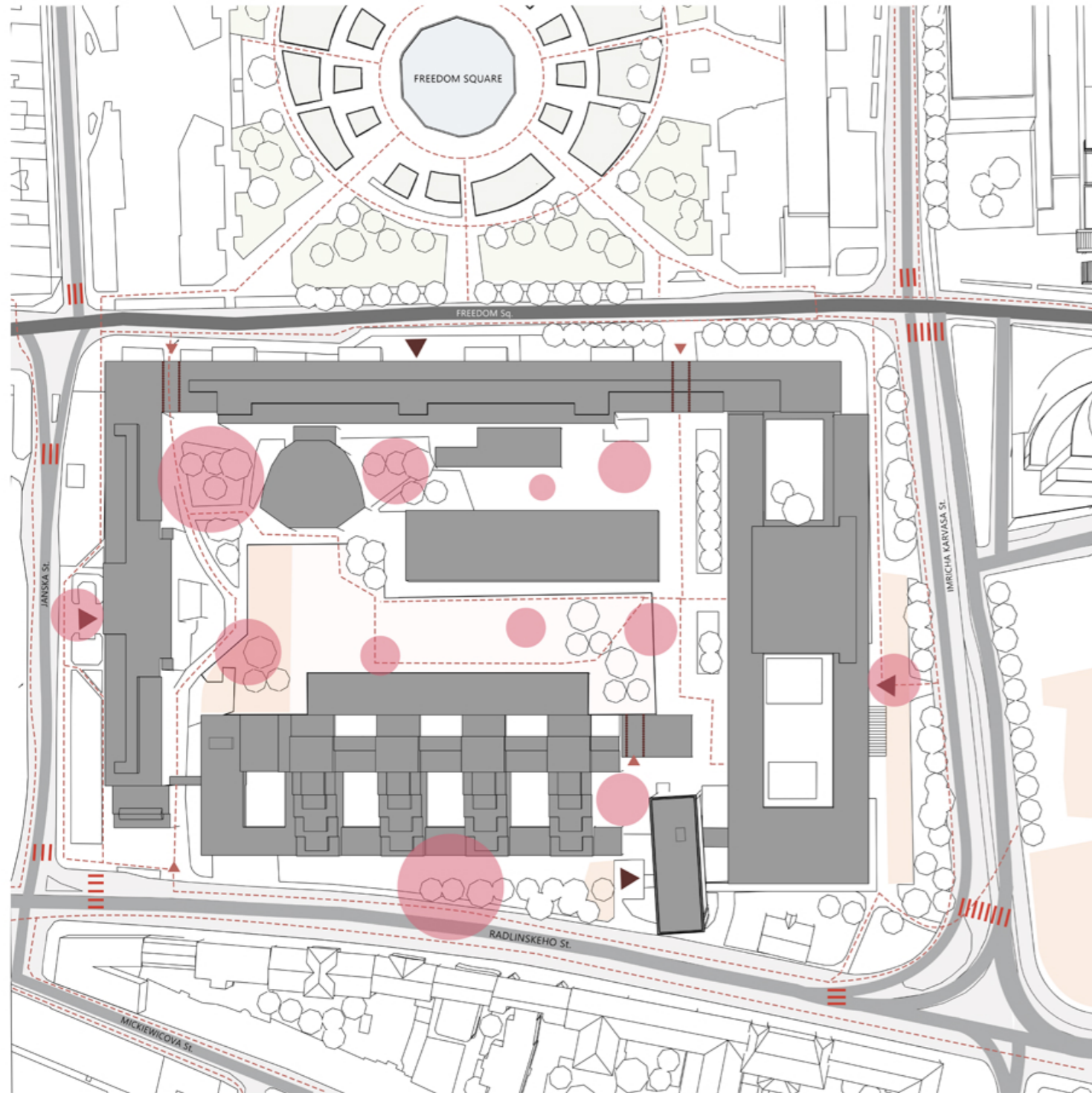


Passive design strategies like natural illumination and with shading to cut off glare in interiors and having courtyard for cross ventilation which consumes less energy for the building to function. Green floors and roofs are designed as a feature for urban farming which is a sustainable practice

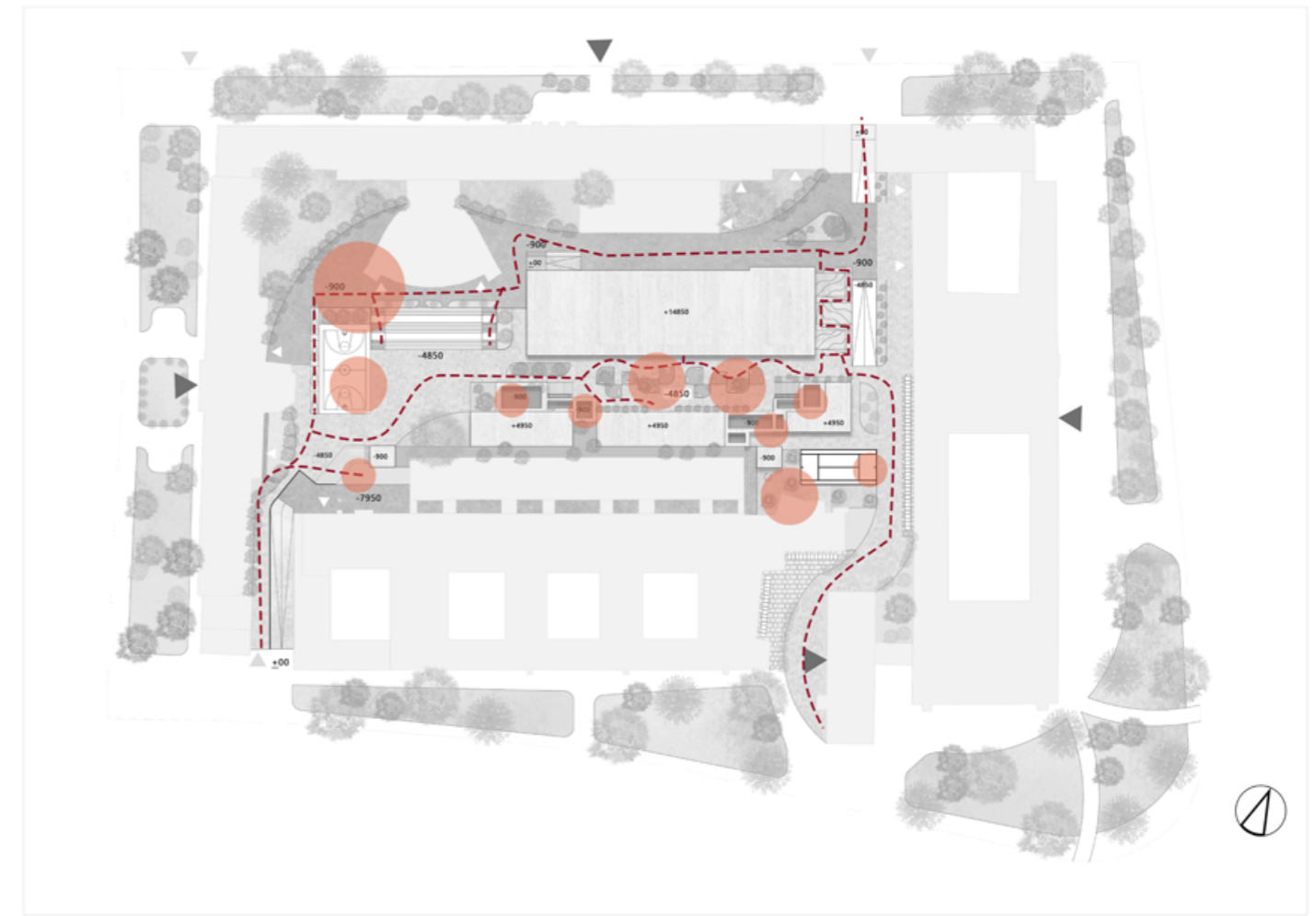
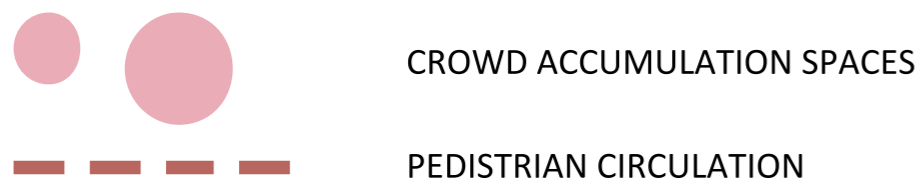
VISUAL CONNECTIVITY TO CENTRAL COURTYARD INDUCING STACK EFFECT

# 7 COMPARATIVE ANALYSIS

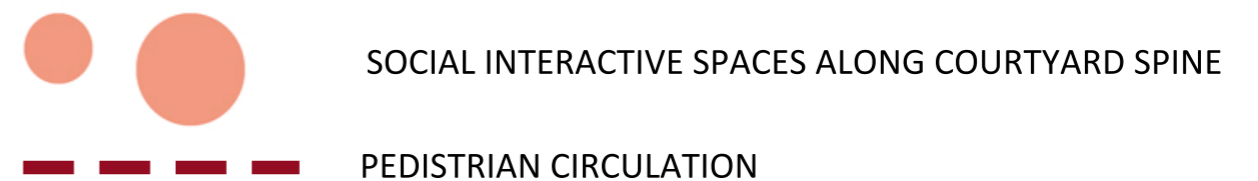
## CIRCULATION AND PUBLIC GATHERING



EXISTING SCENARIO



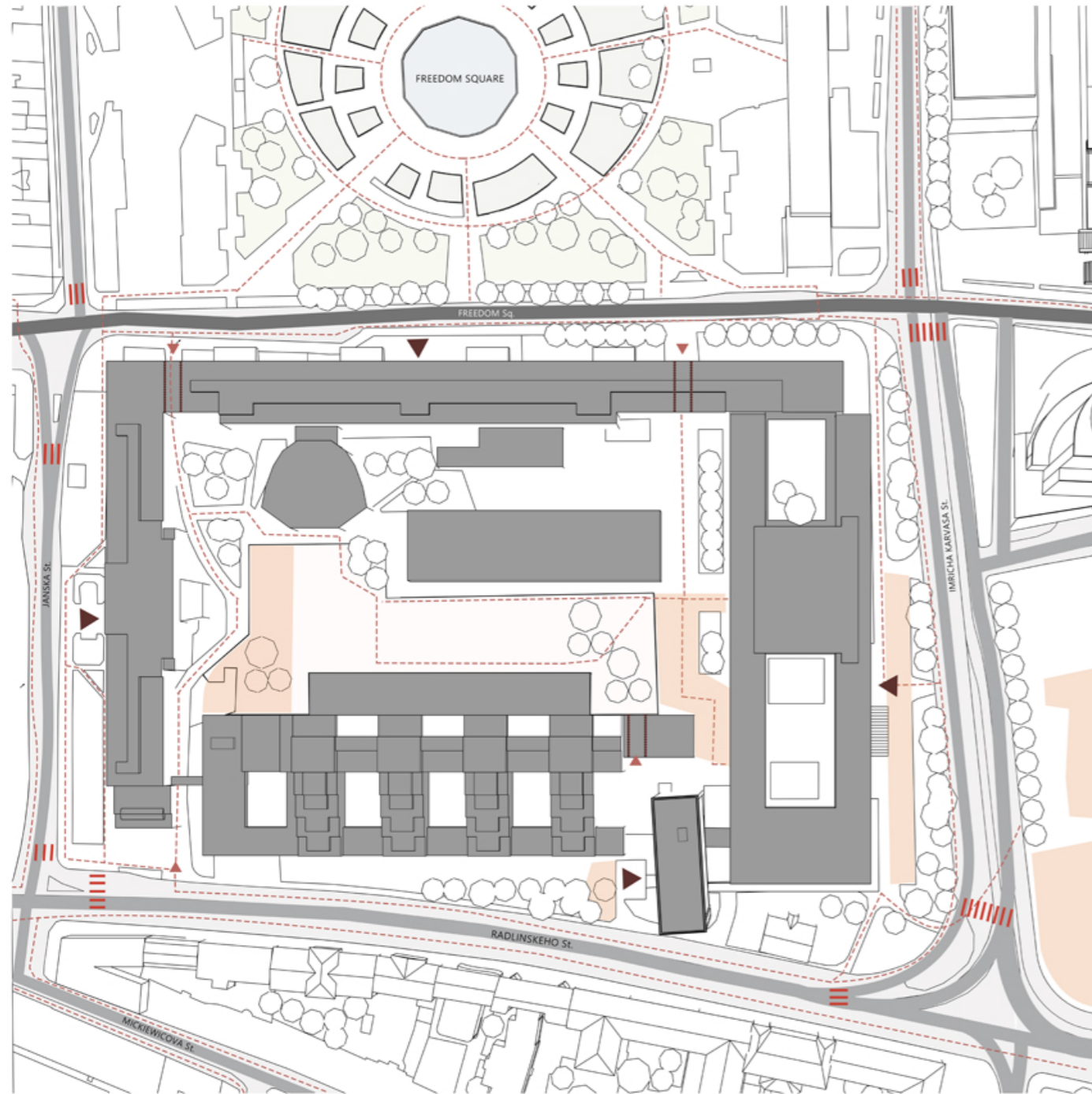
PROPOSED SCENARIO



Having temporary smaller structure in the courtyard, a central atrium space essential for any organization was missing within the site that created haphazard crowd intense zone amidst concrete towers.

In the proposal the building blocks for the center of innovation has been distributed such that a warm welcoming central space is created which is like a central spine for circulation pattern as well. This arrangement not only organizes the site level crowd but also creates a sense of community and belongingness among the members associated with the institution. Ample green interactive zones are added to promote eco-friendly living.

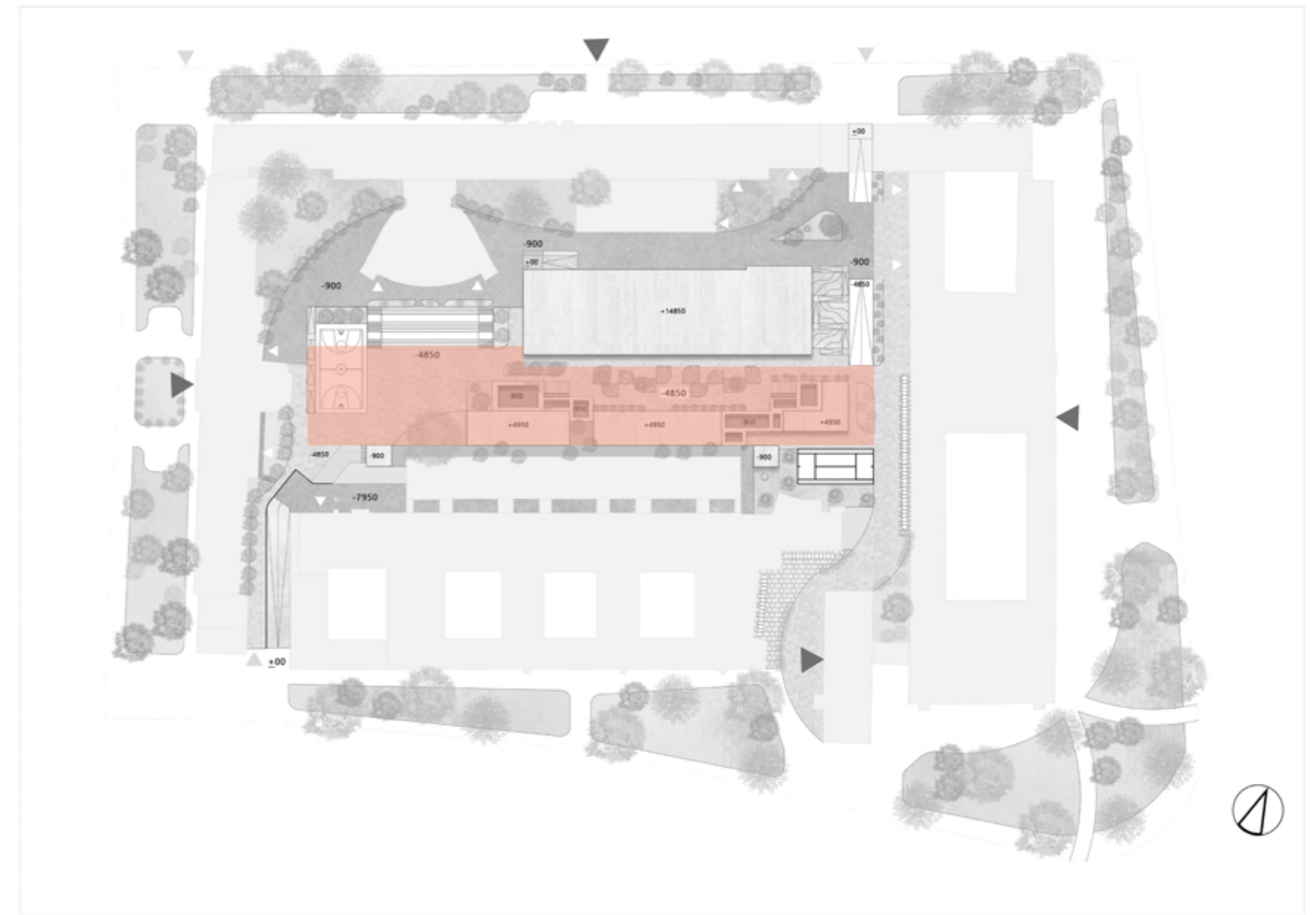
# PARKING PROBLEM



**EXISTING SCENARIO**

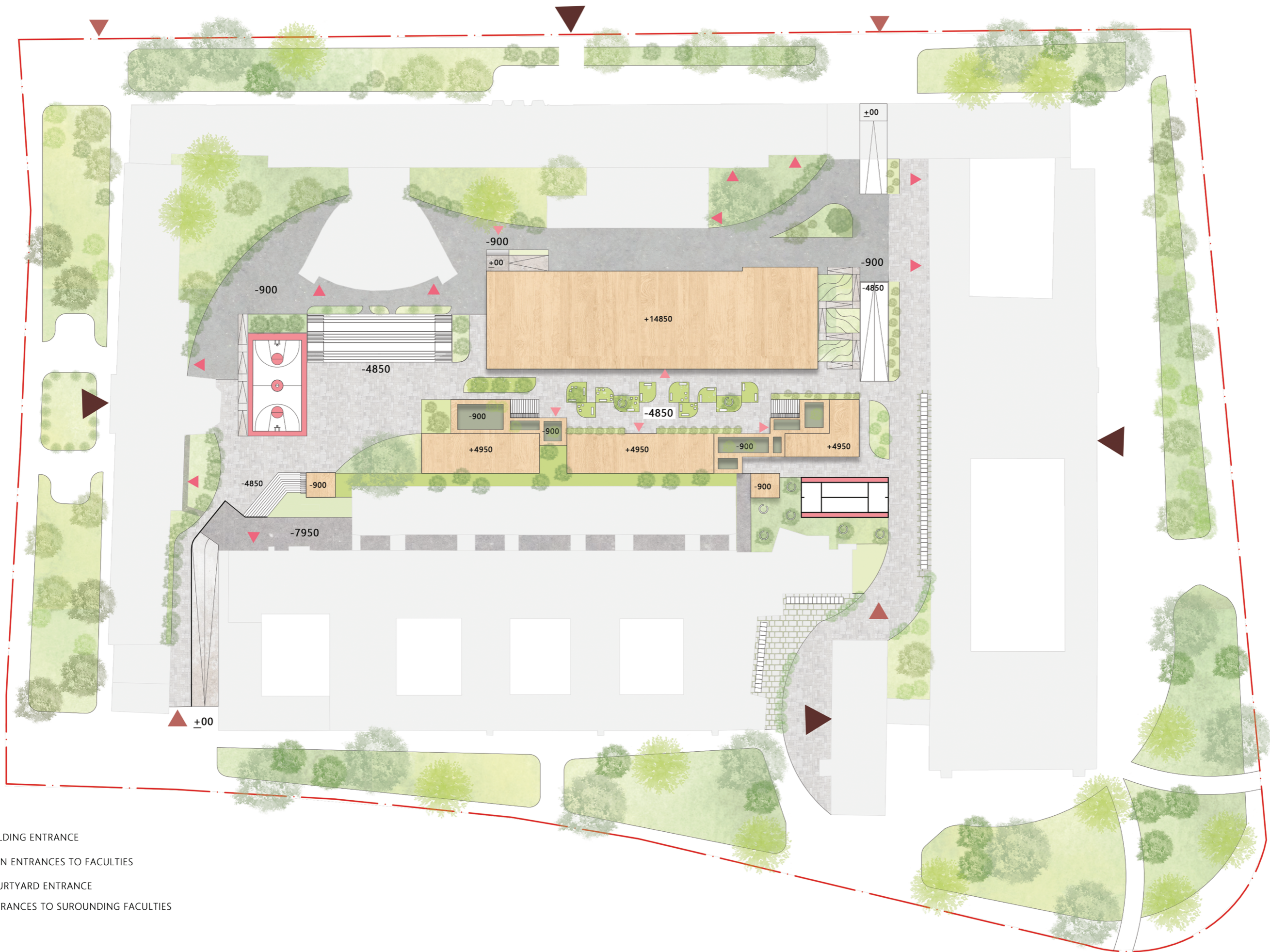
The major problem within the site seemed to be lack of surface parking space which has caused the space to look very disorganized. The vehicular and pedestrian circulation was also not definite in the existing situation for which congestion and havoc was common in crucial hours.

In the proposed design the vehicular circulation is directly from access roads leading to the basement and connecting the other exit point without any surface movement of automobiles making it safe as well as organized.



**PROPOSED SCENARIO**



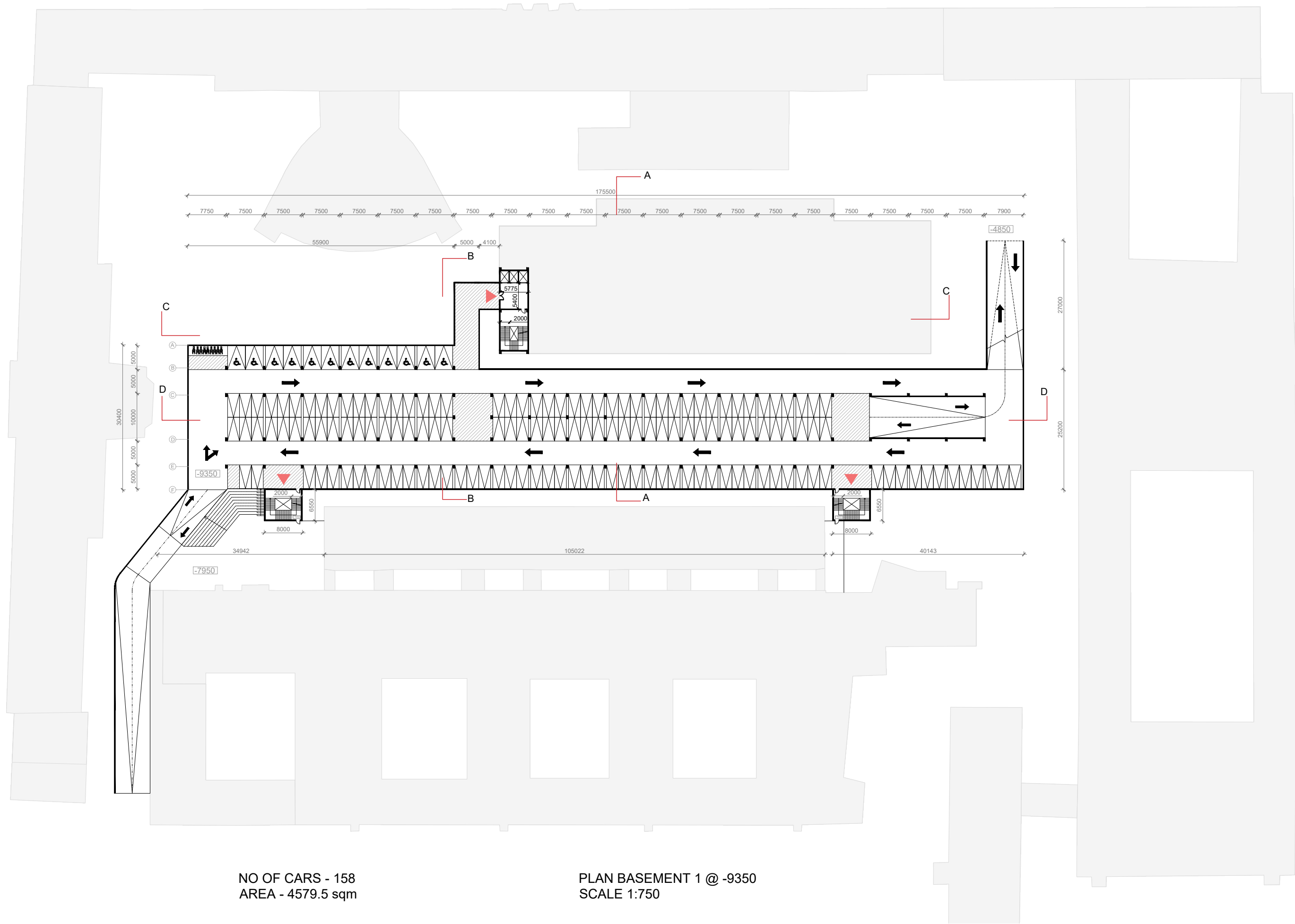


- ▶ BUILDING ENTRANCE
- ▶ MAIN ENTRANCES TO FACULTIES
- ▶ COURTYARD ENTRANCE
- ▶ ENTRANCES TO SURROUNDING FACULTIES



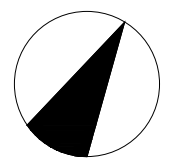
SCALE- 1:1000

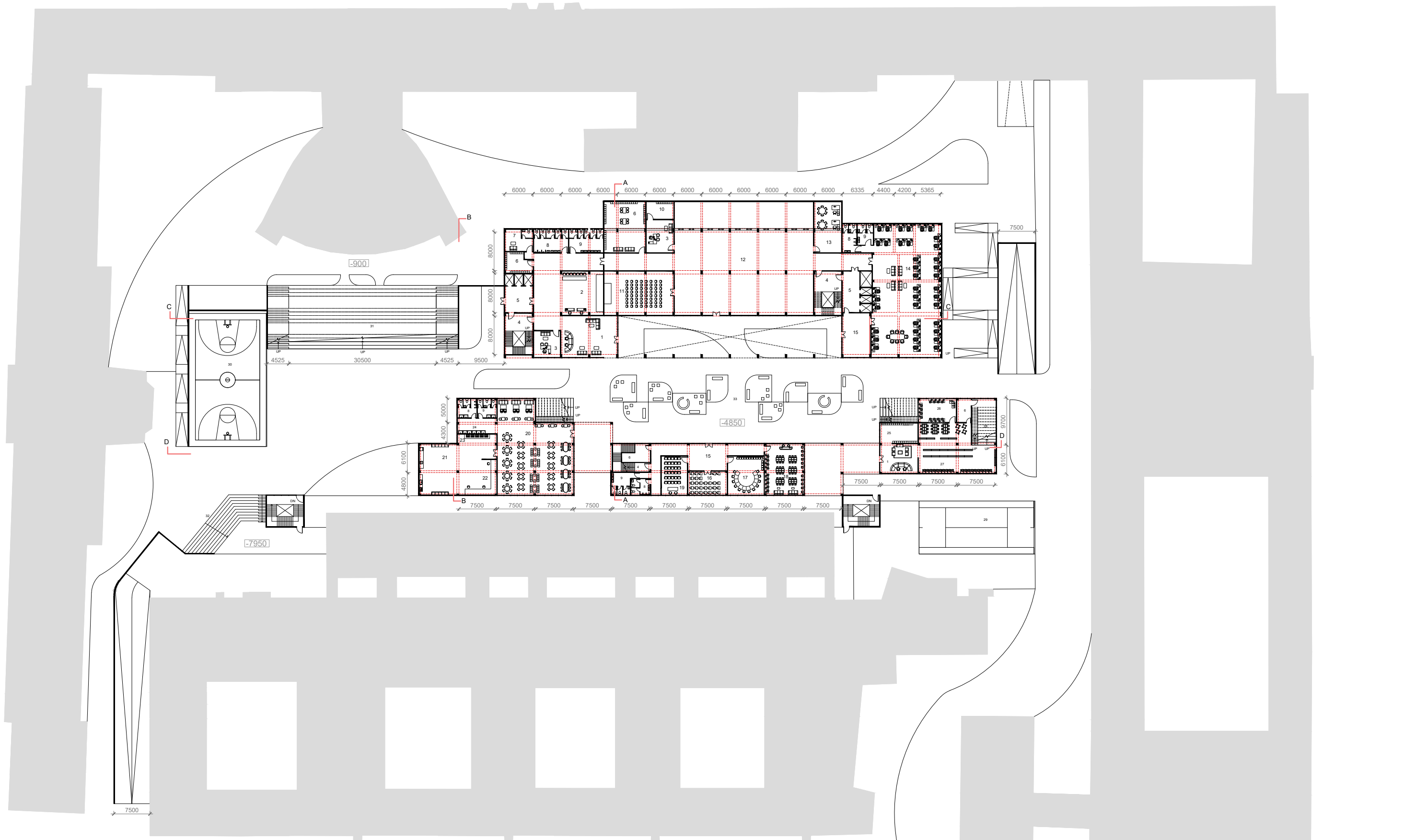




NO OF CARS - 158  
 AREA - 4579.5 sqm

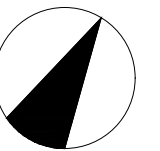
PLAN BASEMENT 1 @ -9350  
 SCALE 1:750



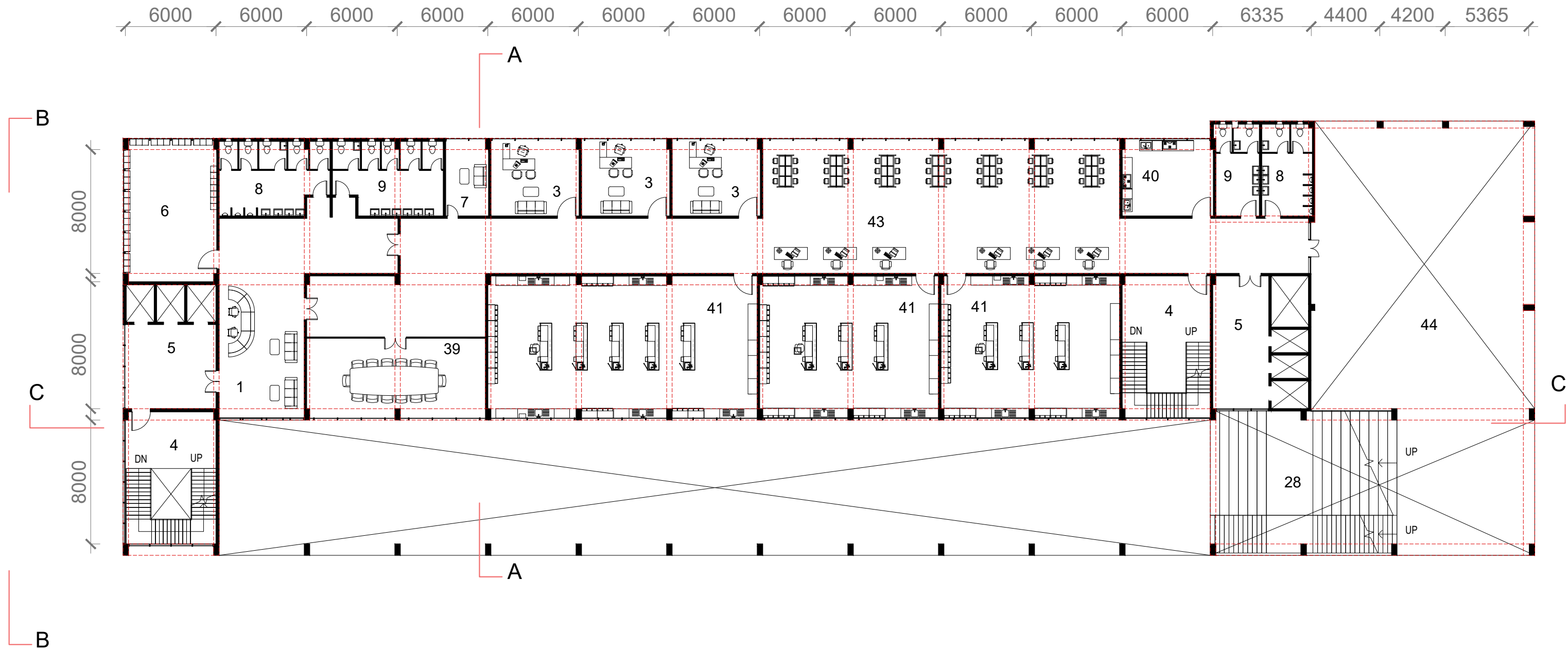


- |                   |                         |                     |                     |
|-------------------|-------------------------|---------------------|---------------------|
| 1 RECEPTION       | 11 SCREENING ROOM       | 21 KITCHEN          | 31 OPEN AIR THEATRE |
| 2 PRINT ZONE      | 12 EXPERIENTIAL CENTRE  | 22 SERVING COUNTER  | 32 LEISURE SEATING  |
| 3 OFFICE          | 13 INFO STUDY ROOM      | 23 WASH AREA        | 33 COURTYARD        |
| 4 STAIRCASE       | 14 TECHNICAL BACKGROUND | 24 HAND WASH        |                     |
| 5 LIFT LOBBY      | 15 ENTRANCE FOYER       | 25 LOCKER ROOM      |                     |
| 6 STORAGE         | 16 CLASSROOM            | 26 DIGITAL LIBRARY  |                     |
| 7 JANITOR ROOM    | 17 MULTI-PURPOSE HALL   | 27 LIBRARY          |                     |
| 8 MALE TOILET     | 18 STUDY ROOM           | 28 CASUAL SEATING   |                     |
| 9 FEMALE TOILET   | 19 LEISURE ROOM         | 29 TENNIS COURT     |                     |
| 10 OFFICE STORAGE | 20 CANTEEN              | 30 BASKETBALL COURT |                     |

FLOOR PLATE AREA 3650sqm  
**GROUND FLOOR PLAN @ -4850**  
 (SCALE 1:750)



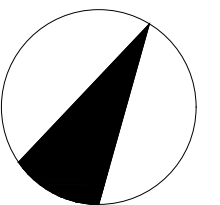




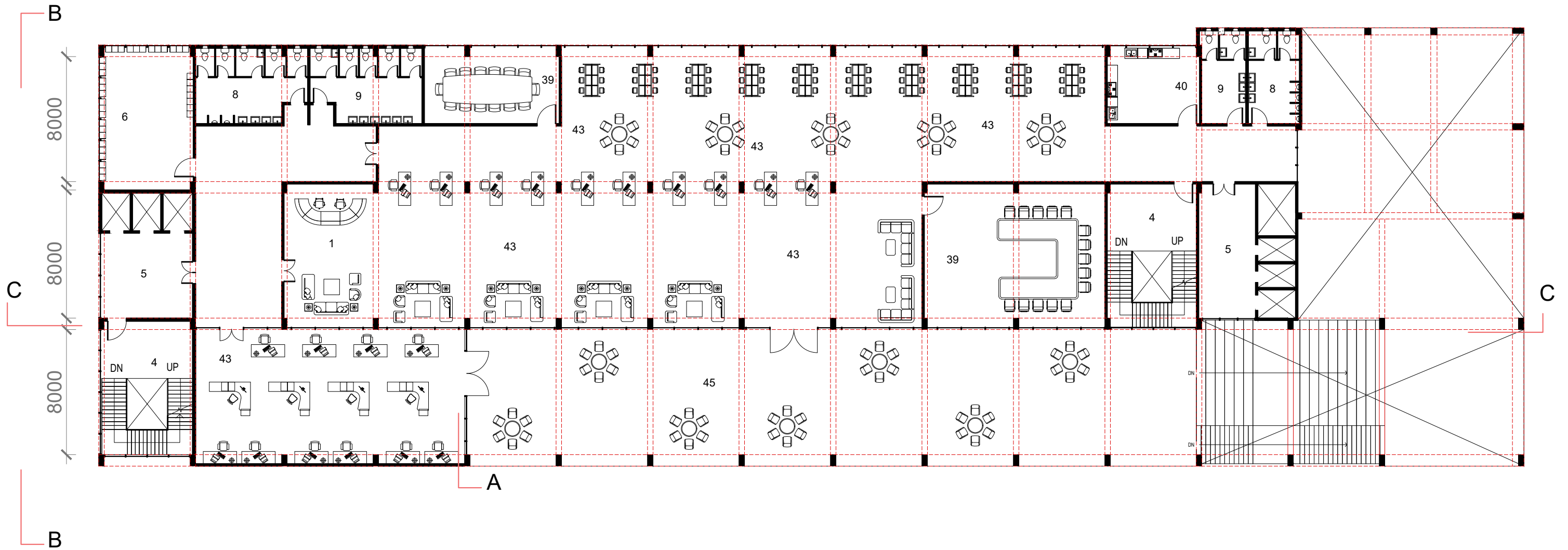
- |                 |                 |
|-----------------|-----------------|
| 39 MEETING ROOM | 8 MALE TOILET   |
| 40 PANTRY       | 9 FEMALE TOILET |
| 41 LABORATORY   | 4 STAIRCASE     |
| 44 SOCIAL SPACE | 5 LIFT LOBBY    |
|                 | 6 STORAGE       |
|                 | 7 JANITOR ROOM  |
|                 | 1 RECEPTION     |
|                 | 3 OFFICE        |

FLOOR PLATE AREA 1995 sqm

**SECOND FLOOR PLAN @ +4950**  
(SCALE 1:250)



6000 6000 6000 6000 6000 6000 6000 6000 6000 6000 6000 6000 6335 4400 4200 5365

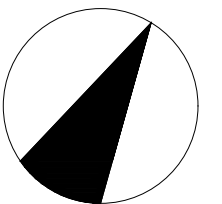


- 39 MEETING ROOM
- 40 PANTRY
- 41 LABORATORY
- 43 CO-WORKING SPACE
- 44 SOCIAL SPACE
- 45 OUTDOOR COVERED CO-WORK
- 8 MALE TOILET
- 9 FEMALE TOILET
- 4 STAIRCASE
- 5 LIFT LOBBY
- 6 STORAGE
- 1 RECEPTION
- 3 OFFICE

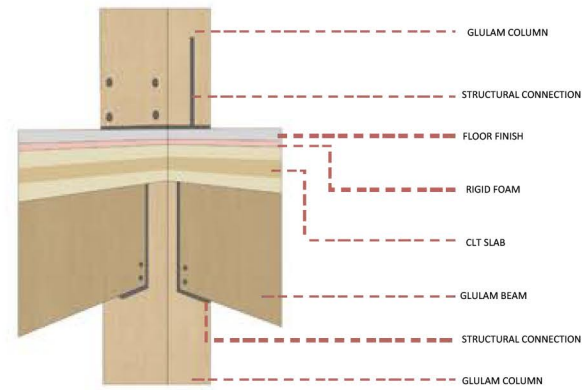
FLOOR PLATE AREA 1900 sqm

## THIRD FLOOR PLAN @ +9900

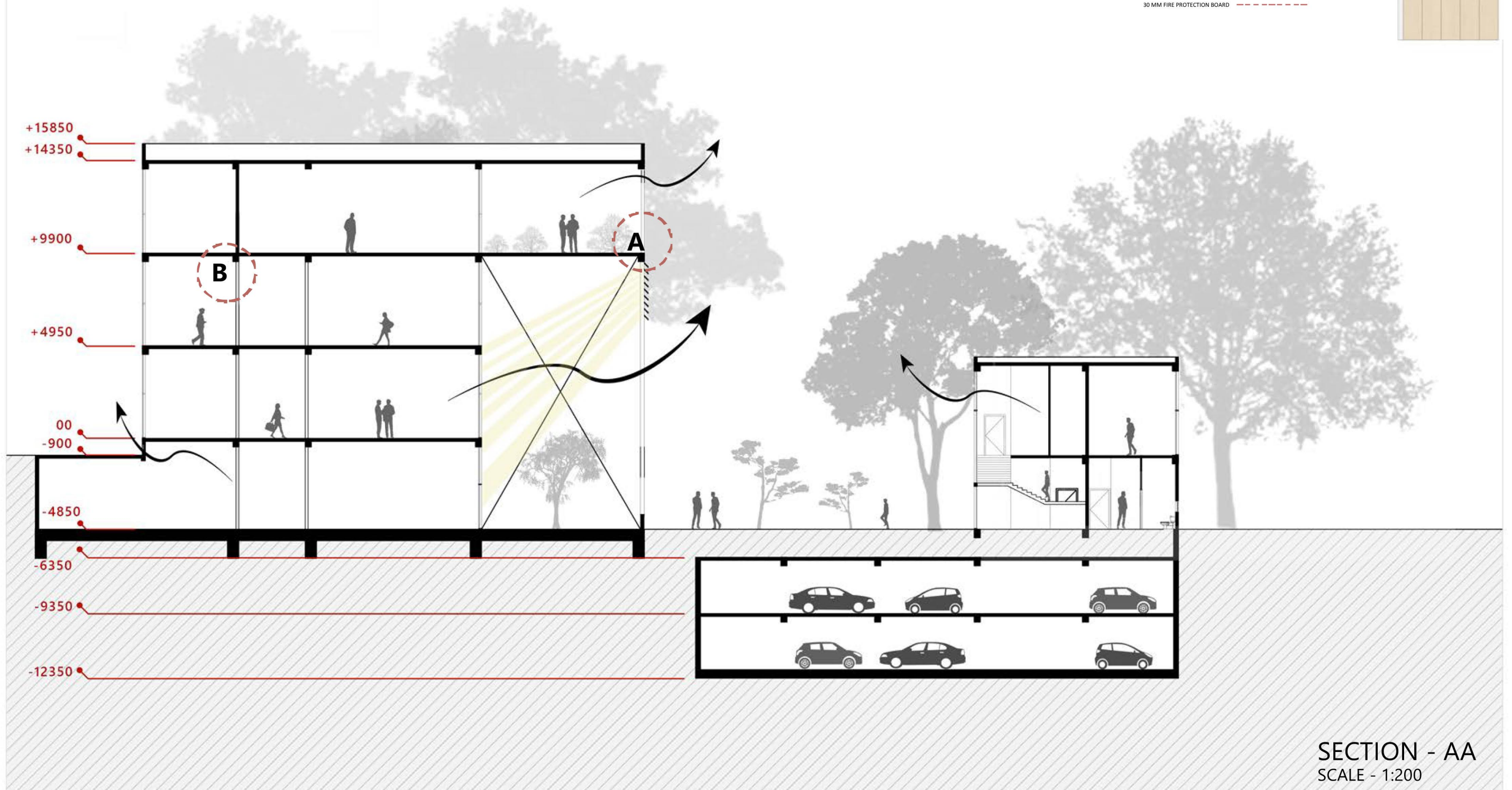
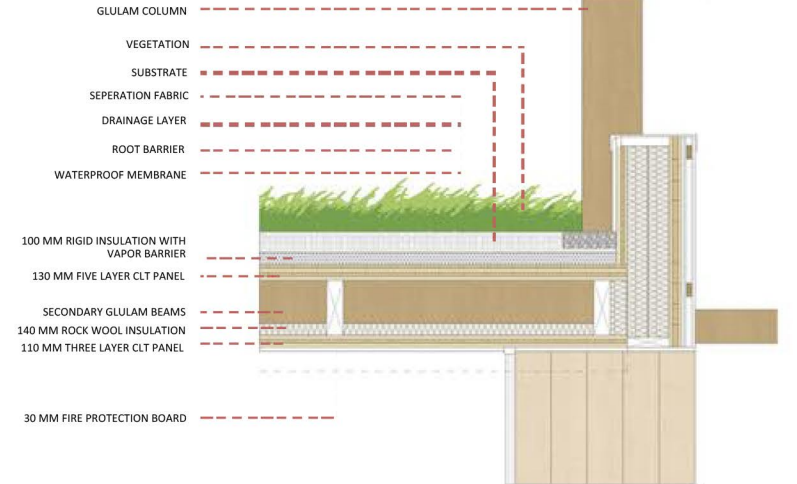
(SCALE 1:250)



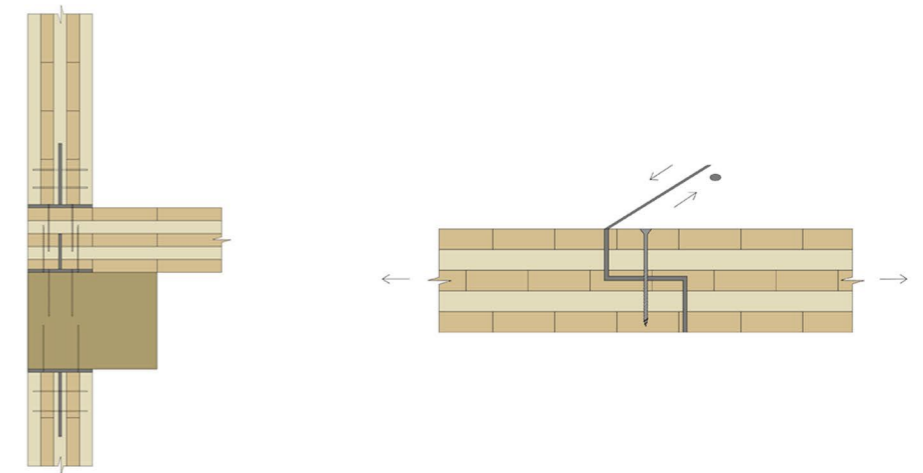
## B - GLULAM COLUMN BEAM AND FLOR CONNECTION



## A - GREEN ROOF / SLAB DETAIL

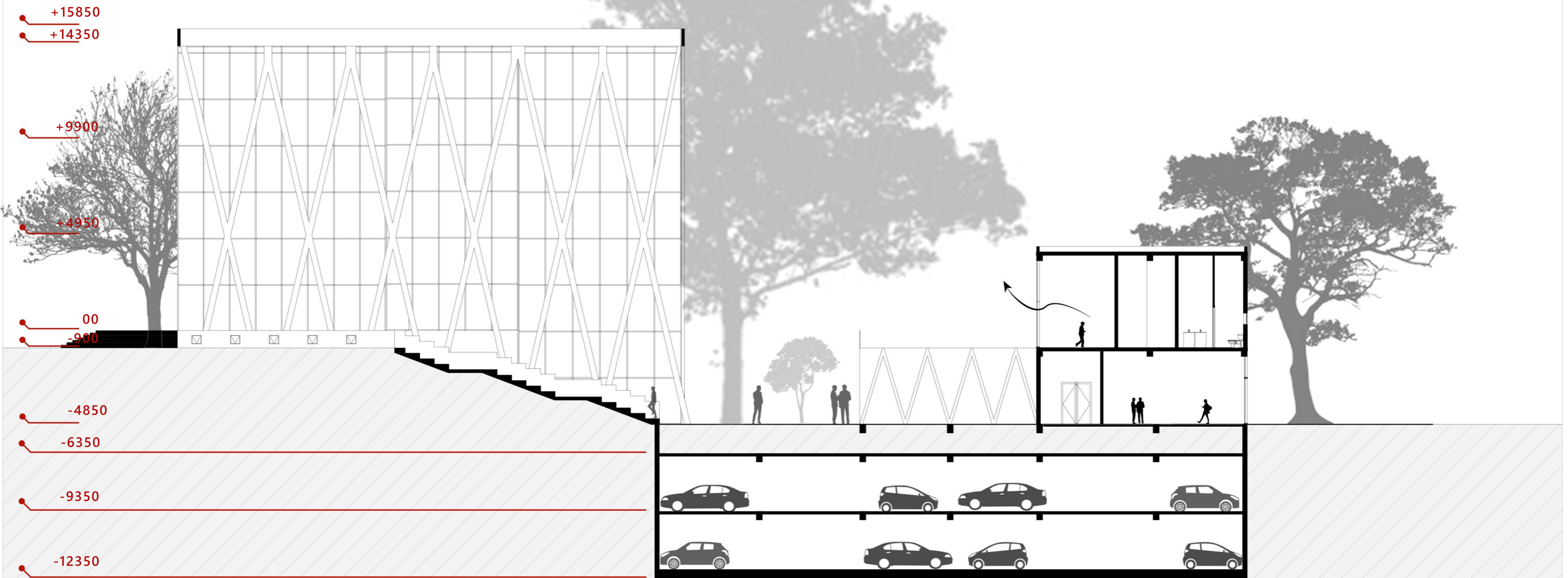


SECTION - AA  
SCALE - 1:200

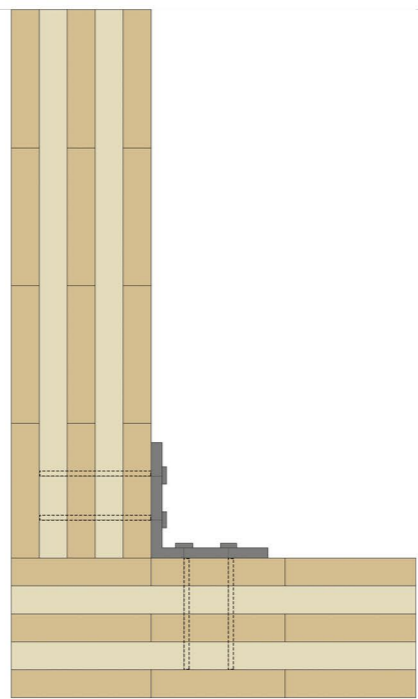


**GLULAM BEAM AND  
SLAB CONNECTION**

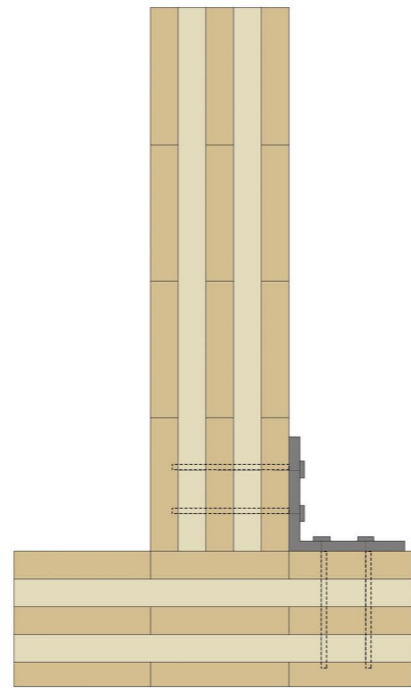
**CLT SLAB TO SLAB  
CONNECTION**



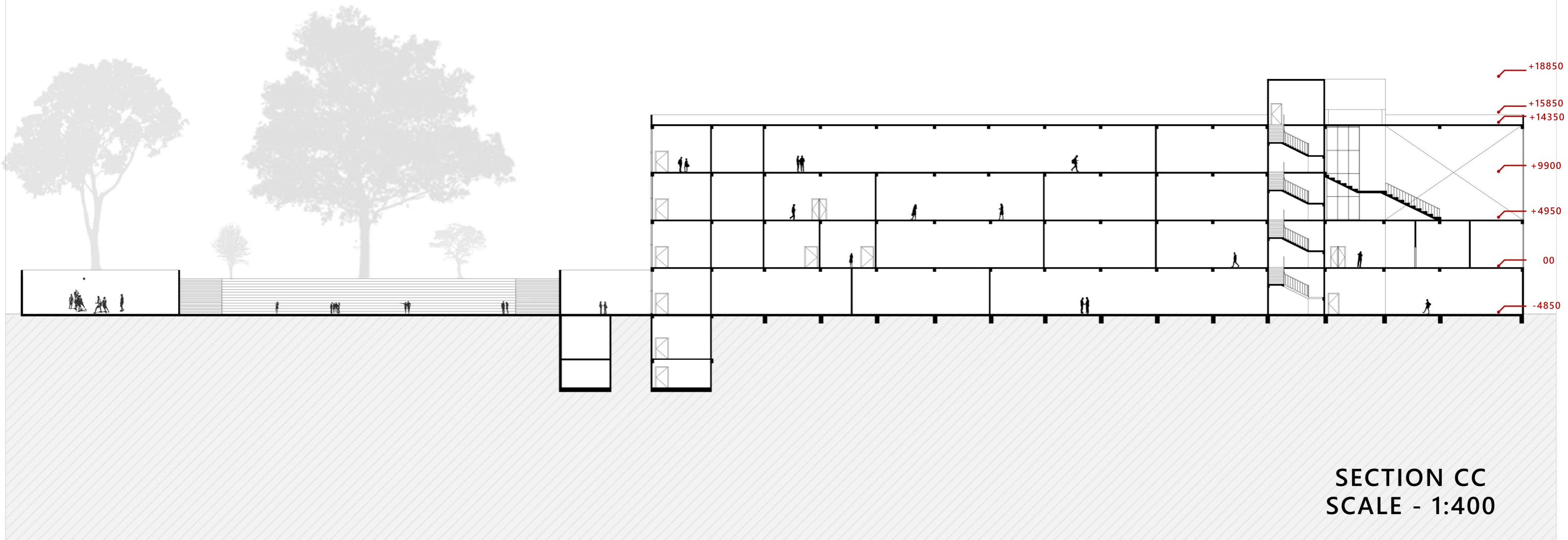
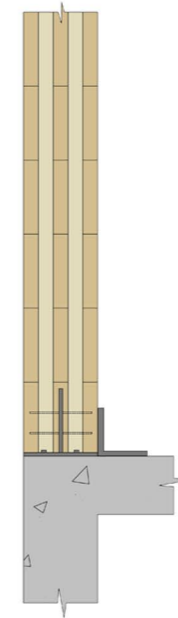
**SECTION BB  
SCALE - 1:200**



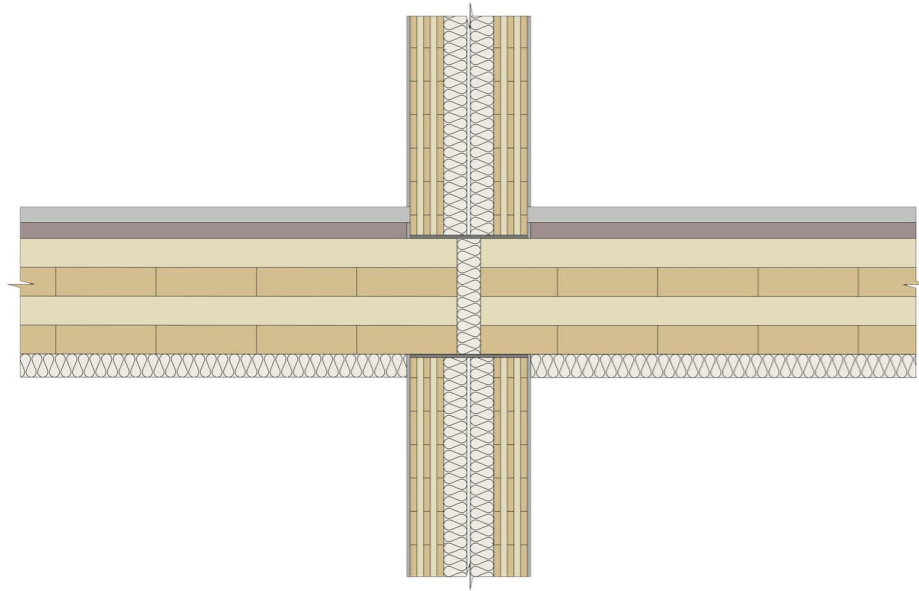
CLT WALL TO SLAB JOINTS



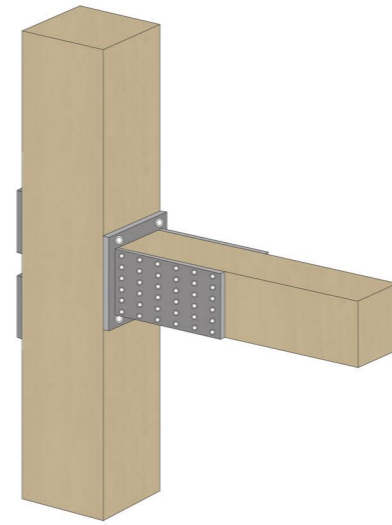
CLT WALL TO CONCRETE FOUNDATION CONNECTION



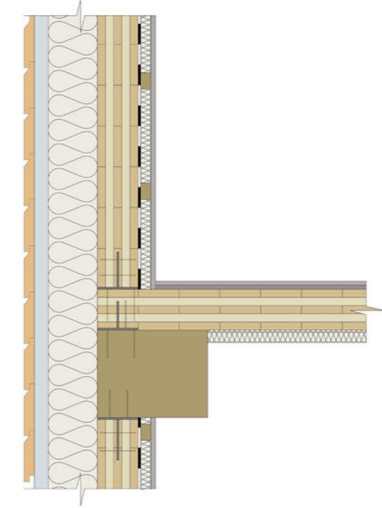
SECTION CC  
SCALE - 1:400



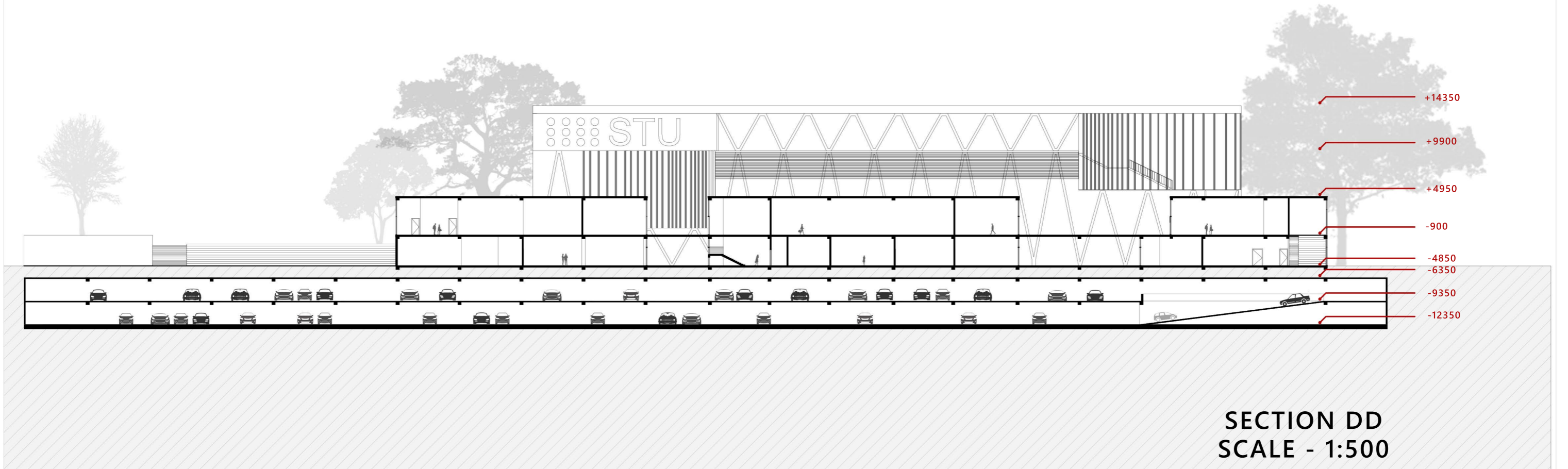
**INSULATION IN INTERNAL LOAD BEARING WALLS**



**GLULAM COLUMN TO BEAM CONNECTION**



**EXTERNAL WALL INSULATION AND CLADDING**



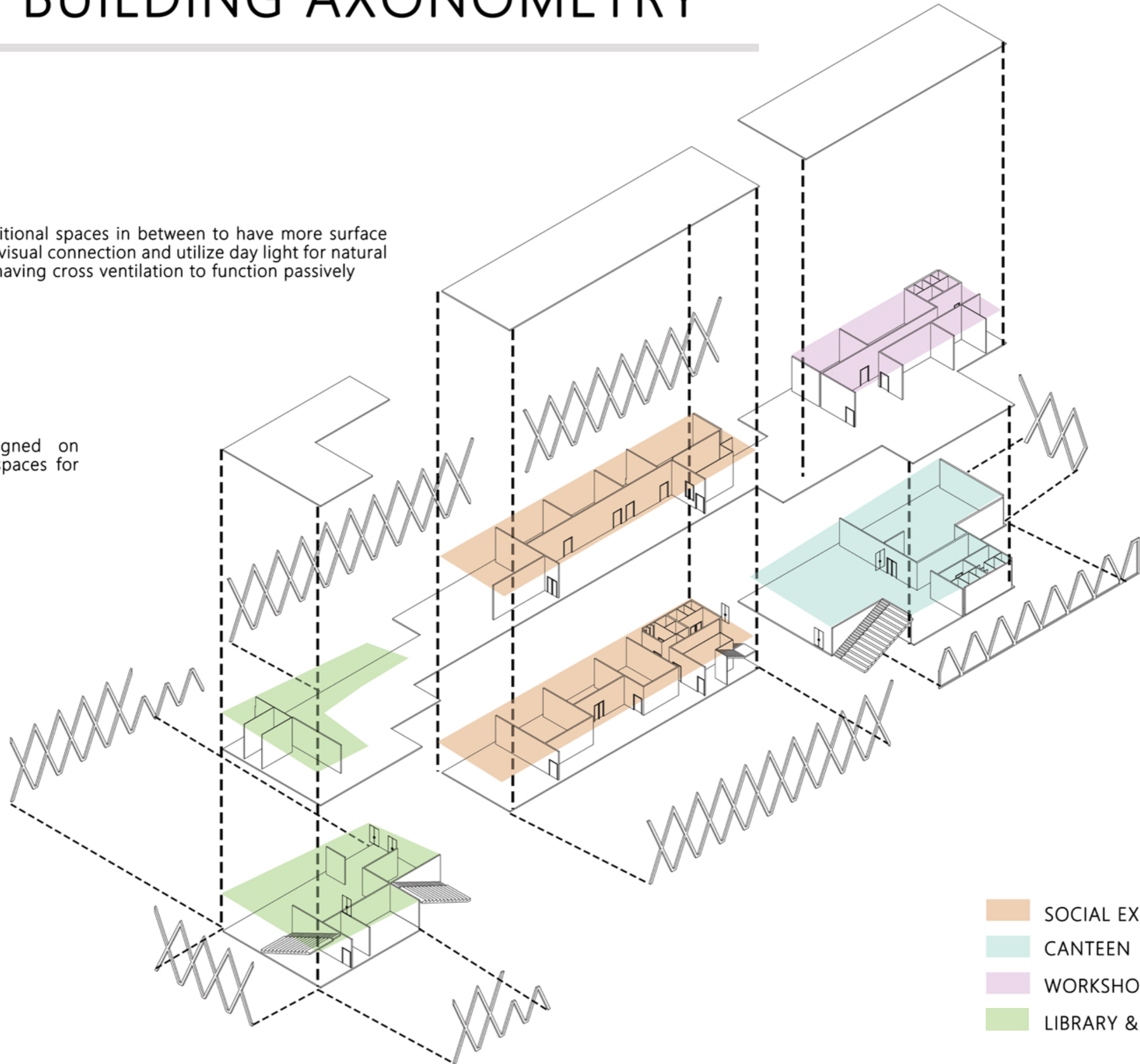
**SECTION DD  
SCALE - 1:500**

# 10

## BUILDING AXONOMETRY

Blocks placed with transitional spaces in between to have more surface area for indoor outdoor visual connection and utilize day light for natural illumination inside also having cross ventilation to function passively

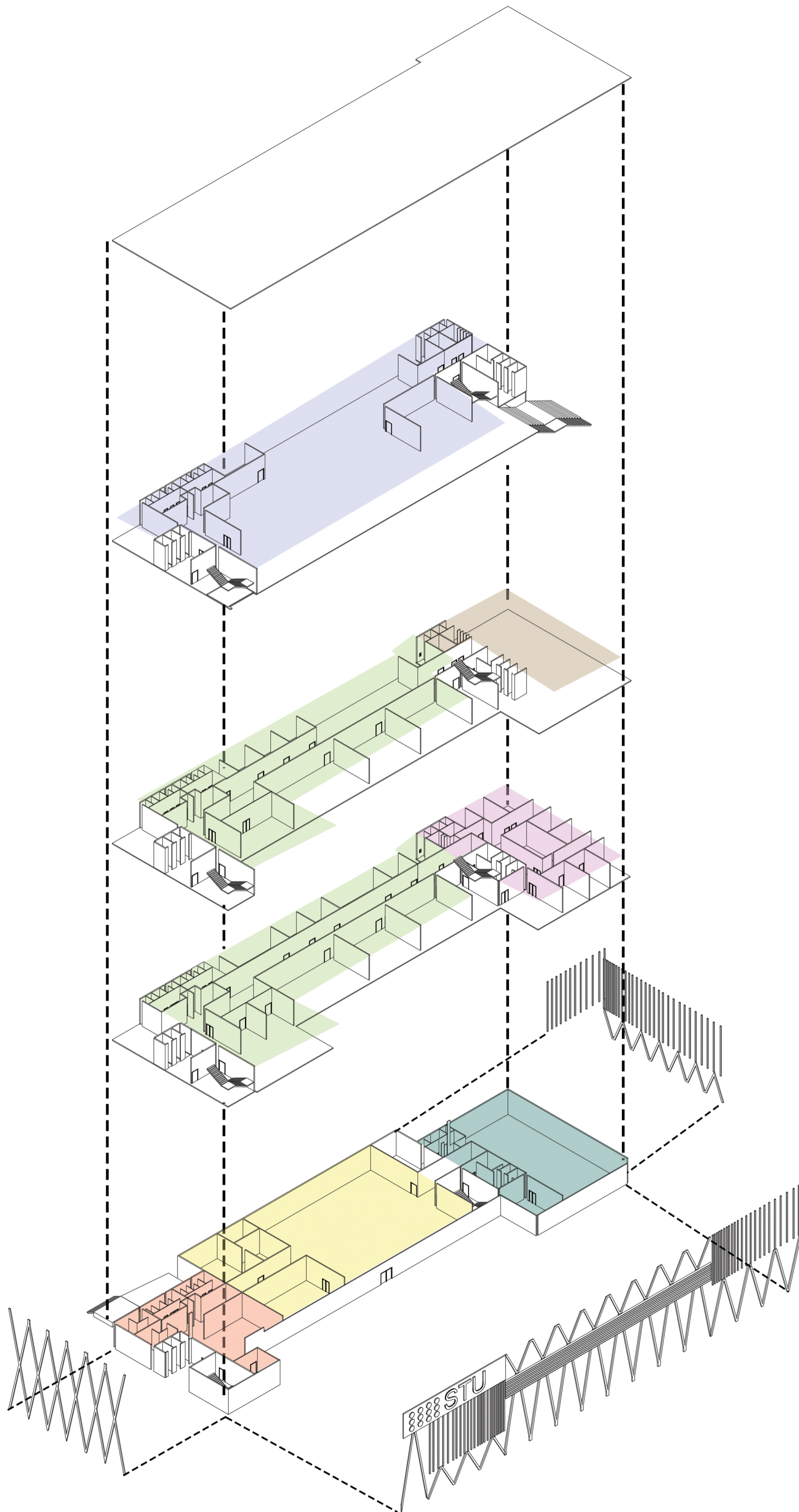
Green roofs are designed on upper floors as social spaces for gathering and leisure.



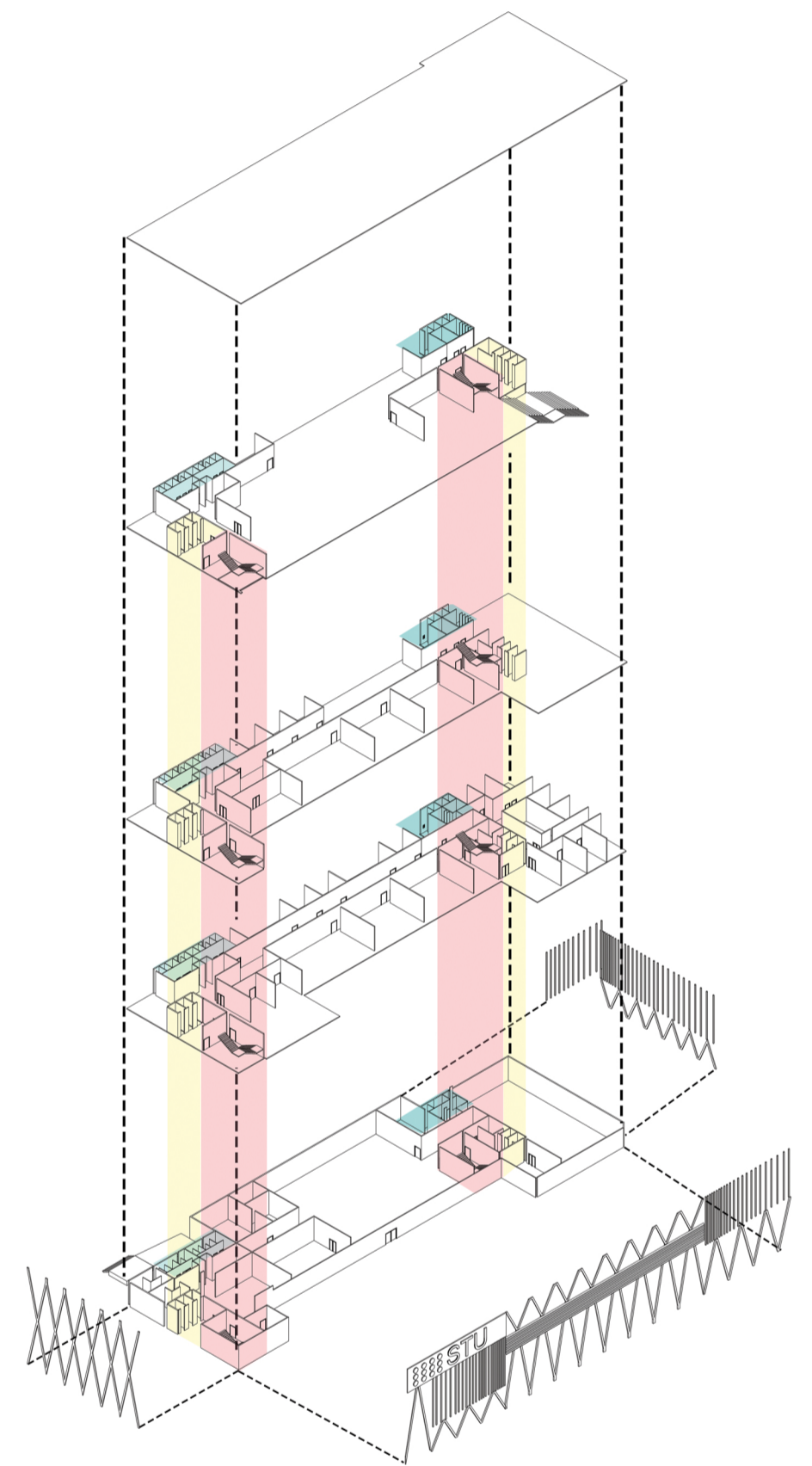
- SOCIAL EXHIBITION MULTIPURPOSE
- CANTEEN
- WORKSHOPS
- LIBRARY & MEDIA CENTER

# BUILDING AXONOMETRY

## REAEACH AND INNOVATION CENTER



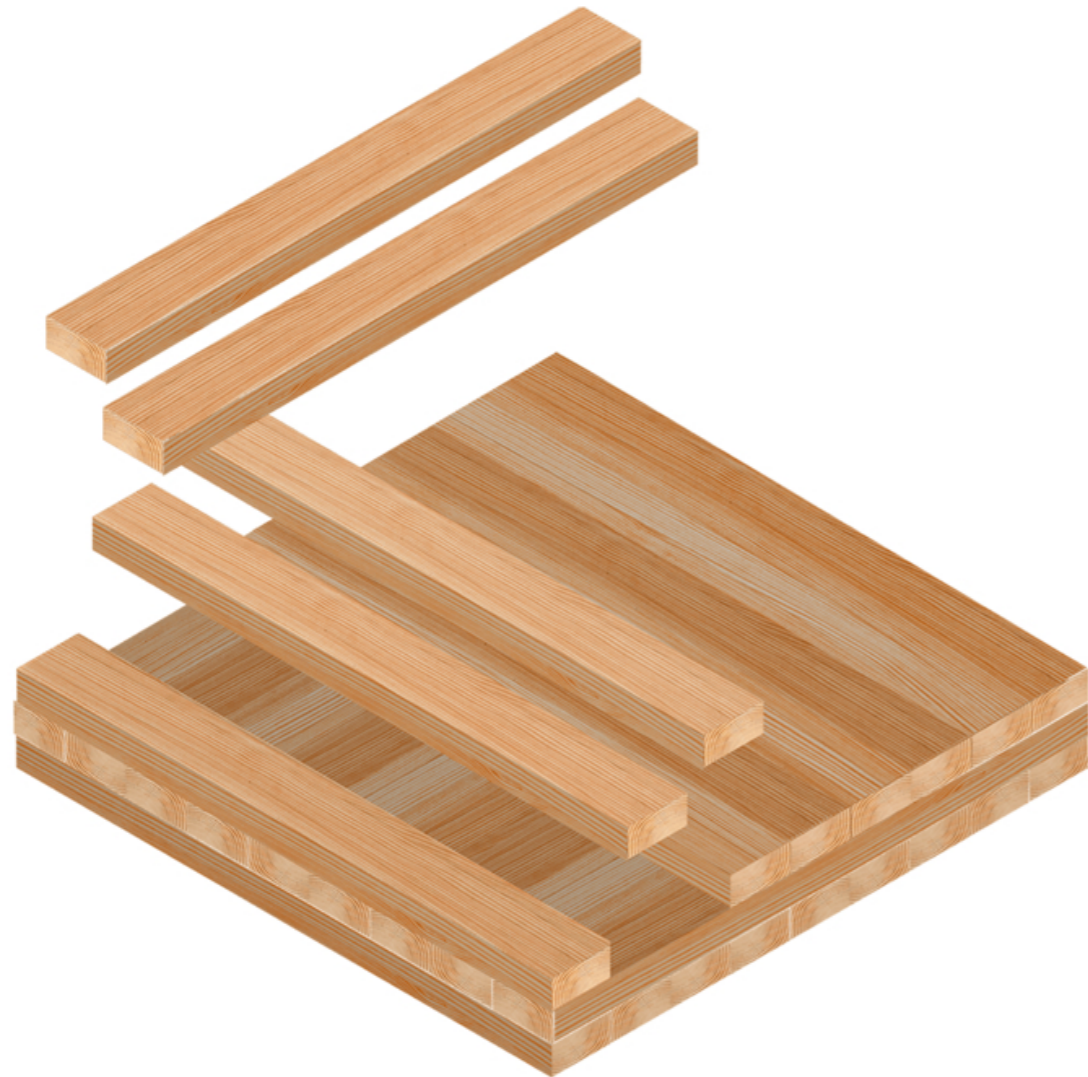
- VERTICAL TRANSPORTATION CORE
- LIFT CORE
- PLUMBING CORE



- |                      |                              |  |
|----------------------|------------------------------|--|
| RECEPTION LOBBY      | SEMI- OPEN SOCIAL SPACE      | EXPERINTIAL CENTER OF SCIENCE & RESEARCH |
| STARTUP CENTER       | OFFICE                       |  |
| TECHNICAL BACKGROUND | INNOVATION & RESEARCH CENTER |  |

# 11

## MATERIALITY & SUSTAINABILITY



Investing in a sustainable policy, CLT (Cross Laminated Timber) along with Glulam has been chosen as the primary building materials of the structure. The new timber technologies in the construction industry promises carbon neutrality along with an unique set of possibilities waiting for creative thinkers to play with.

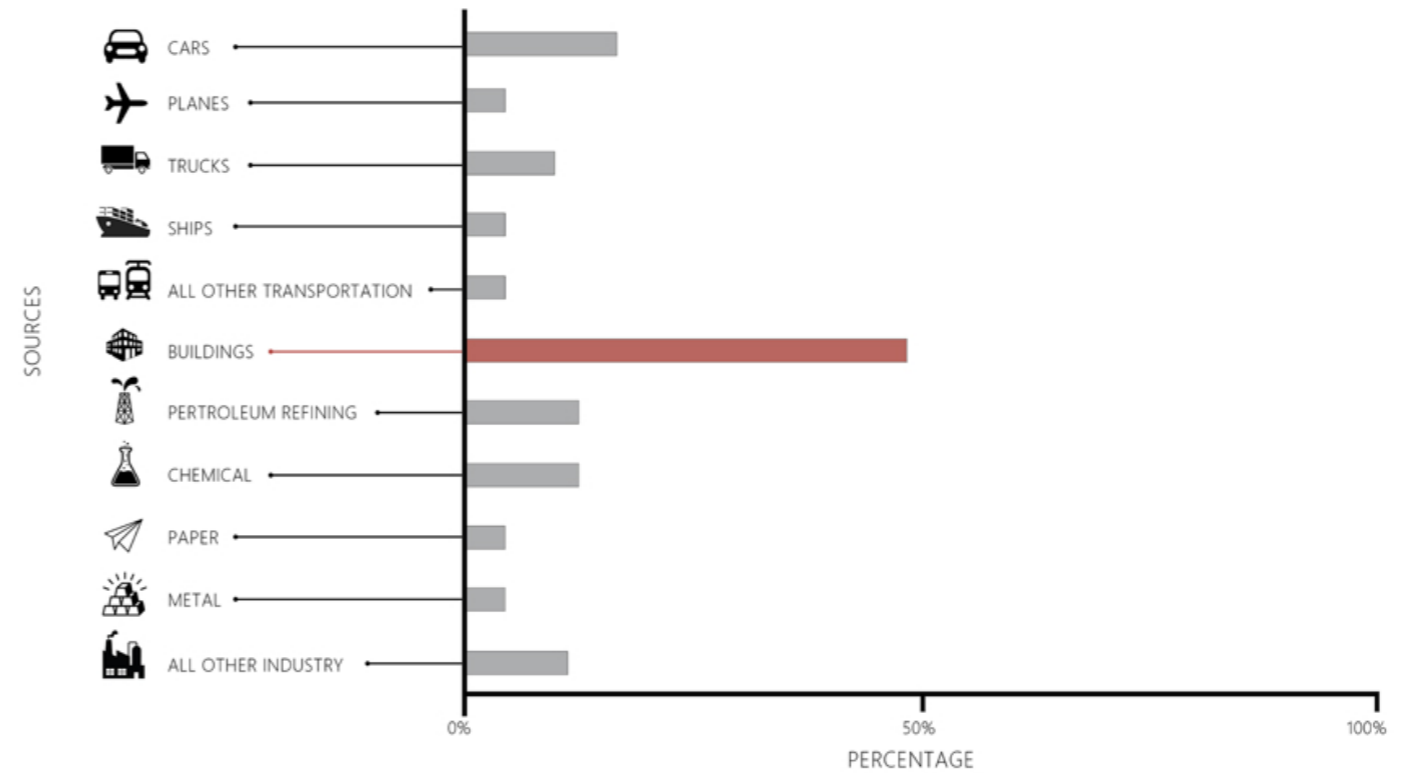
The buildings are imagined as modular CLT buildings that are prefabricated packed and quickly assembled on site. Almost every component of the building can be disassembled replaced and reused in the life span of the building.

Cross-laminated timber, or CLT, is touted as a more sustainable option for building construction than concrete and steel. Wood in CLT panels pulled CO<sub>2</sub> from the atmosphere, and that carbon should remain locked up as long as the building stands.

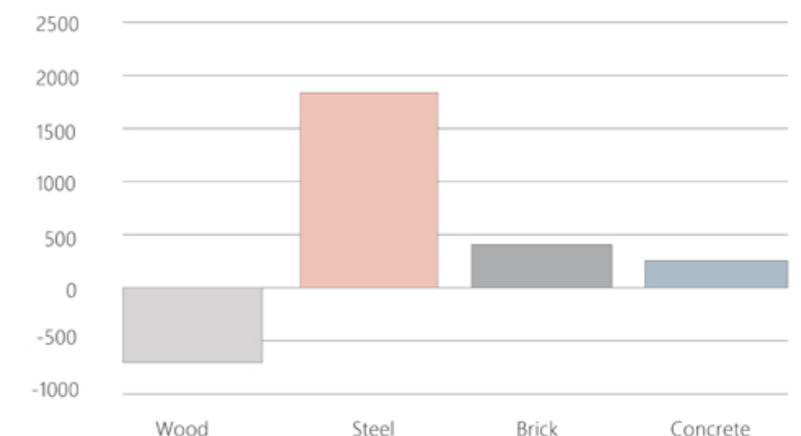
Timber construction on the other hand with Glulam and CLT do not rely on fossil fuels as timber sequesters carbon directly from atmosphere. One cubic meter of CLT would store 1-1.5 tons of CO<sub>2</sub>. CLT is lightweight, cost-effective, installed rapidly and versatile.

Cross-laminated timber, or CLT, is touted as a more sustainable option for building construction than concrete and steel. ... Wood in CLT panels pulled CO<sub>2</sub> from the atmosphere, and that carbon should remain locked up as long as the building stands.

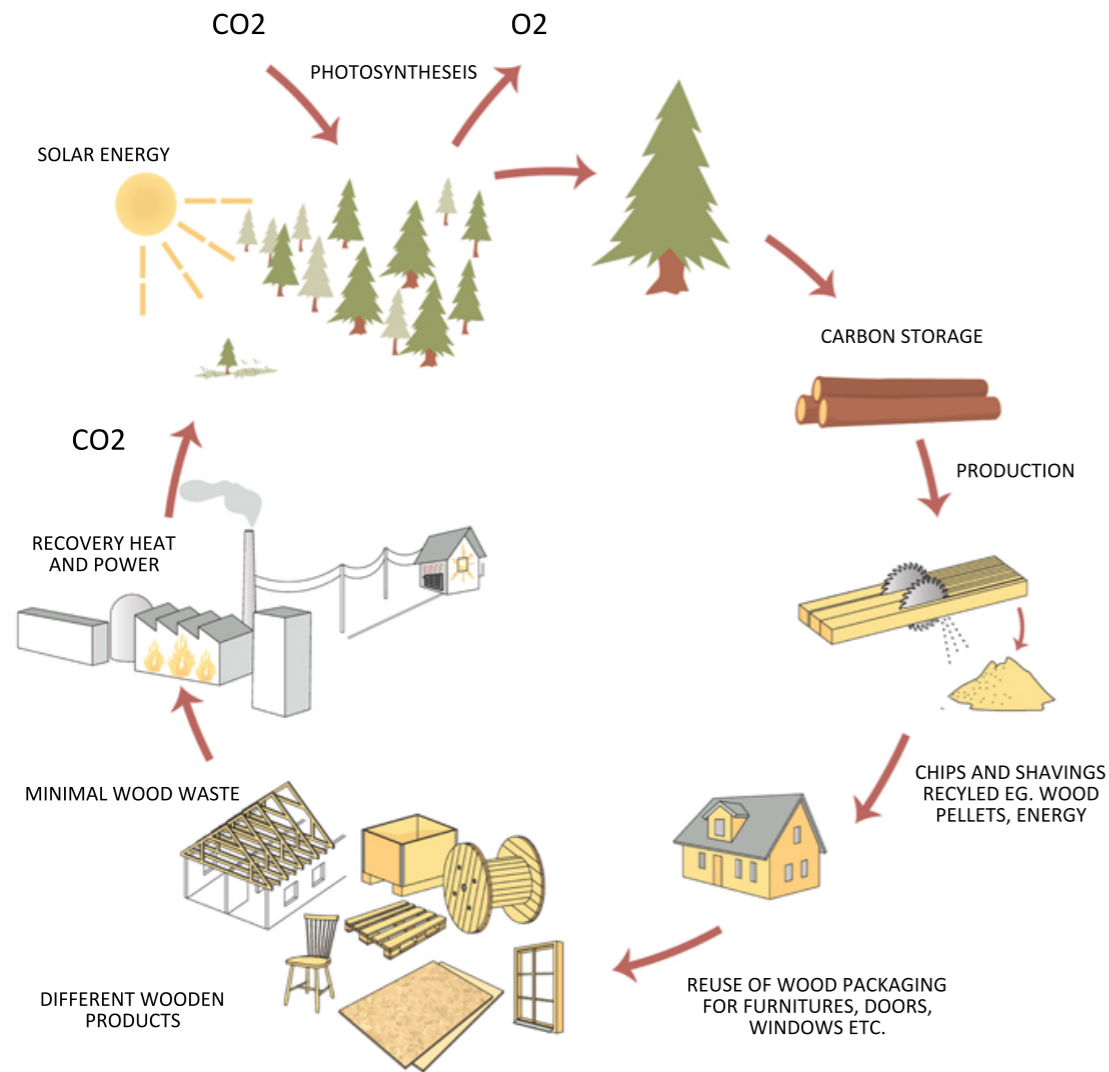
ENERGY CONSUMPTION



Kg of CO<sub>2</sub> created (or stored) to create each tonne of building materials

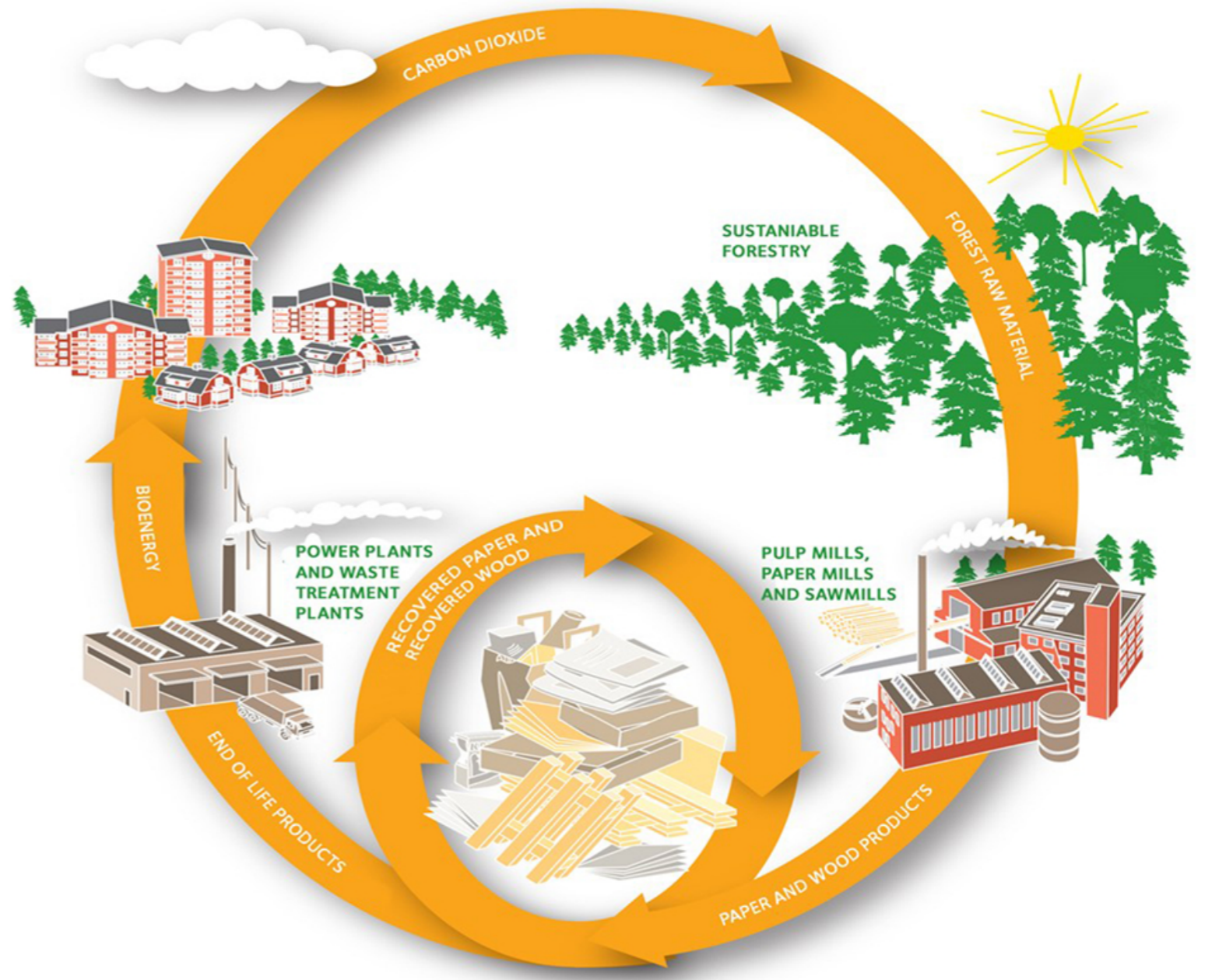


# ECO-CYCLE



Timbers used for manufacturing CLT are harvested from sustainable forests. The circular economy ensures the plantation of new forest that extract more CO2 from the atmosphere than old forests.

# BUILDING TIMBER FOREST IN CITY SCAPE



# CLT- PROPERTIES

Despite being five times lighter than concrete, CLT has comparable **strength** per weight ratio to concrete and the multi-layer wooden panel spans in two directions. Each layer is placed cross-wise to the adjacent layers to increase its stability and strength.

Wood surfaces can be more easily **modified** than concrete.

Due to its arrangement as a solid wall panel, rather than a framed construction comprising discrete load bearing post elements, CLT also **distributes concentrated loads** as line loads at the foundation level, which will reduce the requirement for localized pad foundations.

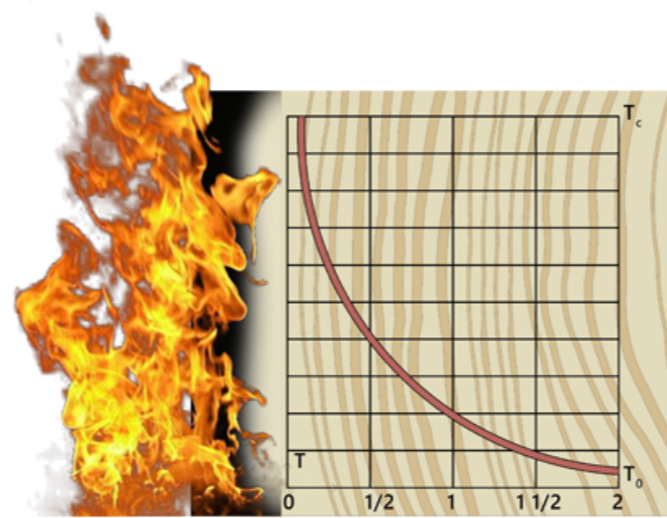


ILLUSTRATION SHOWING A TYPICAL TEMPERATURE/TIME GRADIENT THROUGH SOLID TIMBER UNDER FIRE CONDITIONS.

CLT's **fire resistance** is provided through 'charring'. As the face of the timber panel is exposed to a fire that ramps up to a temperature in excess of 400 degrees C, the surface of the timber ignites and burns at a steady rate. As the timber burns it loses its strength and becomes a black layer of 'char'. The char becomes an insulating layer preventing an excessive rise in temperature within the unburnt core of the panel. It is this unaffected core which continues to function for the period of the fire resistance.

Fire resistance testing of CLT panels is to **ISO 834** – the same standard used for door sets which most of us are familiar with.

# SERVICE DETAIL THROUGH CLT SLABS

