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INTRODUCTION

The project detailed in this technical report higlights a conceptual Candian Community Center ,'The Zone', focused on the entity of the family of new Candians as its main user and facilitates their integration into a new society filled with challenge and opportunity.

The Zone creates a journey for both the child and the parents and focuses on their development and growth into society by providing a program that accomodates the needs of a new immigrant and integrates the new communities within the city of Cambridge, Ontario.

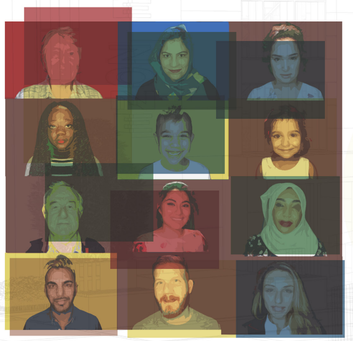
The building is based on a 3m x 3m grid with a primary structure of glulam beam and column frame that supports an assembly of CLT slabs envelopped with a fibre cement rainscreen panel system and covered with a green roof pierced by a sawtooth skylight structure.

The concept behind the design of the building follows the idea of a mosaic, an assembly of 'Tesserea' pieces, that come together to form the building or in a larger sense, the community enhanced by this building. As a new immigrant, the hardest thing is to form social connections that can make you feel like home, and that is the intention of the building, to create a socialization space to accommodate its users and facilitate their move into this new world.

The concept of the mosaic builds up from the simplest element of the grid and finds its way in the design and structure of every element in the building all the way to the signage. Just like the complexe mosaic that makes every single user, the building celebrates connections and allows each individual piece to shine.

COMMUNITY CENTER FOR NEW CANADIANS

EVERYBODY BRINGS A PIECE FROM HOME



CULTURAL MOSAIC

EMBRACING THE DIFFERENCES

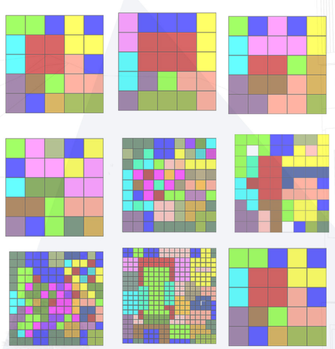
INTEGRATION

PERSERVING IDENTITIES

WELCOMING CULTURAL TRADITIONS

UNDERSTANDING VALUES

CREATING A SOCIAL NETWORK



COUNSELLING

LEGAL

CHILD CARE

GUEST LECTURES

ART AND GALLERY

ADMIN

SERVICE ONTARIO

MUSIC SHOWS

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PERFORMANCE

LEARNING

AUXILLARY SPACES

DRAMA

MUSIC

ASSEMBLY SPACE

DANCE

ART

COURTYARDS

CHARACTER BUILDING

MULTI-USE

COMPUTER

LANGUAGES

GASTRONOMY

OPEN LIBRARY

PLAY AREA

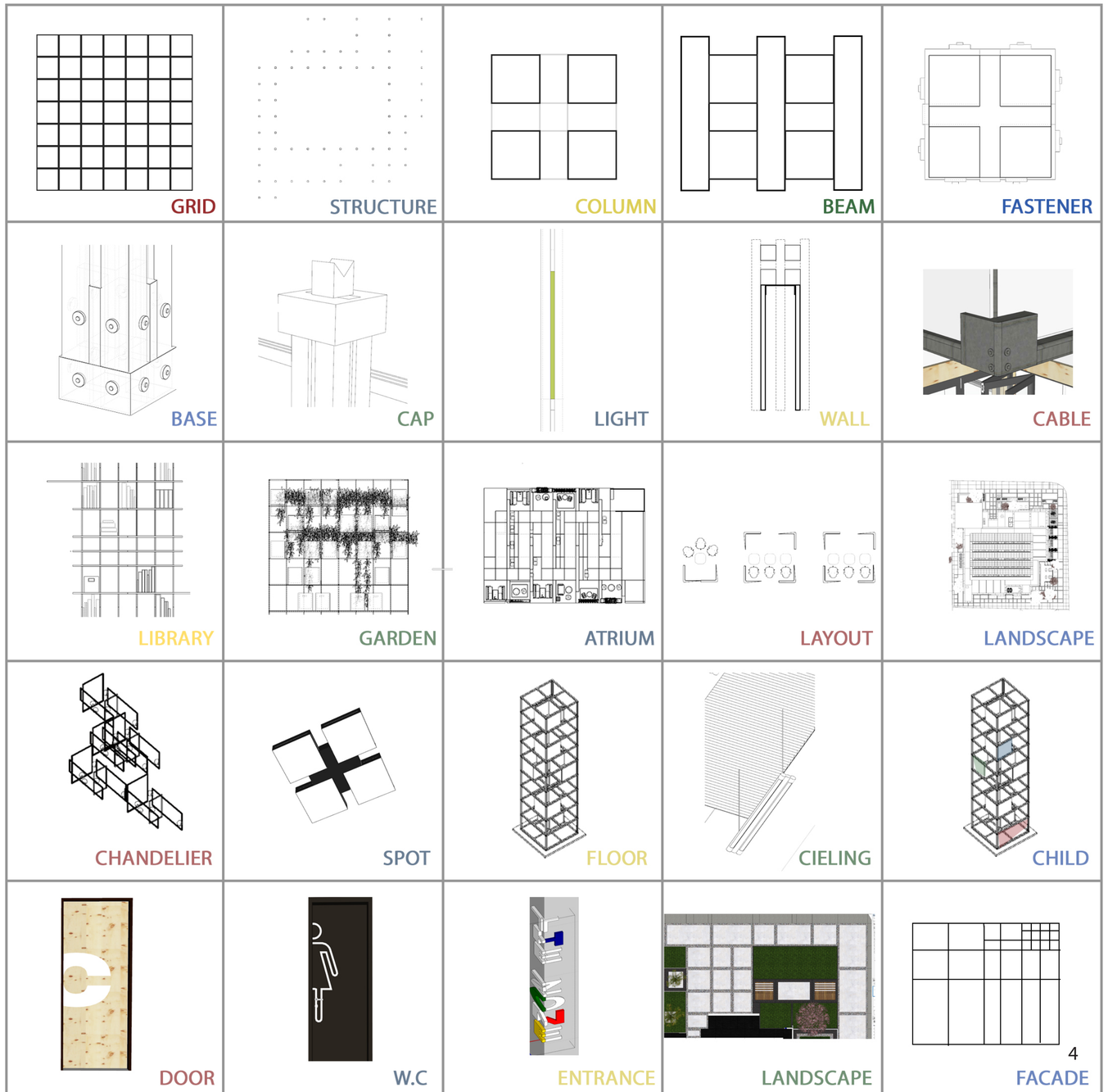
THE ABACUS

The design begins by a mosaic of the program that was assembled on a variety of different sized grids starting from 2m x 2m to 7m x7m. The most suitable for the size and purpose of this building was the 3m x 3m grid and that is where the journey of the layout of the program begins.

The Abacus in the figure on the left highlights the development of the grid mosaic into the various elements of the buildings starting with the structural grid and than focusing on the smaller details such as the shape of the Glulam coloumn, its connection to the beam, the fasteners used to connect the beams to various elements such as the balconies etc., as well as then moving on to larger elements that form the library and the interior gardens, and then widening the scope to the layout of the seating assemblies, the atrium and the landscape as examples.

The Abacus continues to explain how the grid was used in 2D and 3D to create various signage and languages of design for the different elements in the program such as the lighting, the doors, the landscape and the facade.

The idea of taking the concept of the mosaic further was to inegrate it in the design, the users, the functions, the structure, the lighting etc. Since the mosaic is heavily integrated within the design as well as the structure, this report will feature various overlapping elements of the design that are vital to explaining the structure and the environmental strategies used for this building.



THE BUILDING ON SITE

The building is located close to the Waterloo School of Architecture in Cambridge, Ontario. It's location makes it a great space for the creation of a community and the lack of assembly spaces/ activity areas in the neighbourhood gives the building the opportunity to shine in terms of creating a space that can host and accomodate events while still maintaining an educational and more formal function.

Wlith regards to its orientation on the site, the buildings is centered in the middle of the site with the North- Eastern corner being it's main entrance highlighted by the large signage and the protrusion of the building facade.

This orientation also enables the site to be seen from the main street , Grand, which is the route generally taken by commuters going into Cambridge and specifically Galt Center as well as to the School of Architecture and various important buildings such as the Idea Exchange and the Public Library.

Environmentally, this Orientation also helps provide natural ventilation through the large operable curtain walls on either side of the entrance, it also provides good natural lighting into the entrance lobby diffusing to the atrium.

STRUCTURE, ENVIRONMENT AND DESIGN

As part of the integration process the structure, the environmental strategies and the efficiency of the design are all integrated into one.

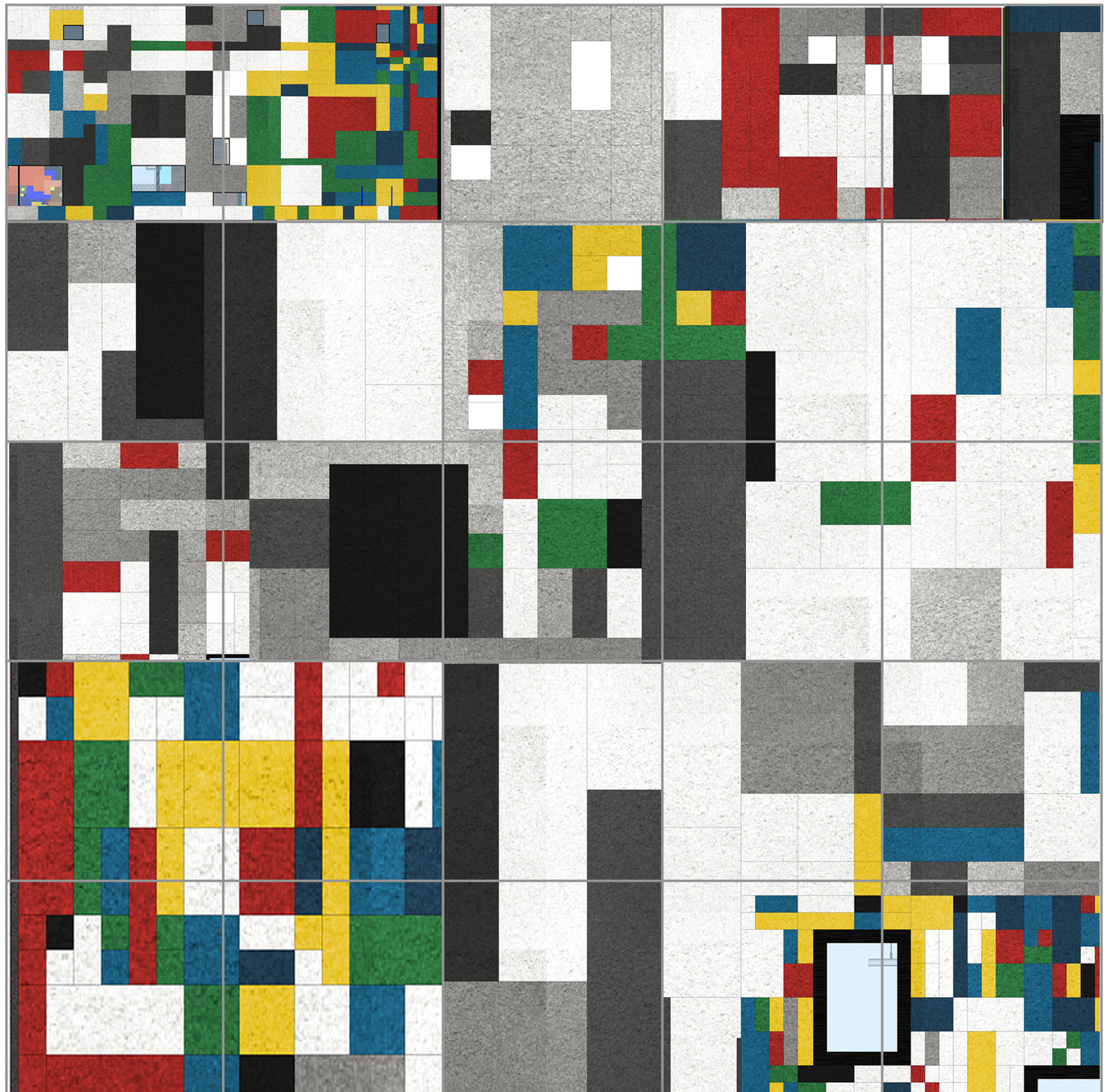
As will be explored in further detail in this report, there are many elements of the design that have multiple functions.

The grid to the right shows the design of the elevation, it was also an exploratory diagram to maximize the benefit of having a Fibre cement rain screen cladding system as the building envelope and explore if there design of the panel could change the efficiency of the water drainage.

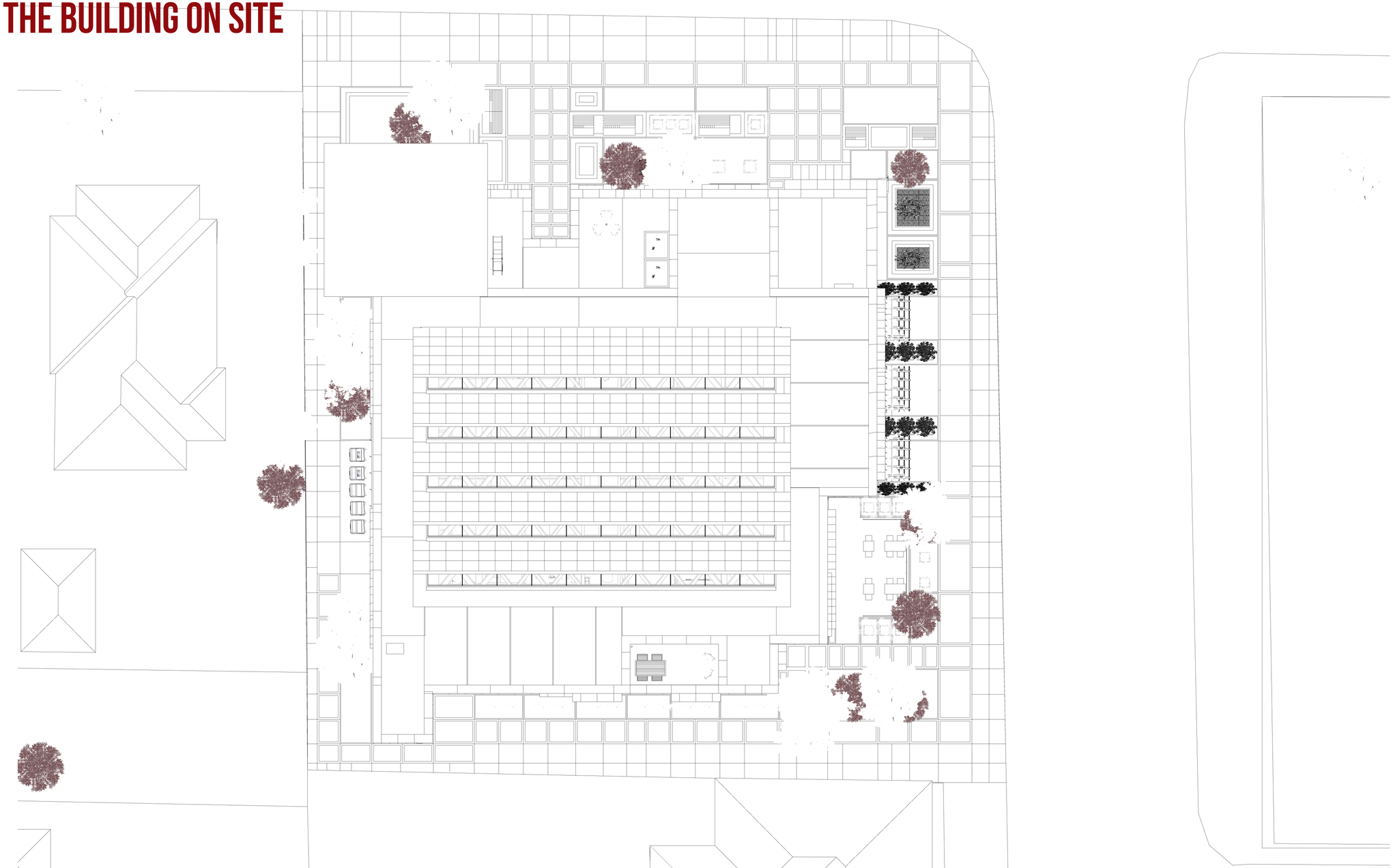
In conclusion, the panels were designed in 500mm x 500mm pre-fabricated panels, each with a custom design suited to the elevation design concept making each piece unique and relevant to its facade.

The saw-tooth roof is designed with Southern Skylights to maximize indirect light and Northern Tesla Photovoltaic Panels to maximized energy production. The remainder of the roof is an extensive green roof with a system to allow for rain water storage, use and direction. Increasing the height of the building allows undisturbed sunlight and air to the roof during all times of the day.

The following pages contain the design drawings of the project.



THE BUILDING ON SITE




THE NONE

EASTERN ELEVATION

WESTERN ELEVATION

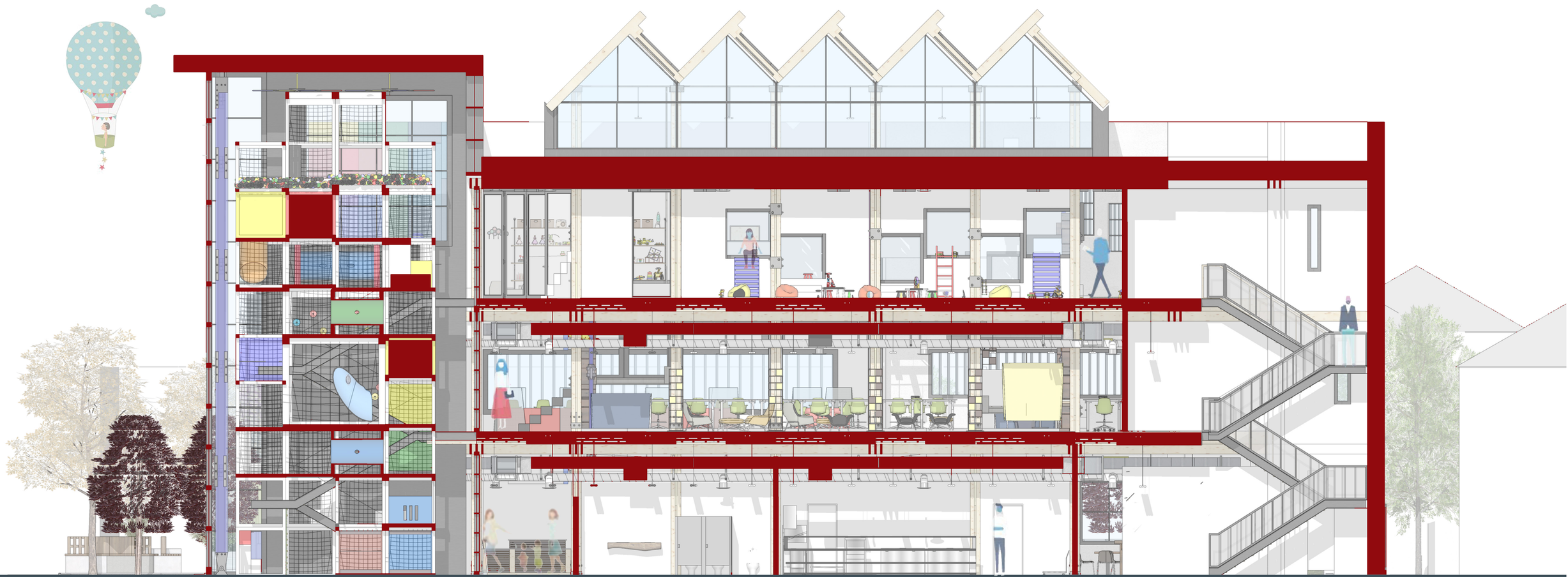
SOUTHERN ELEVATION

NORTHERN ELEVATION

SECTION A- A

SECTION B-B

SECTION C-C

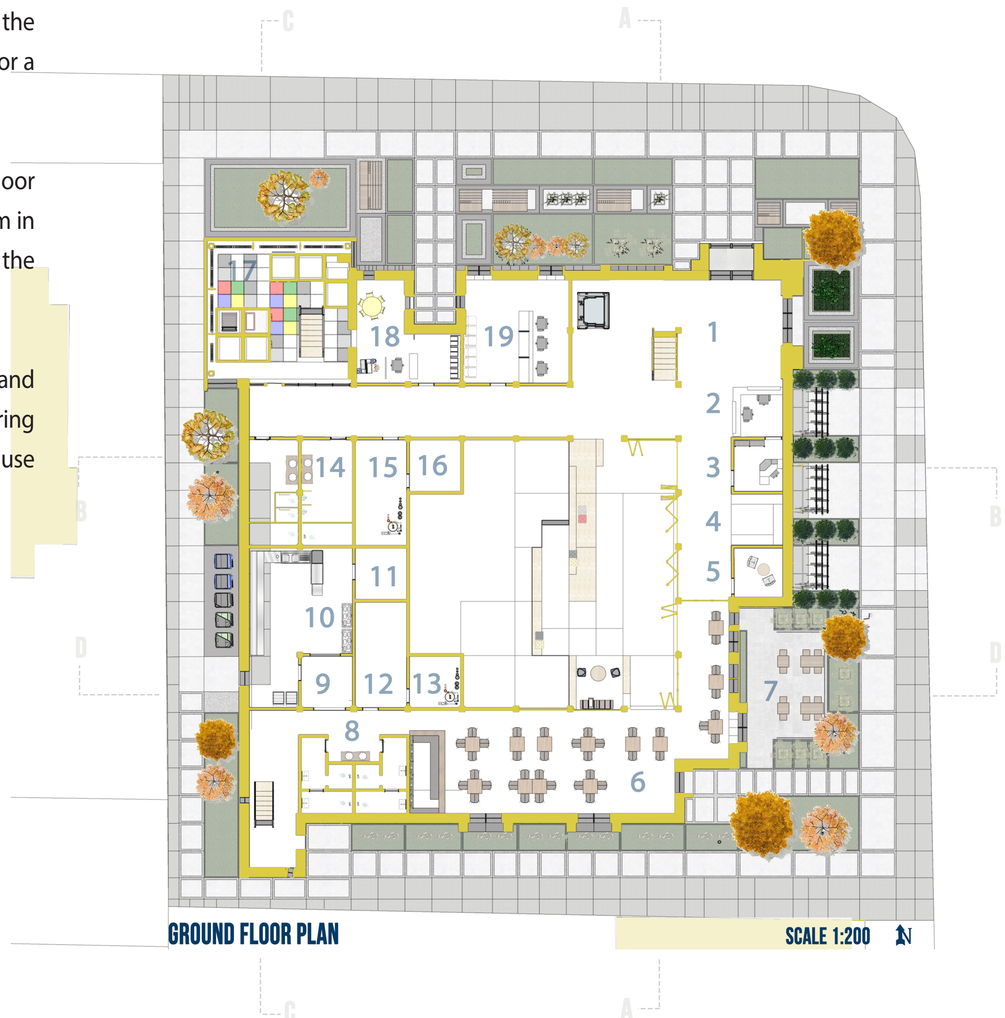


GROUND FLOOR PLAN

The entrance of the building is located on the North Eastern facade to maximize it's visibility from the busiest road axis. The double doors form a feature in the entrance due to the protrusion of the first set of doors, but this in turn allows for a conservation of heat inside the building during colder months.

The Atrium in the middle of the plan is ramped upwards towards the first floor and hosts the largest portion of the building program. Below it starting at 2.7 m in height begin the service rooms such as the mechanical room, the Lan room, the main washrooms, and the main kitchen.

Located on the South East end of the building is the restaurant with it's indoor and outdoor areas situated to recieve the maximum daylight. Due to the neighbouring building on that site, the sun does not infringe on the comfort of the users because it is not direct into the restaurant during peak hours of usage.



1- MAIN ENTRANCE LOBBY
2- RECEPTION DESK
3- ADMIN SPACE
4- WAITING AREA
5- PRIVATE MEETING ROOM
6-RESTAURANT / CAFE
7- OUTDOOR RESTAURANT
8- WASHROOMS
9- PICK-UP AREA
10- MAIN KITCHEN
11- COOLER
12- JANITOR ROOM
13- BOILER ROOM / MECHANICAL ROOM
14-MAIN WASHROOMS
15- SERVICES WITH MECHANICAL ROOM
16- SERVER AND ELECTRICITY ROOM
17- THE PLAYHOUSE
18- DAY CARE DROP-OFF
19- SERVICE ONTARIO

FIRST FLOOR PLAN

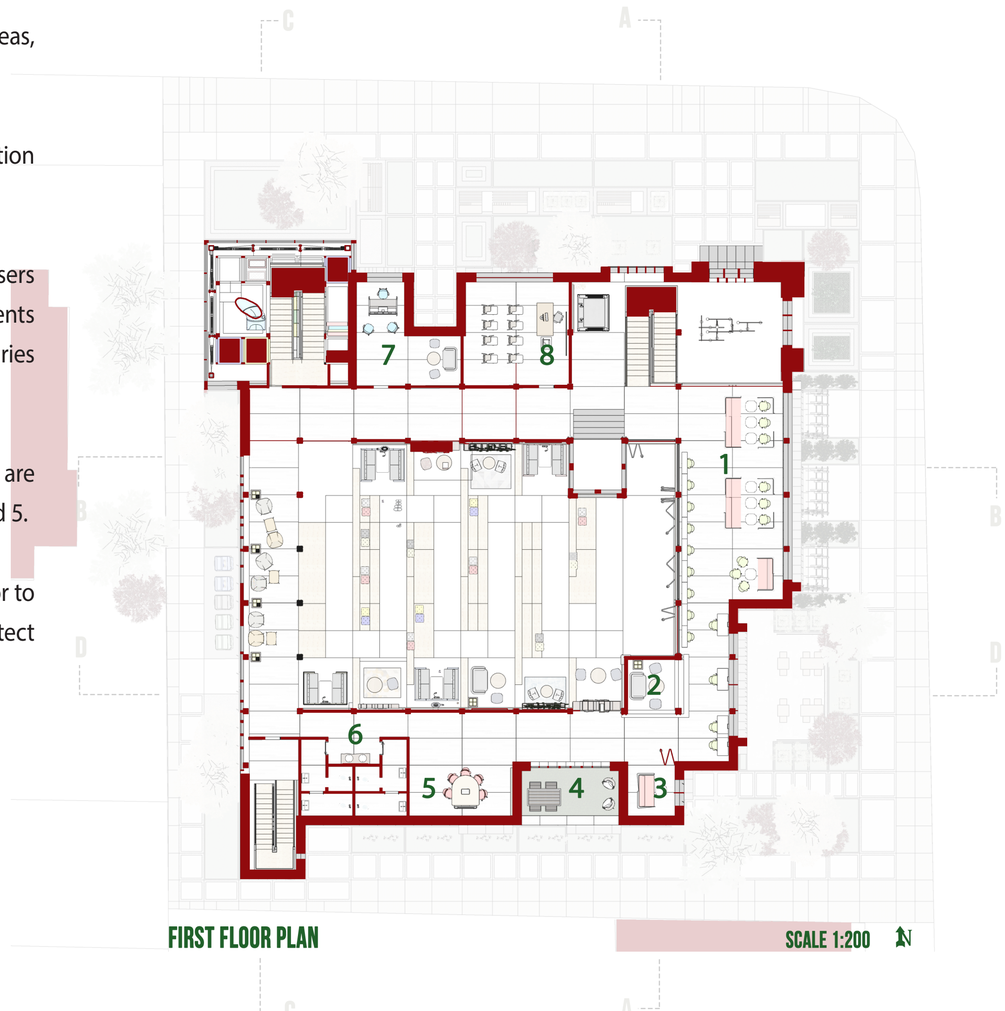
The first floor hosts the activities of the adults: classrooms, library, reading areas, computer area, working rooms, meeting rooms and multimedia hub.

This floor is intended for the parents mostly but it designed to welcome solcialization in certain areas and is open to public use.

The ramped atrium is the main central entrance for this floors as it allows the users to also experience the full program climbing up the stairs and allows for moments of interaction, socialization, as well as contains seating areas and secondary libraries and multimedia hubs for quick use.

In terms of privacy, the closed classrooms are for registered classes and there are several rooms that can be booked for a quieter atmosphere such as room 3 and 5.

The computer and multimedia areas are located on the Eastern side of the floor to prevent glare and direct sunlight on the screens. There are also Louvres that protect the windows and can be adjusted to the comfort of the users.



1- OPEN WORK SPACE
2- READING AREA
3- QUIET AREA
4- ROOF GARDEN
5- MULTIMEDIA GROUP STATION
6-WASHROOMS
7- COUNSELOR'S OFFICE
8- CLASSROOM

SECOND FLOOR PLAN

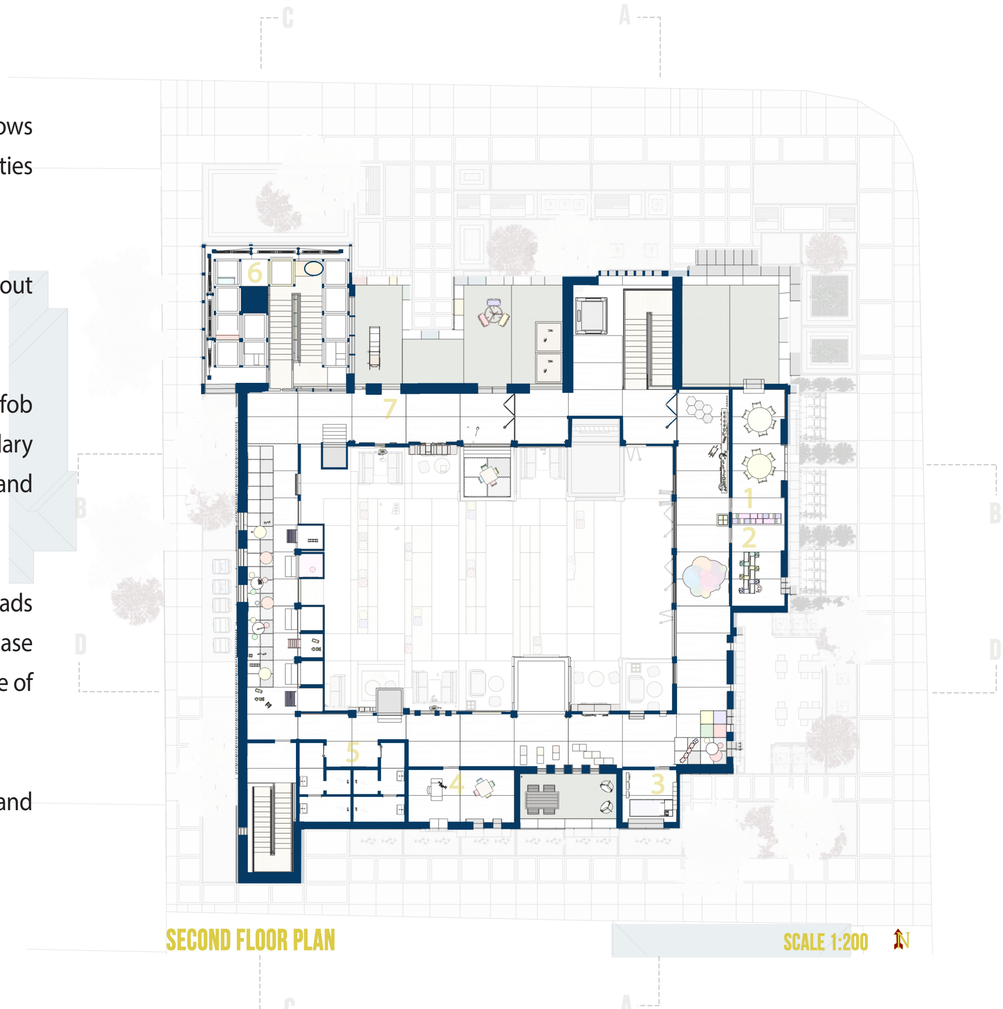
The second floor is mostly for the children. It is a large learning playground that allows for maximum uninterrupted movement and multiple moments and opportunities of learning and growth.

The area is supervised with a ratio of 1:3 staff that are always available to carry out the activity programs of the day.

In terms of security, this area can be accessed from all three staircases by using a fob to open the doors. The main staircase on the North Eastern sideis the secondary drop-off point and leads to the classrooms which have storage for backpacks and outerwear.

The main drop-off point for the children is located in the ground floor and leads directly into the 'Playhouse'. In the playhouse there are 3 routes, the main staircase and 2 playful routes categories as easy and hard depending on the level and age of the child.

The emergency staircase is located on the South Western side of the building and provides a direct route downwards and onto the main road.

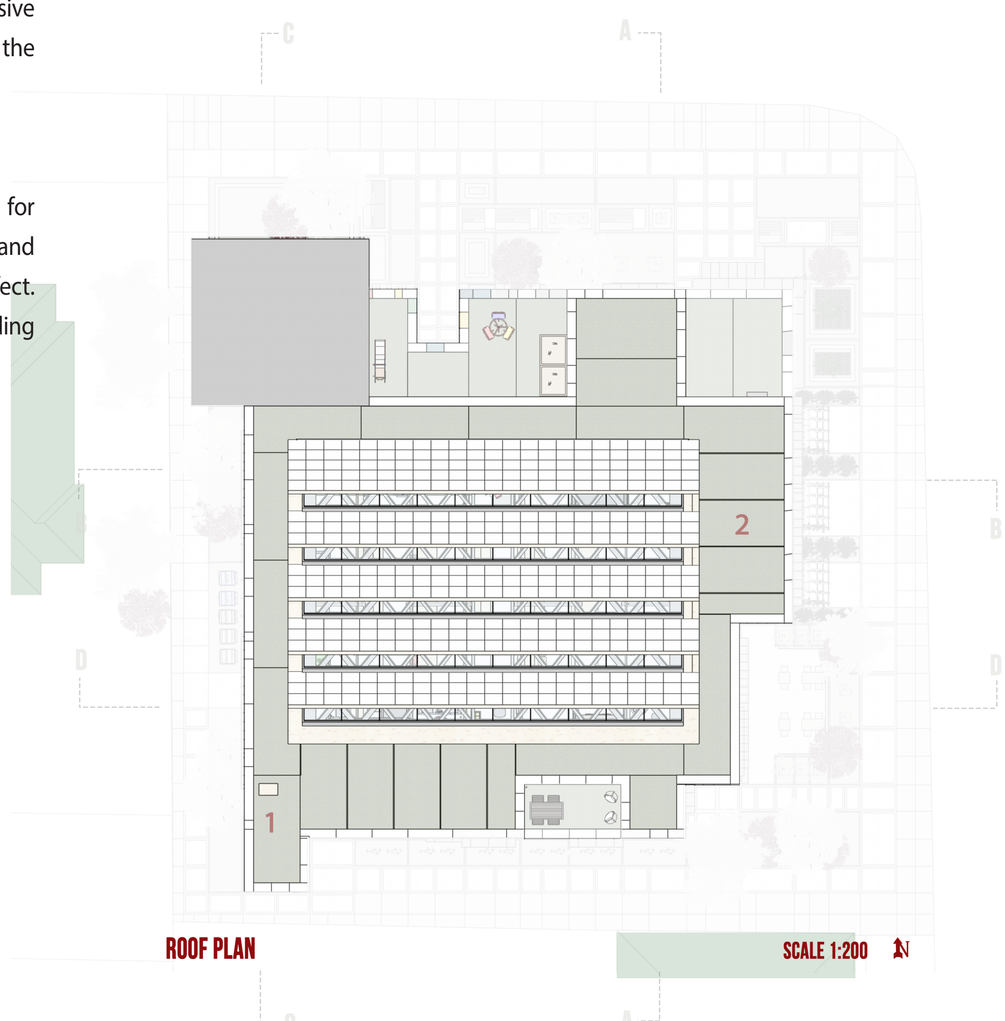


1- GROUP LEARNING
2- ART CLASSROOM
3- SLEEPING AREA
4- CLASSROOM
5- WASHROOMS
6- THE PLAYHOUSE
7- OUTDOOR PLAY AREA

THE ROOF

The roof has 3 main elements: The saw tooth above the atrium, the extensive green roof above the secondary spaces and the slightly sloped CLT roof above the playhouse.

Each element has it's own function. As previously explained, the Saw Tooth is for daylight optimization and energy collection, the green roof is for water retention and mamagement and for environmental benefits such as decreasing the island effect. The CLT roof supports the fans used to ventilate the playhouse and is protruding outwards to provide shade on the all glass facade.



ROOF PLAN

SCALE 1:200 N

1- MAINTENANCE ACCESS HATCH
2- INACCESSIBLE EXTENSIVE GREEN ROOF

THE STRUCTURE

As shown in the diagram to the right, the structure is divided ino many smaller elements that create the building as a whole. Each element is integrated with the design in terms of function, form and aesthetic.

In the following pages, the exploded axonometirc will be explained in further detail elaborating on how the structure works and how it is integrated into the design.

SAW TOOTH ROOF EMBEDDED WITH TESLA CONCEALED PV PANELS.

FRAMED GLASS WINDOWS RESTING ON CONCRETE WALL AND HOLDING CLT TRUSSED SAWTOOTH STRUCTURE

CLT ROOF SLOPED AT 2%

3MX3M BALCONIES SUPPORTED BY A SYSTEM OF HSS STEEL BASE CONNECTED TO STEEL CABLES HANGING FROM THE ROOF

HANGING LIGHTING FIXTURES

CLT FLOOR SLABS EMBEDDED WITH INFLOOR HEATING/ SERVICES AND ACCOUSTIC BARRIERS

SECOND FLOOR FLOOR AND INTERIOR WALLS

FIRST FLOOR FLOOR AND INTERIOR WALLS

SUSPENDED AND EXPOSED HVAC SYSTEM

GROUND FLOOR AND INTERIOR WALLS

SUSPENDED AND EXPOSED HVAC SYSTEM

ATRIUM RAMPED CONCRETE SLAB ON GRADE FLOOR WITH EMBEDDED FLOOR HEATING

WELDED HSS CUBE SYSTEM SUPPORTING THE PLAYHOUSE

CUSTOM DESIGNED GLULAM COLOUMN AND BEAM STRUCTURE ACTING AS THE PRIMARY FRAME

HSS COLOUMNS BRACED BY STEEL WIRES AND STRUCTURAL GLASS FINS SUPPORTING THE CURTAIN WALL

FRAMED CURTAIN WALL WITH EMBEDDED TRICKLE VENTS

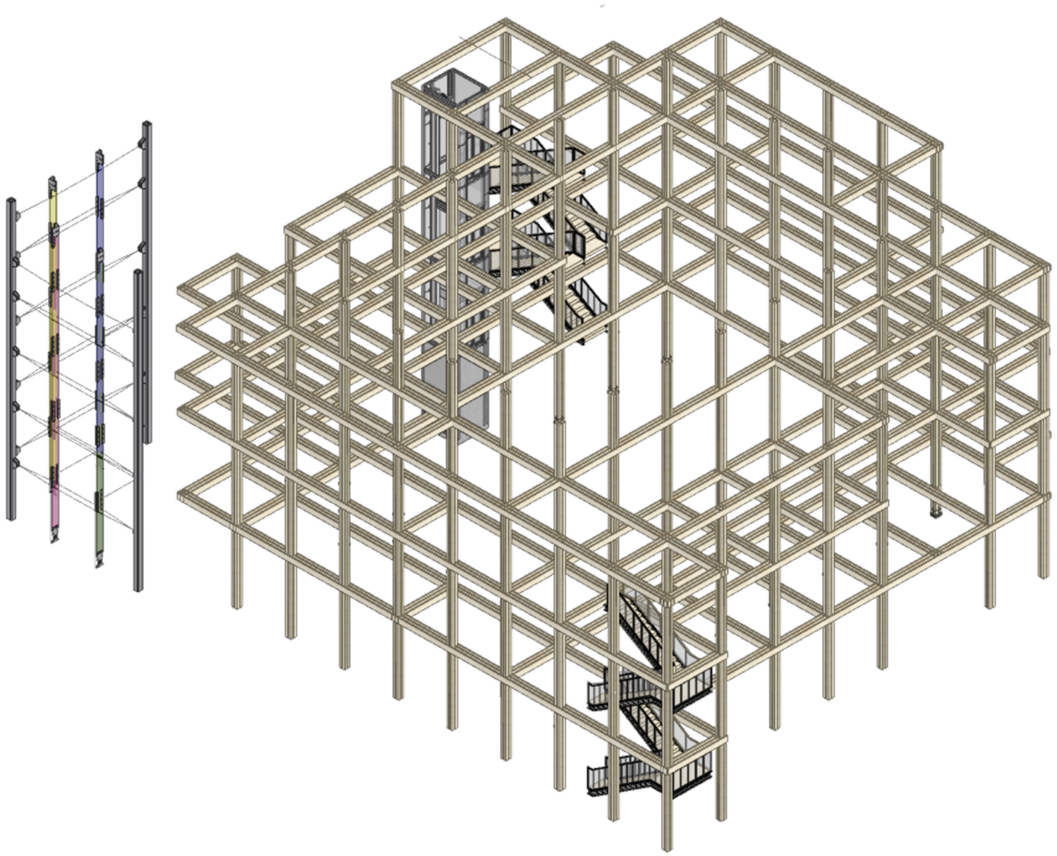
SWISSPEARL* RAINSCREEN FIBER CEMENT PANELS HUNG ON A KNIGHTWALL SUSPENSION THERMAL BREAK REDUCING SYSTEM

PRIMARY STRUCTURE

The building is supported by a frame of glulam beams and columns spread out on a 3m x 3m grid. Due to the small span of the grid, the flexibility was increased in terms of the location of the columns since glulam can support very large spans.

The playhouse is a seperate structure from the main grid and is supported by chrome coloured glass fins braced together with steel cables. On the corners, there are HSS coluns that increase the strength of the connections and hold the wires in place. The primary function of the fins is to support the curtain wall that embraces this area.

The two main cores of the building have steel braced wooden stairs with steel and glass railings and a steel and glass elevator core.



SKIN AND ENVELOPE DESIGN

The skin of the building is made of Fibre Cement custom designed rain screen panels that allow for water drainage. This is the main system for rain water management as it contains a drainage plane that encircles the whole building. The green roof covering this system is designed in a way that the water can drain directly to the back of the panels and into the surrounding landscape. The details in the following pages will elaborate further on how this relationship works.

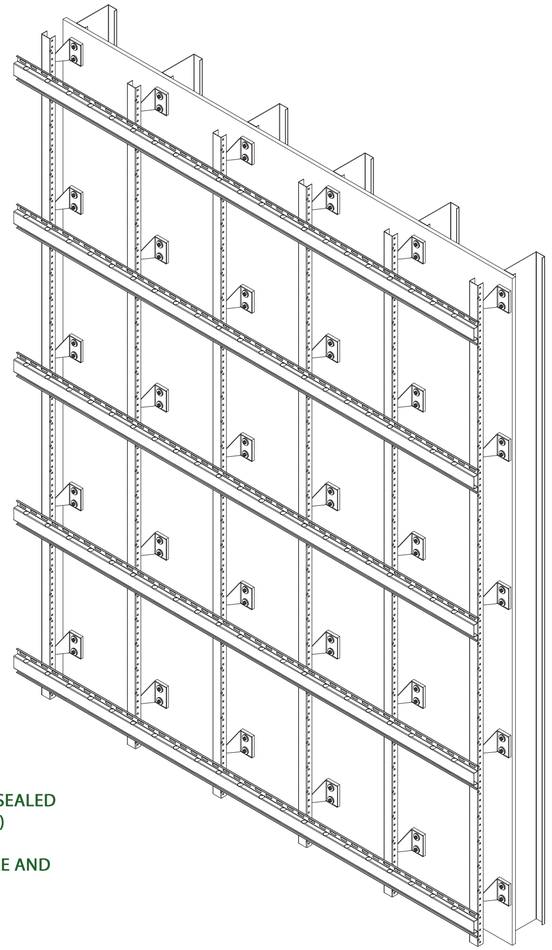
All of the windows are operable in order to enhance the natural ventilation capabilities of this building. Ther are also accompanied by mechanically adjustable louvres on all facades except the north for shading and privacy if needed.

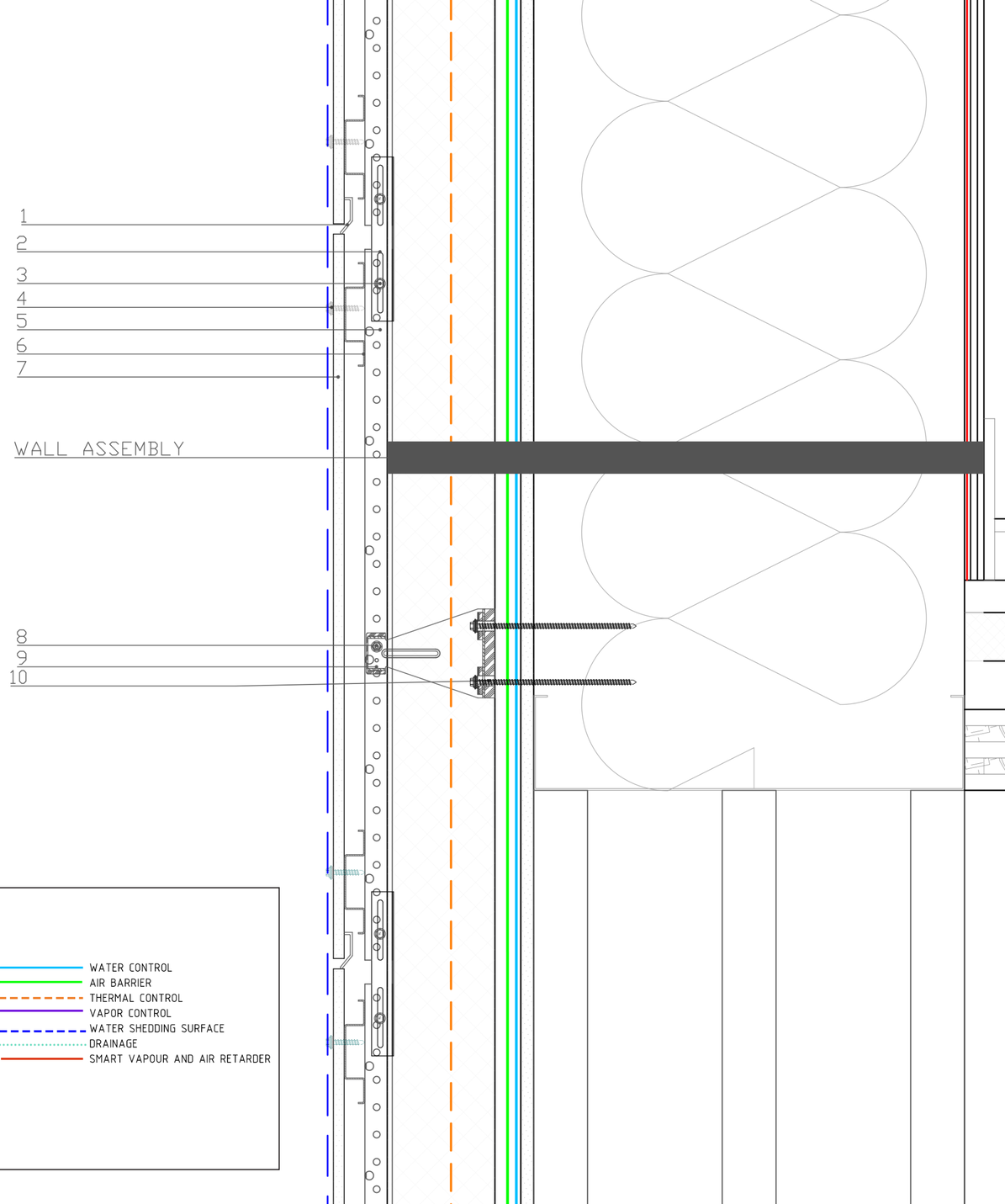
The glass elements are all double glazed, Low-E coating with Argon to maximize their efficiency. These elements give an R Value of 3.84 $K.m^2/ W$ and a U Value of 1.476 $W/m^2 {}^oC$.

WALL AND RAINSCREEN ASSEMBLY

By using the KnightWall system, the thermal bridging due to the wall connections is decreased. This is because the thermal brackets are covered in a plastic layer that conceals the steel and minimized heat escape.

The system is attached to the Sheathing layer behind the main structure and allows for water drainage and a continious environmental barrier further improving the negery performance of the building as well as ensuring the longevity of the structure

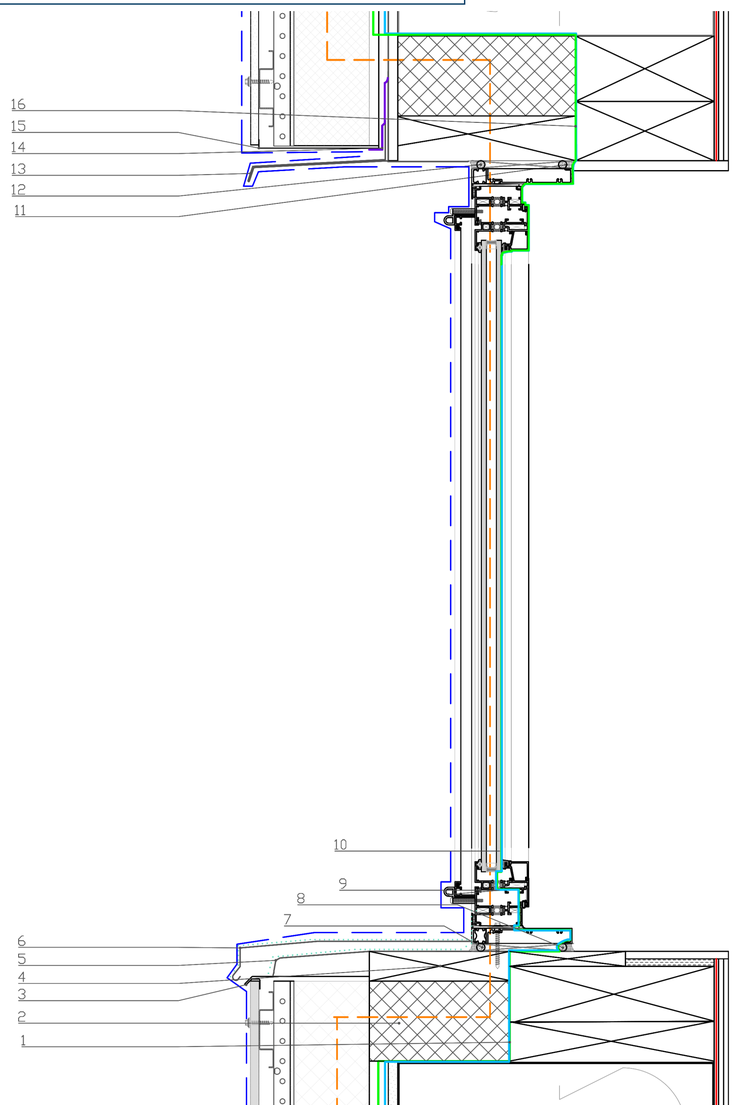




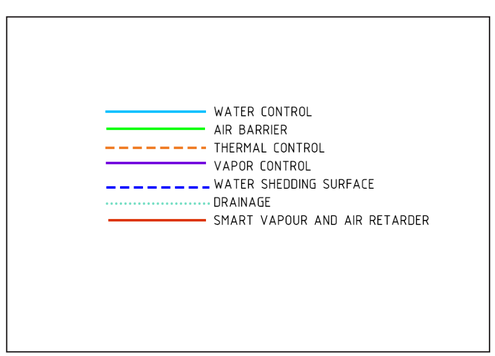
WALL ASSEMBLY
FIRE-PROOF LATEX PAINT
12 mm GYPSUM BOARD
10 mm CERTAINTEED CONTINUOUS AIR BARRIER AND SMART VAPOR BARRIER
400 mm THERMAFIBRE ULTRABATT THERMAL MINERAL WOOL INSULATION, AIRSEALED AT THE JOINTS USING SEALR TAPE (MADE OF 70% RECYCLED CONTENT) EMBEDDED IN STEEL STUD WALL
12 mm DENSGLASS FIBERGLASS MATT GYPSUM SHEATING (PROVIDES MOISTURE AND MOLD RESISTANCE)
15 mm TREMCO PARASEAL HDPE DUAL WATERPROOFING SHEET MEMBRANE
12 mm TREMCO EXDAIR FLUID APPLIED AIR AND VAPOR BARRIER
75 mm FOMULAR CODEBOARD XPS RIGID INSULATION
25 mm AIR GAP CONTAINING HORIZONTAL RAILS OF KNIGHTWALL ATTCHMENT SYSTEM
25 mm KNIGHT WALL ATTACHMENT SYSTEM
12 mm SWISSPEARL FIBRE CEMENT RAINSCREEN PANELS

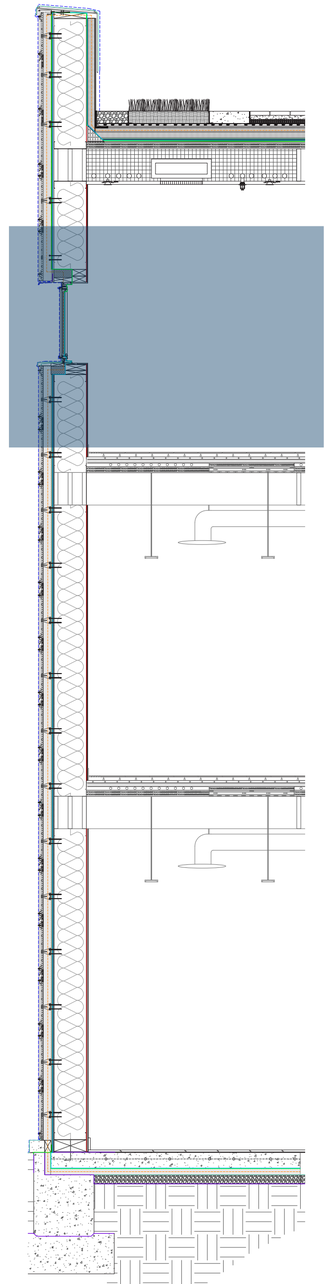
1. ALUMINUM DRIP FLASHING FASTENED TO BACK OF CLADDING PANELS FOR WATER DRAINAGE
2. SPICE CLIP CONNECTED TO S-RAIL VIA 2 STEEL TEK SCREWS
3. WEATHERPROOF COATED STEEL FASTENERS
4. STAINLESS STEEL NEOPRENE WASHERED FASTENERS
5. KWS VERTICAL S-RAIL PERFORATED 18 GAUGE, CORROSION-PROOF COATIN
6. KNIGHT WALLSYSTEM 2''-5'' PanelRail (2" shown), 18 gauge, 50 ksi, ULTRA ANTI-CORROSION COATINGPRIMARY SEALANT
7. SWISSPEARL FIBRE CEMENT 500X500 mm CLADDING PANELS
8. KNIGHTWALLSYSTEMS thermaBracket-S, 2-6", 14 gauge, 50 ksi, ANTI-CORROSION COATING
9. KWS. FASTENING PLATE
10. KNIGHTWALLSYSTEM STAINLESS STEEL TEK SCREW w/1,000 HR SALT SPRAY COATING

WINDOW DETAILS



1. OVERLAPPING AIR, VAPOR AND WATER BARRIES (SAME AS IN WALL ASSEMBLY: 12 mm TREMCO EXDAIR FLUID APPLIED AIR AND VAPOR BARRIER
2. 75 mm FOMULAR XPS INSULATION ACTS AS THERMAL AND VAPOR CONTROL. AIR SEALED USING SEALANT-R TAPE ON SITE AT EDGES.
3. SWISS PEARL INSECT SCREEN WITH 1/8 '' AND 3/16 '' STAGGERED PERFORATIONS
4. WOODEN BLOCK SUPPORTING WINDOW FASTNERS
5. SUBSILL FLASHING
6. METAL DRIP FLASHING
7. PRIMARY SEALANT
8. SECONDARY SEALANT
9. ALUMICOR 900 SERIES - 1350 OPEN-IN WINDOW
10. DOUBLE GLAZED GLASS PANELS
11. BACK SEALANT
12. FRONT SEALANT
13. METAL DRIP FLASHING
14. FLUID APPLIED WEATHER RESISTANT BARRIER
15. 3. SWISS PEARL INSECT SREEN WITH 1/8" AND 3/16" STAGGERED PERFORATIONS
16. OVERLAPPING AIR, WATER AND VAPOR MEMBRANES (N°1)





THE ROOF SYSTEM

The saw tooth roof is made from an open web steel joint that rests on the glulam columns from the extremities. This allows for a large uninterrupted span over the atrium space. The opposing side is made from a CLT structural roof that supports the PVP panels on the top.

The roof is braced using steel wires every three meters that provide the lateral bracing and are attached using a custom steel connection shown in the following page.

The saw tooth roof rests on a concrete wall with operable glass windows on either side (East and West) further encouraging daylight and natural ventilation. The windows in the saw tooth roof are also mechanically operated and can only be controlled from the operating room on the ground floor and can be used to enhance the air-flow in the atrium.

The glass is embedded with heat transmitters on the base that are used in cases of heavy snow in order to speed the melting process. These are activated automatically when the snow piles to a certain height. The water is then absorbed through the green roof, into the drainage plane, and if in excess, it is drained through the rainscreen facade.

The steel cable system, also carries the balconies on the first and second floor that overlook the atrium. They are also supported by connections into the glulam columns to resist any movement and enhance the carrying of the loads

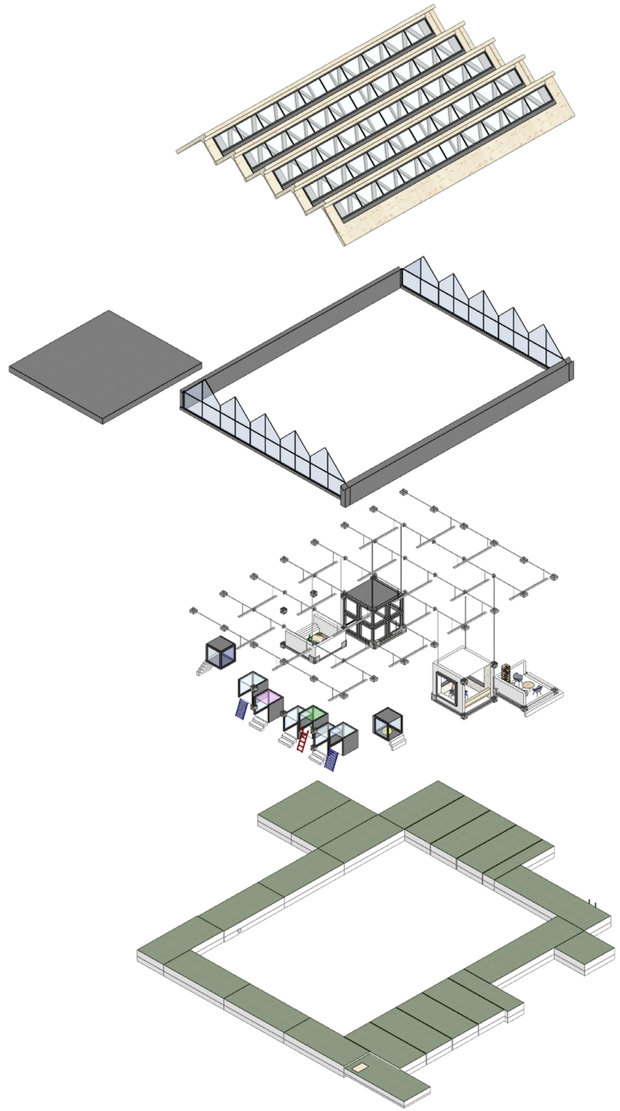
SAW TOOTH ROOF EMBEDDED WITH TESLA CONCEALED PV PANELS.

FRAMED GLASS WINDOWS RESTING ON CONCRETE WALL AND HOLDING CLT TRUSSED SAWTOOTH STRUCTURE

CLT ROOF SLOPED AT 2%

3MX3M BALCONIES SUPPORTED BY A SYSTEM OF HSS STEEL BASE CONNECTED TO STEEL CABLES HANGING FROM THE ROOF

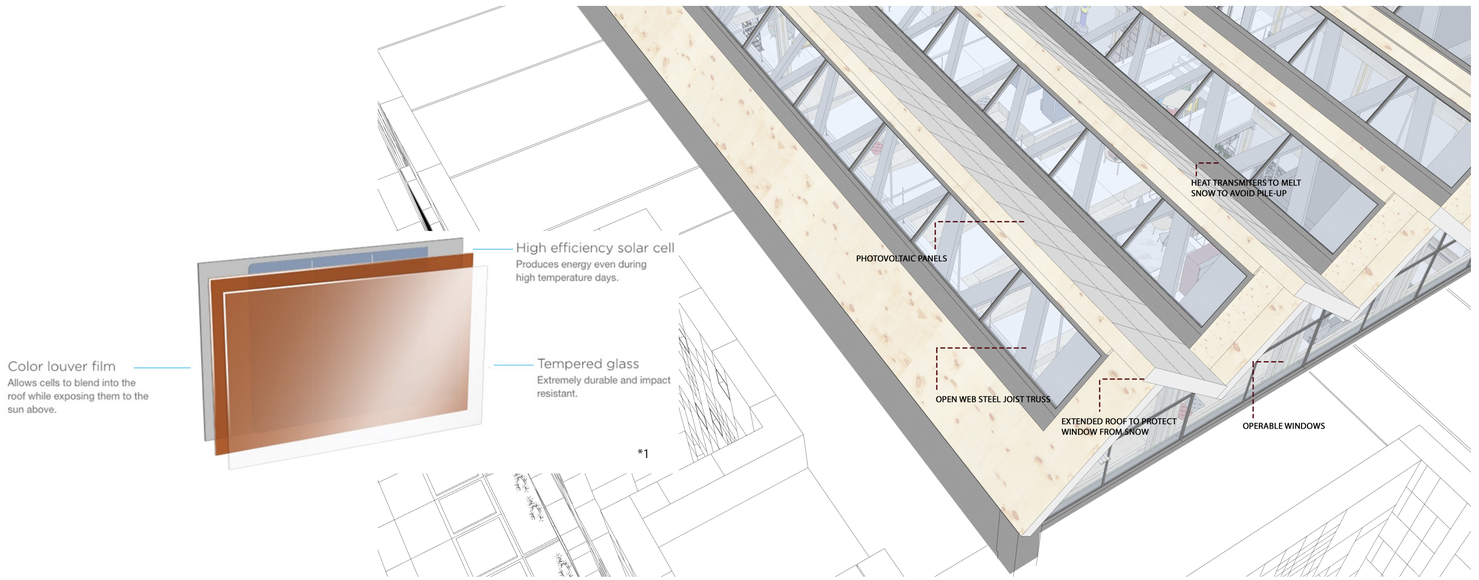
HANGING LIGHTING FIXTURES



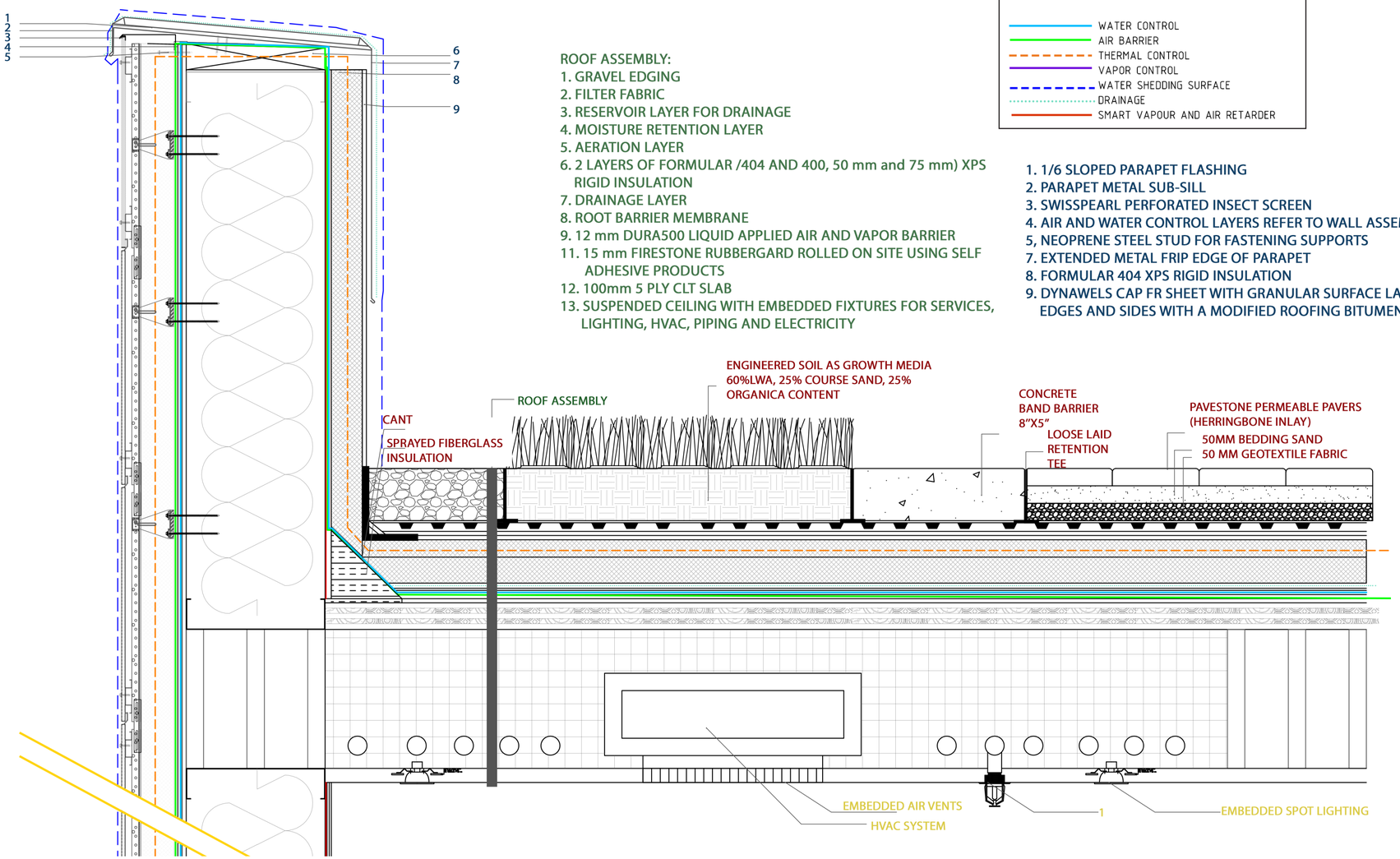
THE ROOF

In a more detailed view of the roof the visulas on the side further explain how the saw tooth roof is structured and put together from an interior view and an exterior view.

The roof is protruding with relation to the windows to allow the water to be drained directly onto the green roof without going onto the bottom layer of glass. This ensures that there is no pile-up of snow and the water can be drained effectively and efficiently without creating problems and leaks.



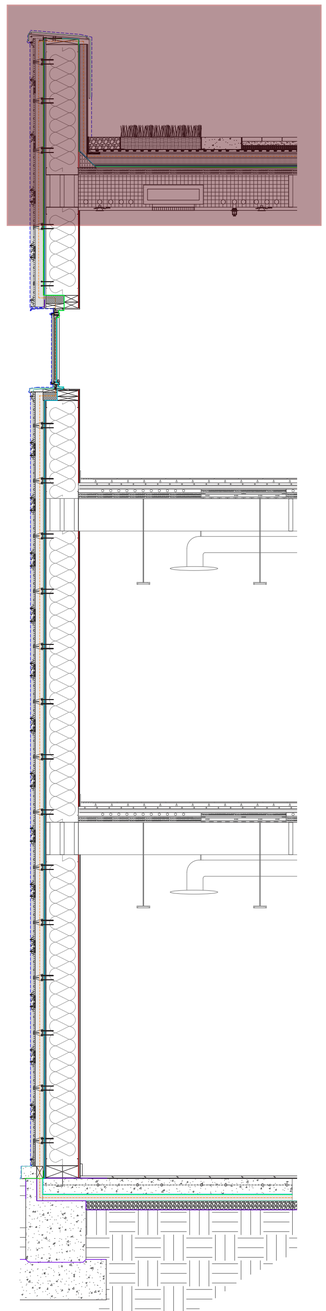
ROOF TO PARAPET DETAIL



ROOF ASSEMBLY:
1. GRAVEL EDGING
2. FILTER FABRIC
3. RESERVOIR LAYER FOR DRAINAGE
4. MOISTURE RETENTION LAYER
5. AERATION LAYER
6. 2 LAYERS OF FORMULAR /404 AND 400, 50 mm and 75 mm) XPS RIGID INSULATION
7. DRAINAGE LAYER
8. ROOT BARRIER MEMBRANE
9. 12 mm DURA500 LIQUID APPLIED AIR AND VAPOR BARRIER
11. 15 mm FIRESTONE RUBBERGARD ROLLED ON SITE USING SELF ADHESIVE PRODUCTS
12. 100mm 5 PLY CLT SLAB
13. SUSPENDED CEILING WITH EMBEDDED FIXTURES FOR SERVICES, LIGHTING, HVAC, PIPING AND ELECTRICITY

WATER CONTROL
AIR BARRIER
THERMAL CONTROL
VAPOR CONTROL
WATER SHEDDING SURFACE
DRAINAGE
SMART VAPOUR AND AIR RETARDER

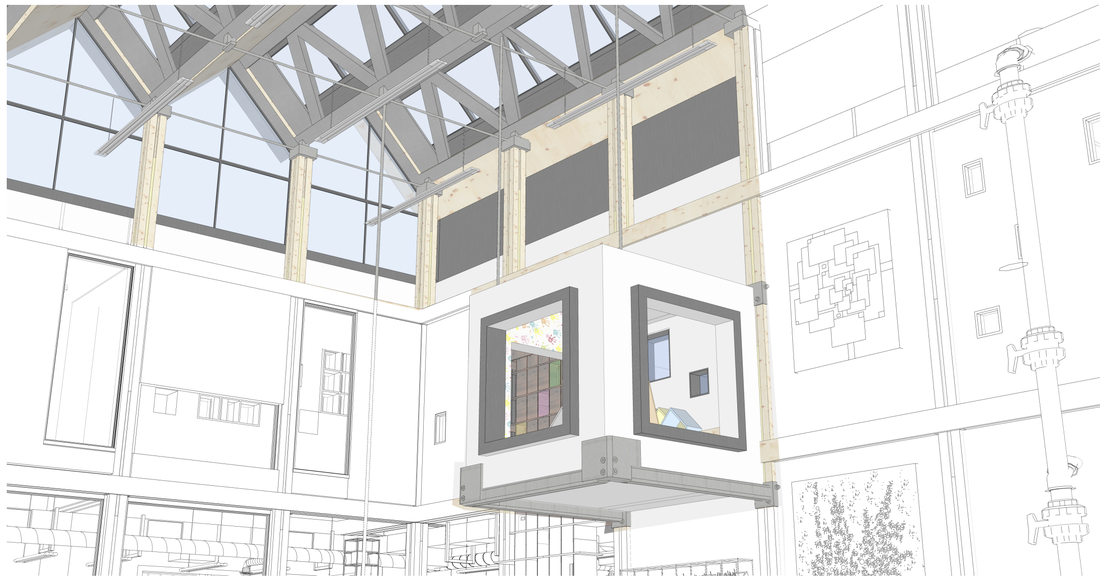
1. 1/6 SLOPED PARAPET FLASHING
2. PARAPET METAL SUB-SILL
3. SWISSPEARL PERFORATED INSECT SCREEN
4. AIR AND WATER CONTROL LAYERS REFER TO WALL ASSEMBLY
5, NEOPRENE STEEL STUD FOR FASTENING SUPPORTS
7. EXTENDED METAL FRIP EDGE OF PARAPET
8. FORMULAR 404 XPS RIGID INSULATION
9. DYNAWELS CAP FR SHEET WITH GRANULAR SURFACE LAID AT 3" OVERLAPS AT EDGES AND SIDES WITH A MODIFIED ROOFING BITUMEN MEMBRANE BASE



THE BALCONIES

The relationship between the balconies and the roof is enhanced by the steel cables that provide a large portion of support but they are also supported by an HSS system that provides a square base for the balconies to sit. The base is linked directly to the columns by the steel fasteners designed specifically for the connections of the balconies and other elements in the building. A more detailed view of the fasteners can be found in The Abacus on Page 4.

There are several different types of balconies depending on the function inside but they all respect the same 3mx3mx3m dimension for the adults, and 1.5mx1.5m for the children.



THE INTERIOR STRUCTURE

The floors are made from a staggered CLT floor slab system that accomodates all the service functions such as the LAN, the sprinklers, the plumbing, the electricity and have embedded outlets for the lighting depending on the space.

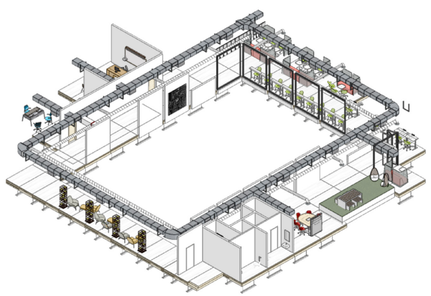
The are pre-fabricated which decreases the labour on the site and the time required for assembly further enhancing the efficiency of the building construction.

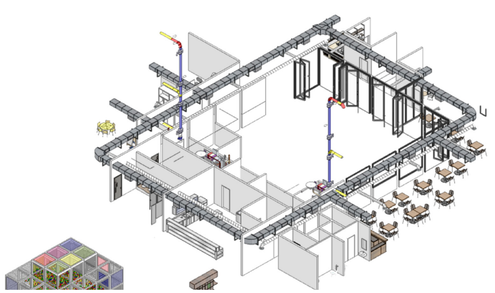
They are designed in 3mx6m panels.

The interior walls are all made from steel studs encased with Gypmsum board and painted with fire proof paint. They are designed to surround the slabs and coumns and in many cases such as those in the following page, they have predesigned glass panels that are embedded within their assembly.

The HVAC system for the ground and first floor is exposed and encircles the main atrium into the secondary spaces.

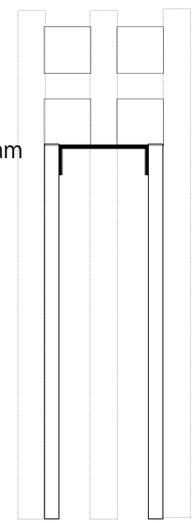
The main atrium depends on in floor heating and a natural ventilation strategy which will be explored in further sections of this report in more details

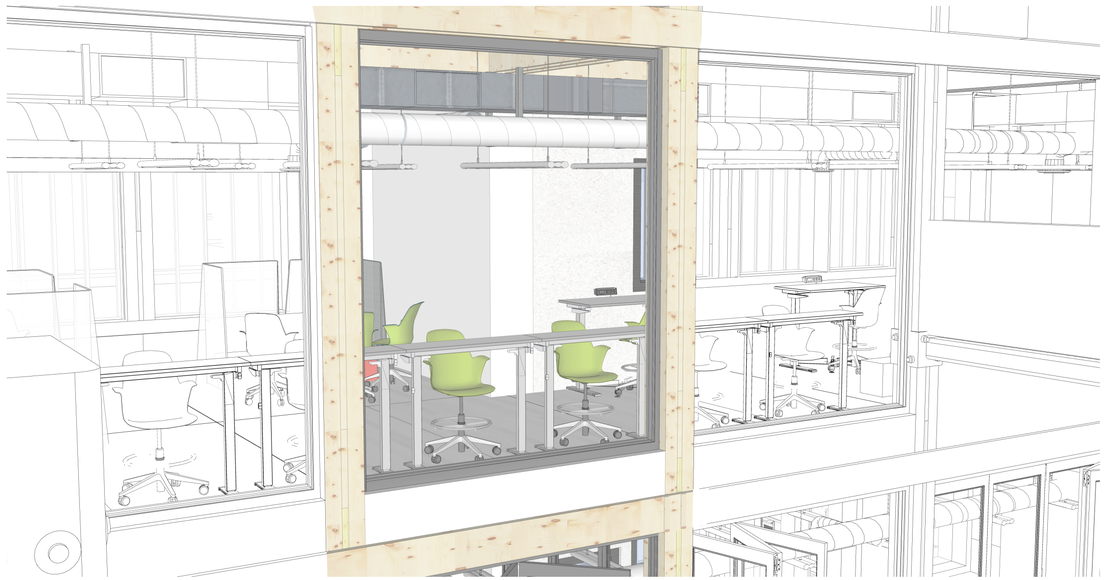




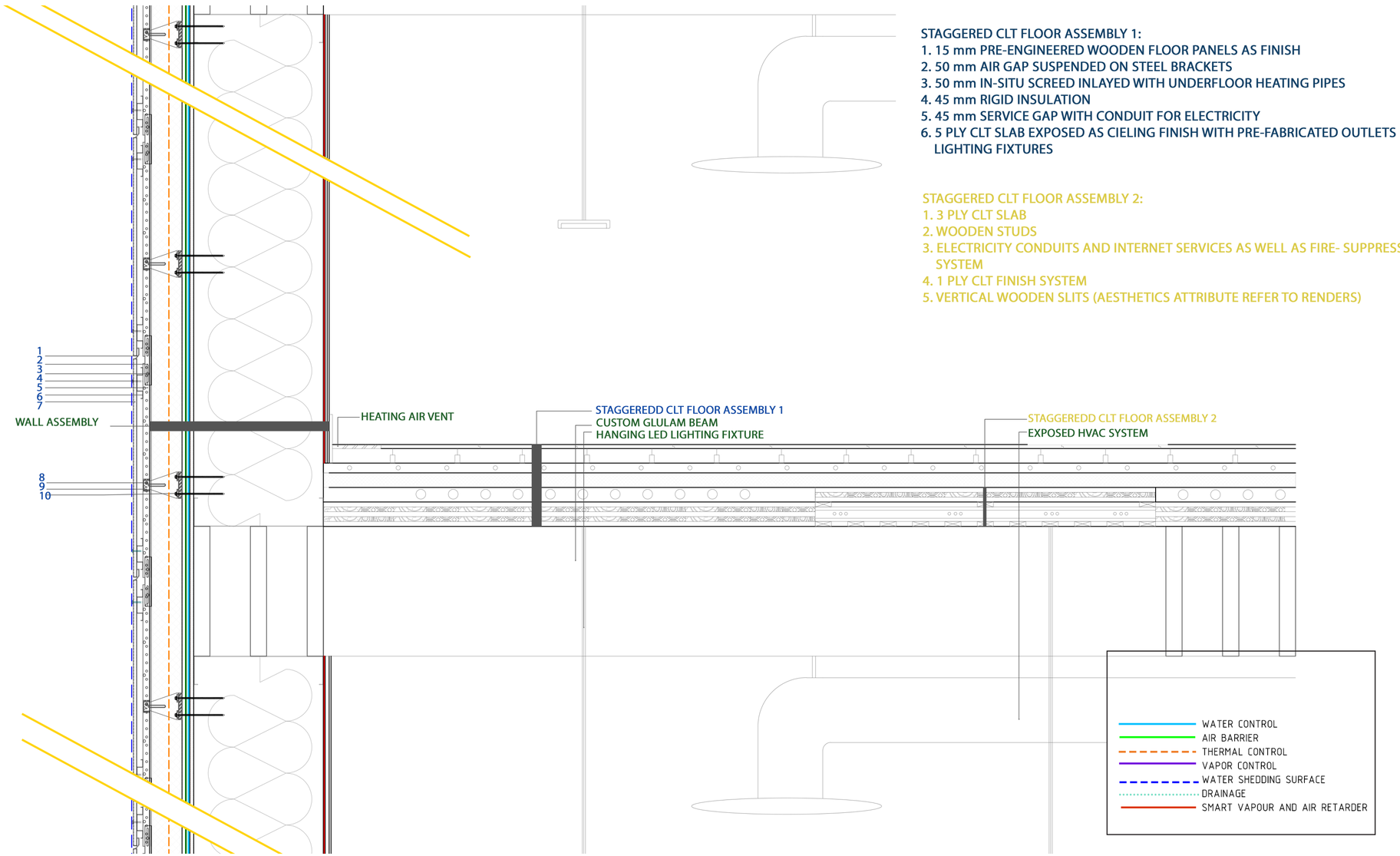
STRUCTURE OF INTERIOR WALLS

The diagram on the right shows the relationship between the exposed glulam columns and the interior walls.



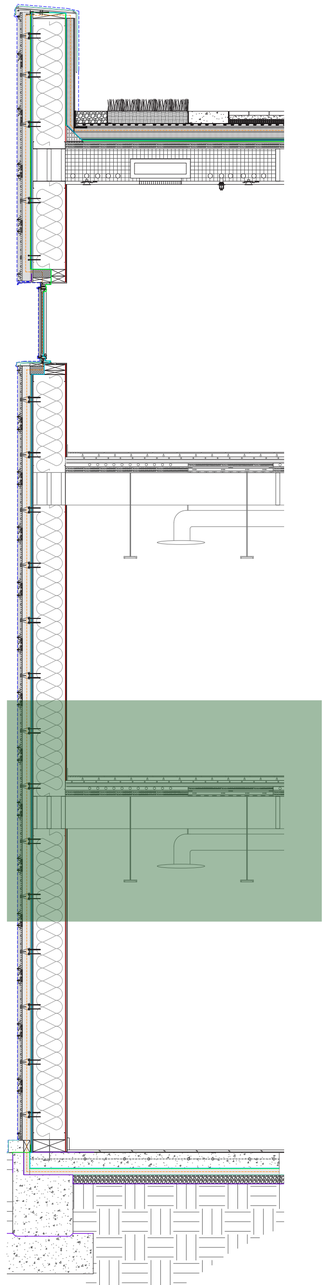


FLOOR ASSEMBLY



STAGGERED CLT FLOOR ASSEMBLY 1:
1. 15 mm PRE-ENGINEERED WOODEN FLOOR PANELS AS FINISH
2. 50 mm AIR GAP SUSPENDED ON STEEL BRACKETS
3. 50 mm IN-SITU SCREED INLAYED WITH UNDERFLOOR HEATING PIPES
4. 45 mm RIGID INSULATION
5. 45 mm SERVICE GAP WITH CONDUIT FOR ELECTRICITY
6. 5 PLY CLT SLAB EXPOSED AS CIELING FINISH WITH PRE-FABRICATED OUTLETS FOR LIGHTING FIXTURES

STAGGERED CLT FLOOR ASSEMBLY 2:
1. 3 PLY CLT SLAB
2. WOODEN STUDS
3. ELECTRICITY CONDUITS AND INTERNET SERVICES AS WELL AS FIRE- SUPPRESSION SYSTEM
4. 1 PLY CLT FINISH SYSTEM
5. VERTICAL WOODEN SLITS (AESTHETICS ATTRIBUTE REFER TO RENDERS)

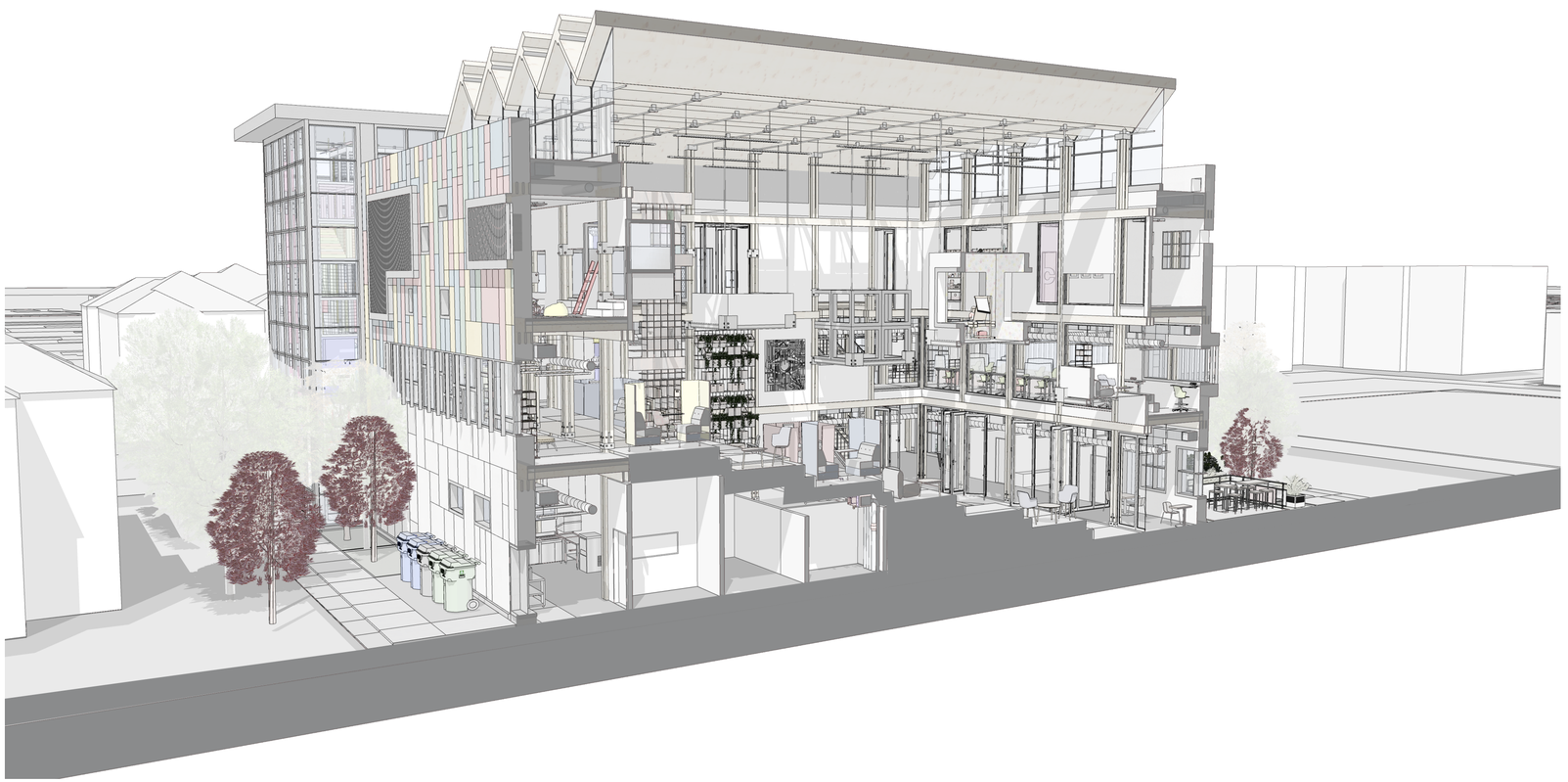


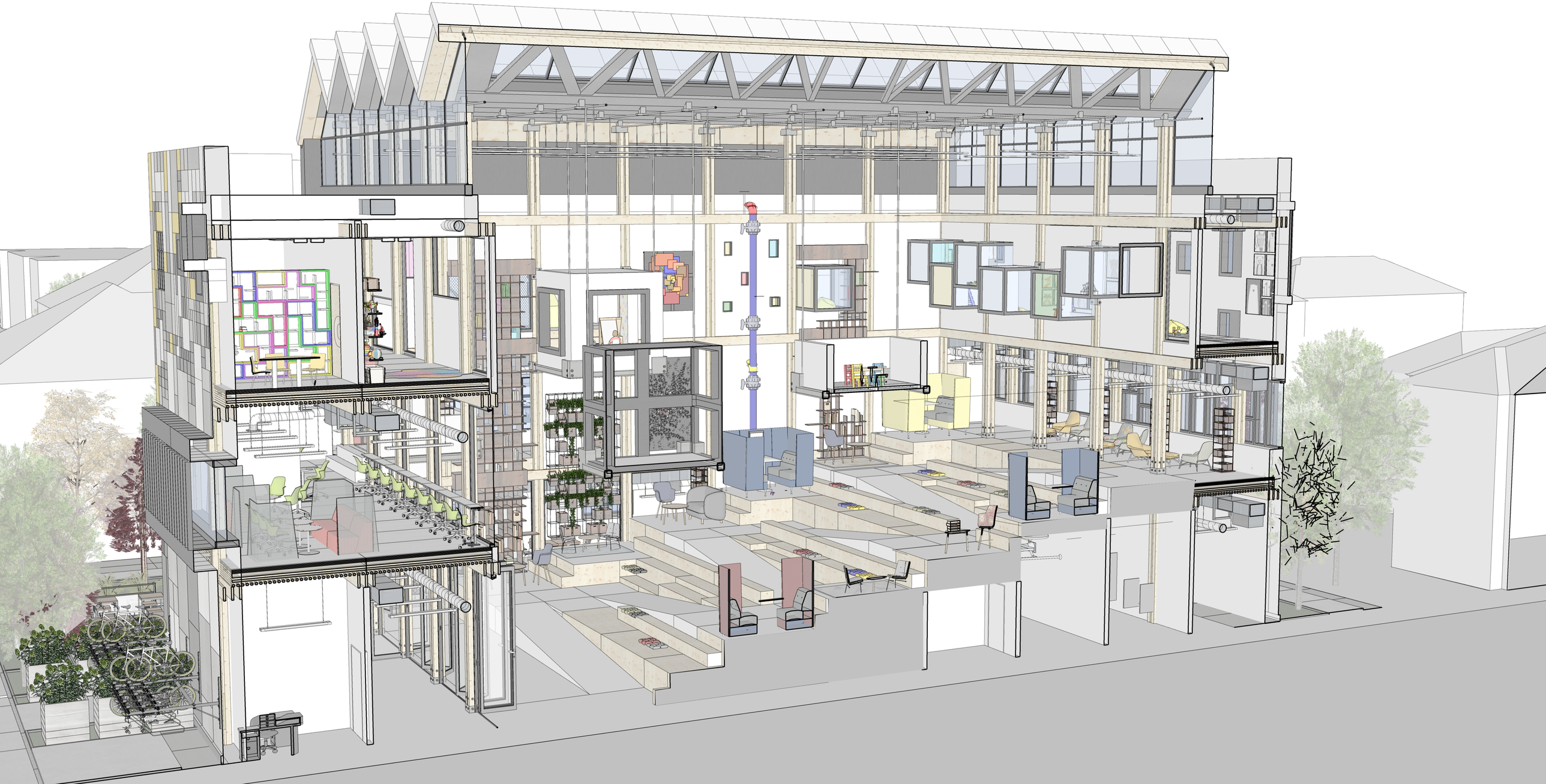
THE ATRIUM

The main soul and program of the building resides in the atrium which combines multiple aspects of the structure, the program, the users, the functions and the environmental strategies.

As seen in the section on the side the windows on the Eastern and Western end of the building provide great lighiting into the space and also highlight various structural elements with shadows which further accentuates their integration in the space.

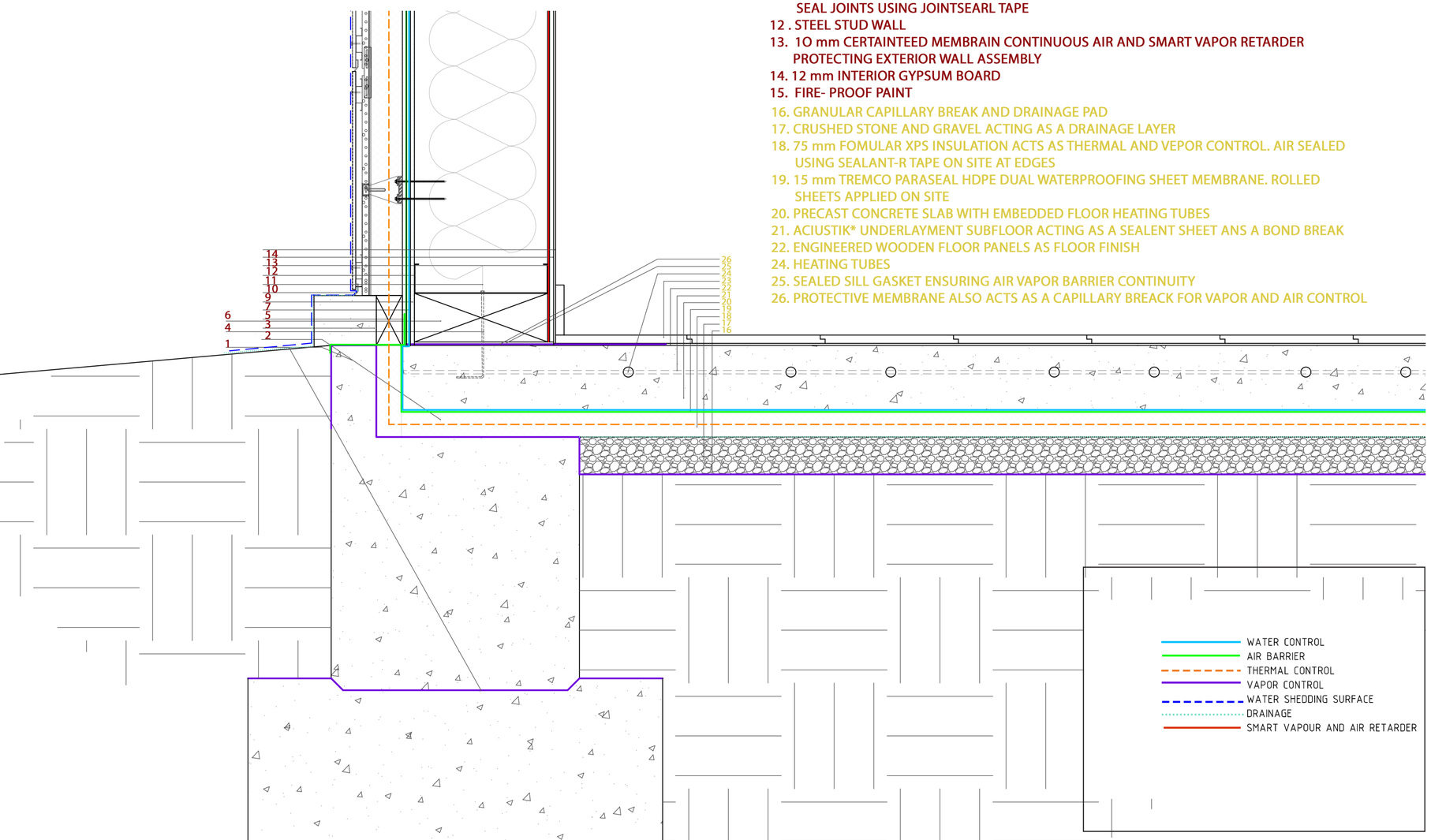
The stairs and ramps are made out of concrete with an embedded in-floor heating system (shown on page 34 in further detail). This creates a comfortable seating area in cold weather that is further highlighted by the use of wooden flooring on the steps that could be used for seating creating an inviting environment.

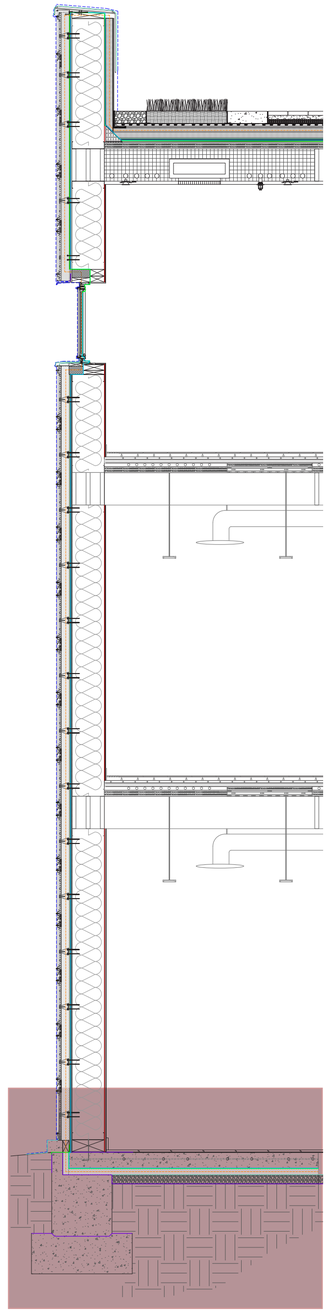




GROUND FLOOR ASSEMBLY

1. CAPILLARY BREAK ACTING AS AN AIR VAPOR BARRIER
2. TOP SOIL SLOPED 5% AWAY FROM THE BUILDING
3. CONCRETE FOUNDATION WALL POURED ON SITE
4. CURVED FOUNDATION SCREW FIXING FOUNDATION TO METAL STUD
5. CONCRETE CURB TO PROTECT BUILDING ENVELOPE FROM WEATHERING DUE TO SOIL CONDITIONS AND FROM WATER WOODEN BLOCK
6. WOODEN BLOCK
7. 12 mm TREMCO EXDAIR FLUID APPLIED AIR AND VAPOR BARRIER (ALSO PROTECTS FROM WATER)
8. 15 mm TREMCO PARASEAL HDPE DUAL WATERPROOFING SHEET MEMBRANE
9. 12 mm DENSGLASS FIBER GLASS MATT FYOSUM SHEATING BOARD (PROVIDES MOISTURE AND MOLD RESISTANCE)
10. METAL CAPPED FRIP FLASHING
11. 400 mm THERMAFIBRE ULTRABATT THERMAL MINERAL WOOL INSULATION, AIR SEAL JOINTS USING JOINTSEARL TAPE
12 . STEEL STUD WALL
13. 1O mm CERTAINTEED MEMBRAIN CONTINUOUS AIR AND SMART VAPOR RETARDER PROTECTING EXTERIOR WALL ASSEMBLY
14. 12 mm INTERIOR GYPSUM BOARD
15. FIRE- PROOF PAINT
16. GRANULAR CAPILLARY BREAK AND DRAINAGE PAD
17. CRUSHED STONE AND GRAVEL ACTING AS A DRAINAGE LAYER
18. 75 mm FOMULAR XPS INSULATION ACTS AS THERMAL AND VEPOR CONTROL. AIR SEALED USING SEALANT-R TAPE ON SITE AT EDGES
19. 15 mm TREMCO PARASEAL HDPE DUAL WATERPROOFING SHEET MEMBRANE. ROLLED SHEETS APPLIED ON SITE
20. PRECAST CONCRETE SLAB WITH EMBEDDED FLOOR HEATING TUBES
21. ACIUSTIK* UNDERLAYMENT SUBFLOOR ACTING AS A SEALENT SHEET ANS A BOND BREAK
22. ENGINEERED WOODEN FLOOR PANELS AS FLOOR FINISH
24. HEATING TUBES
25. SEALED SILL GASKET ENSURING AIR VAPOR BARRIER CONTINUITY
26. PROTECTIVE MEMBRANE ALSO ACTS AS A CAPILLARY BREACK FOR VAPOR AND AIR CONTROL



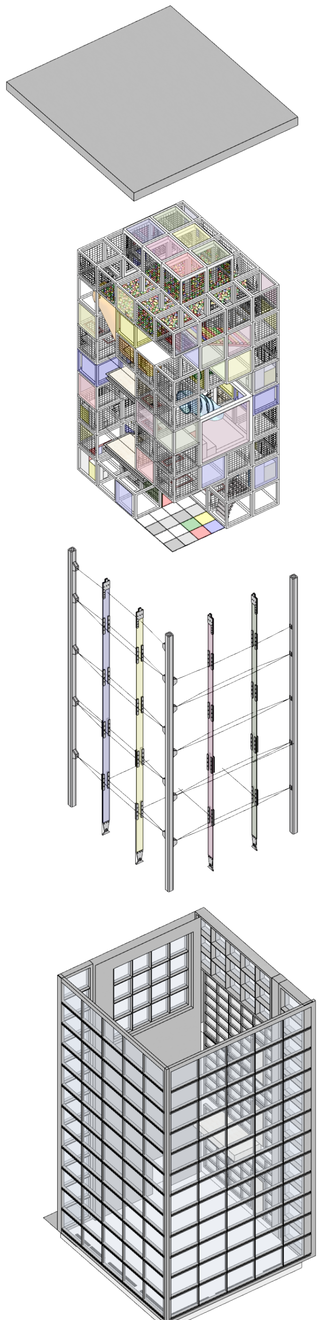


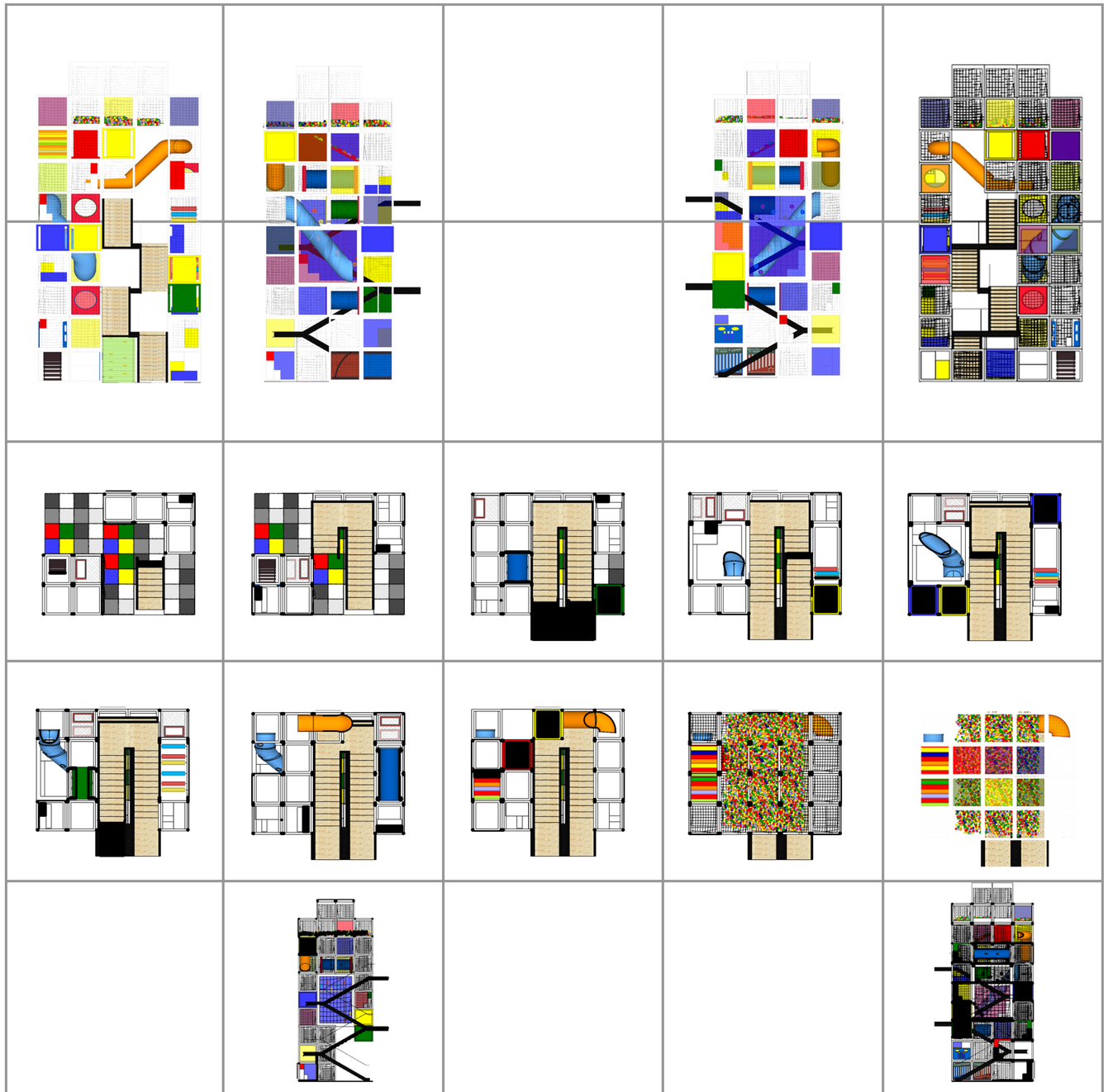
THE PLAYHOUSE STRUCTURE

The Playouse is encased with an asembly of a curtain wall on the sides facing the streets and then a CLT wall with windows on the sides facing the inside of the buildings. The access in and out of the building is controlled by an automatic security system to ensure the safety of the children. There are no exit points from the structure onto the main street. The exits are into the drop-off area in the main floor or the first floor at the top of the ramped stairs or on the top floor into the play and learn area.

As previously explained the glass fins support the curtain walls system and are laterally braced by steel cables that are connected to HSS columns.

The playhouse area itself encircles steel braced stairs and is made from HSS columns that are welded into cubes and stacked ontop of each other with connections in between to create the 12m high structure.





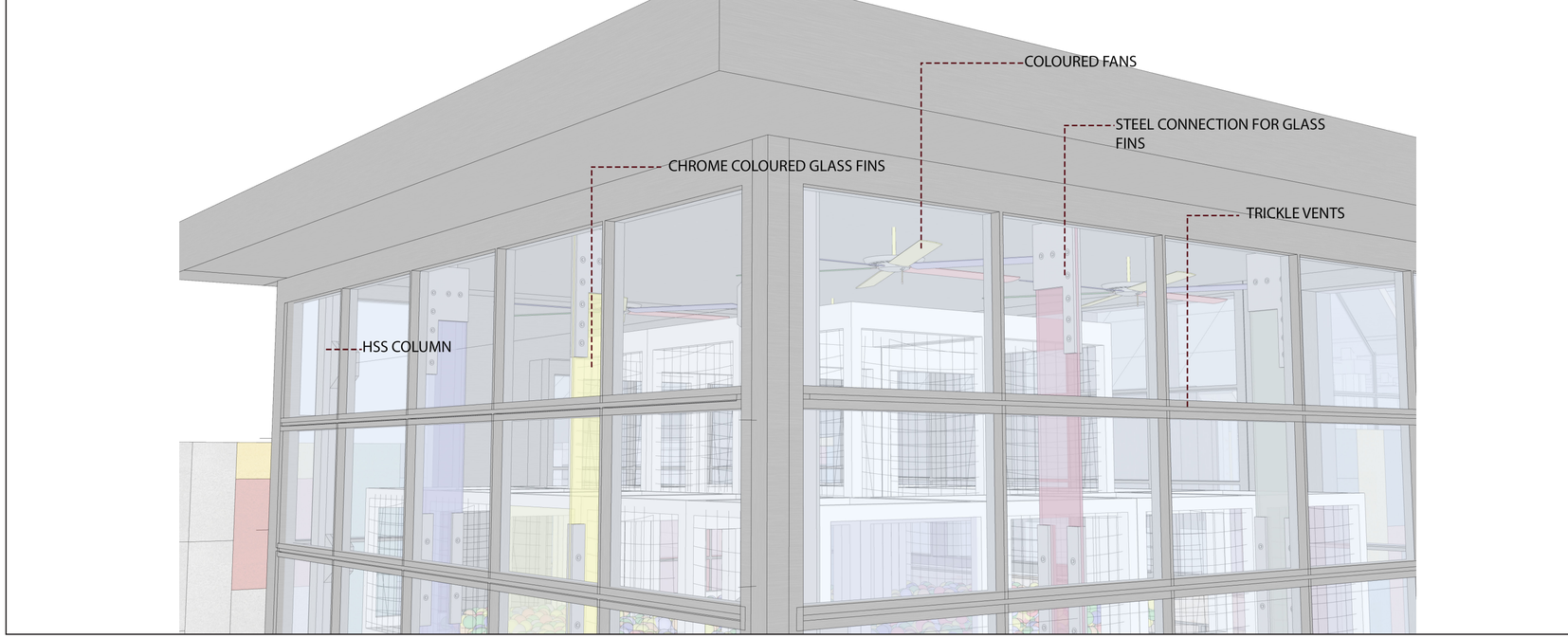
THE PLAYHOUSE SCHEME

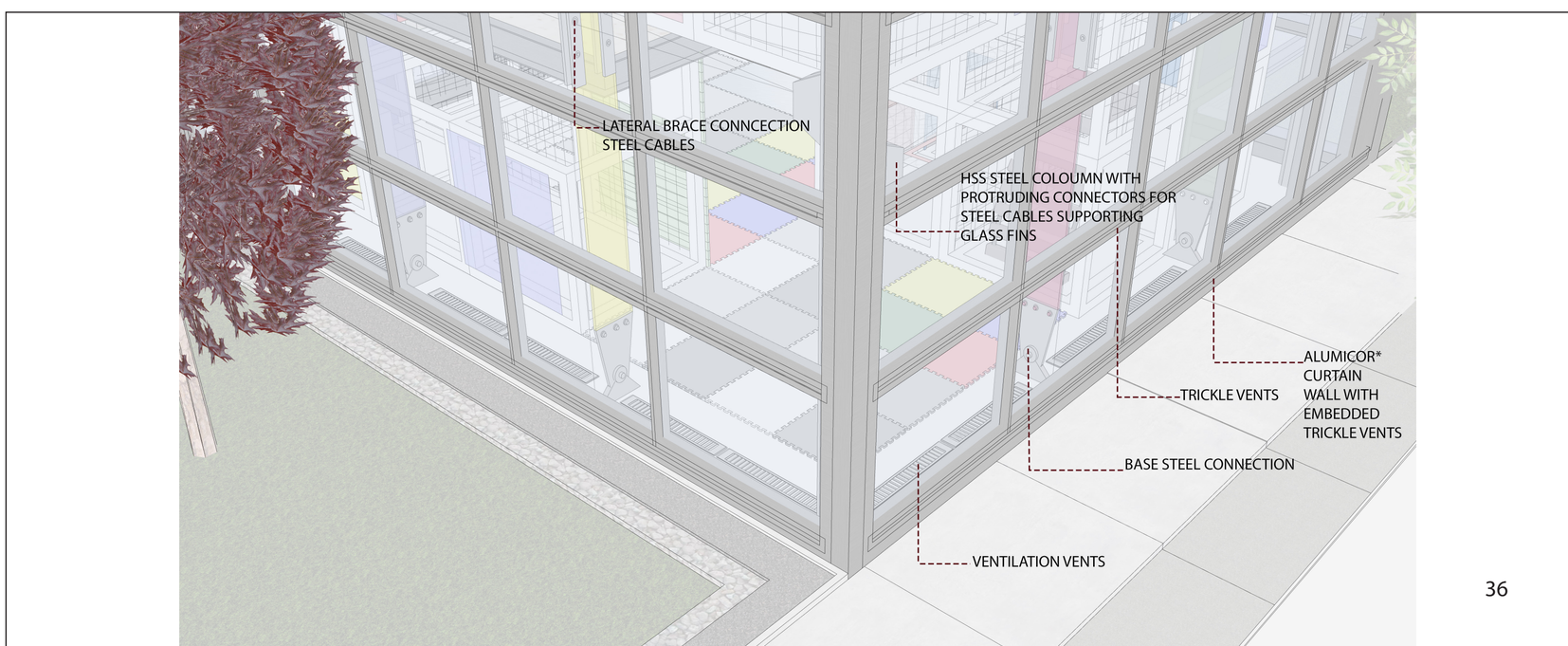
The playhouse depends on a hybrid system of natural and forced air ventilation that can be adjusted automatically depending on the weather as well as manually depending on the comfort of the users.

In the bottom diagram, the ventilation vents are shown which host the main floor heating system allowing the hot air to rise and heat the entire structure.

The curtain wall is embedded with Rotovents/ Trickle vents from Alumicor which are automatically opened and closed to allow fresh air into the playhouse.

The top ones are used as escape vents for the hot air in summer and mechanical fans are turned on to increase the flow of air and cool the area in summer.





ENVIRONMENTALLY EFFICIENT DESIGN

There are several strategies implemented to make this building environmentally efficient that are integrated in the deisgn.

The first and most prevelant is the natural ventialtion strategy for the atrium.

The atrium walls can all be closed to provide a seperately ventilated and heated space or opened to allow the fresh air from the operable windows on the roof in and distributed into the various spaces surrounding the atrium.

The Saw-Tooth roof strategy as explored previously allows for natural ventilation into the atrium and maxmized natural lighting.

The floors of the atrium are heated through an embedded system that allows the air to be regulated and adjusted according to the needs of the users.

Due to the small size of the building, in extremely cold days, the atrium walls can be opened and the forced air system in the exposed HVAC systems on the ground and first floor can be directed to allow for extra heat into the atrium.

The rest of the building also has a hybrid system of in-floor heating and HVAC system to allow for maximum energy efficiency.

The HVAC system acts primarly as a cooling system but can be switched to heat during the colder days and adjusted on an energy saving mode.

The second floor has an embedded HVAC system in the roof while the ground floor and first floor systems are exposed. Having them exposed allows for easier maintenace but in terms of design can also enhance the aesthetic environment of the exposed structural system.

The landscape design has a variety of different trees strategically located to shade various parts of the buildings in sunny days. The trees also provide cool for exterior seating areas which increases the user's comfort.

The building orientation allows for natural air to flow into the operable windows during various times of the day and in different seasons which enhances the buildings natural ventilation strategy.

The playhouse has a seperate ventilation strategy that contains a hybrid of a natural ventilation option, a forced air option and in-floor heating. This combination provides the most efficient method for most areas of the building.

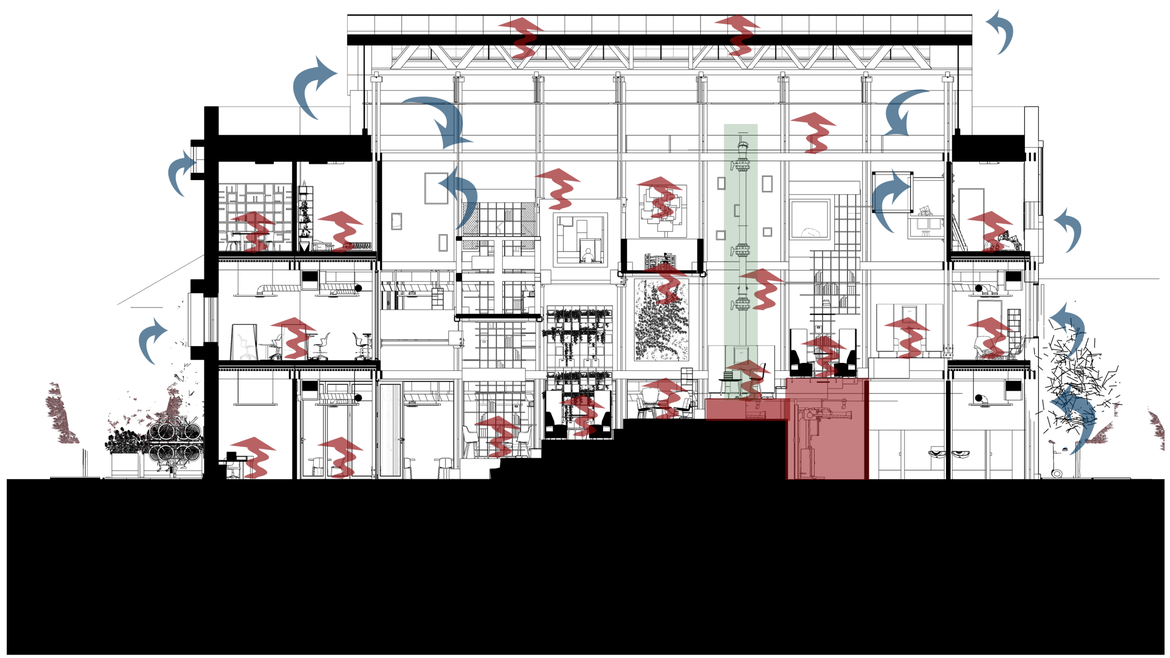
In the playhouse, the fans act as the main mechanical aspect while the trickle vents allow for the air to come into the area and the infloor heating pushes the hot air into the structure.

The following pages will explain the various strategies in more detail.

VENTILATION STRATEGIES

As explained previously, there are several strategies in the building for ventilation.

In blue, the diagram on the right shows the cold air comig in from various windows, in red the hot air going up from the infloor heating and in green is the piping linked to the HVAC system and the distribution in the mechanical room located below the atrium.



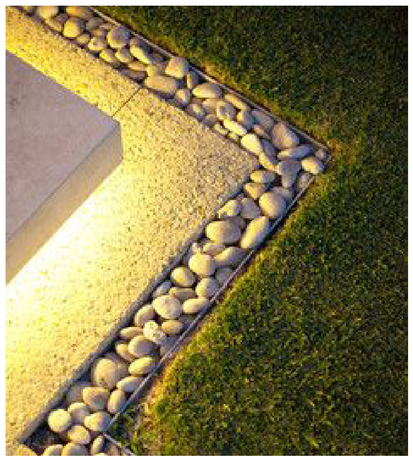
NATURAL VENTILATION

All windows in the buildings are operable and all curtain walls are embedded with RotoVents from Alumicor which enables the buildings to fully function naturally on days where the weather is moderate completely eliminating the need for a mechanical system.

LOCAL PLANTS USED ON SITE

As the landscape was very important in the design, the different elements and trees used were also a very important choice in terms of being friendly to the environment as well as for various uses such as colour, shading and smell.

The images on the right shows the different local trees that were used on the site as well as details of the landscape and the integration of the lighting in various areas of the landscape

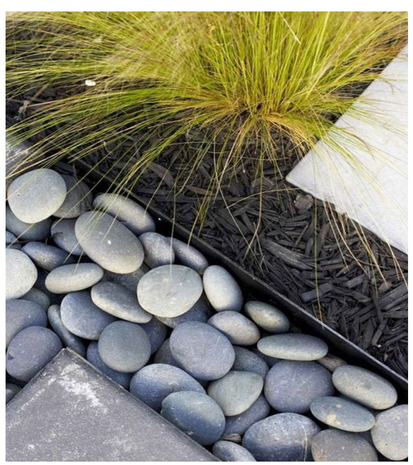


LANDSCAPE DESIGN

LITARIS SPICATA, BLAZING STAR

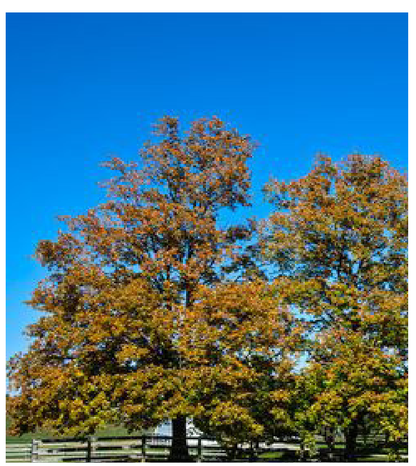
SOLIDAG SHORTI, GOLDEN ROD

SILVER MAPLE



LANDSCAPE DESIGN

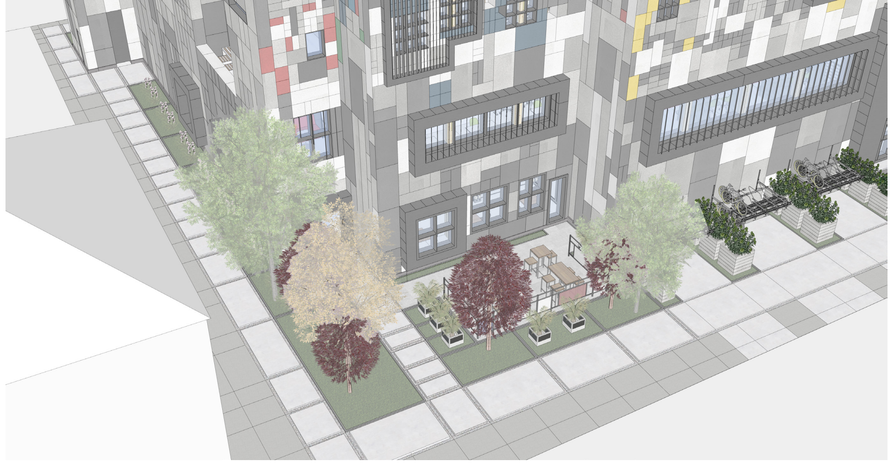
RED MAPLE

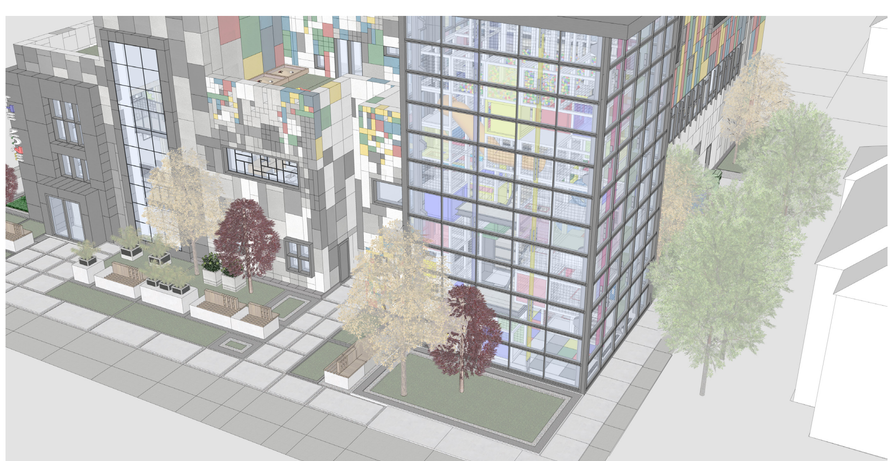


CEDAR CREEK TREE

REDBUD TREE

LANDSCAPE AND SHADE IN DESIGN

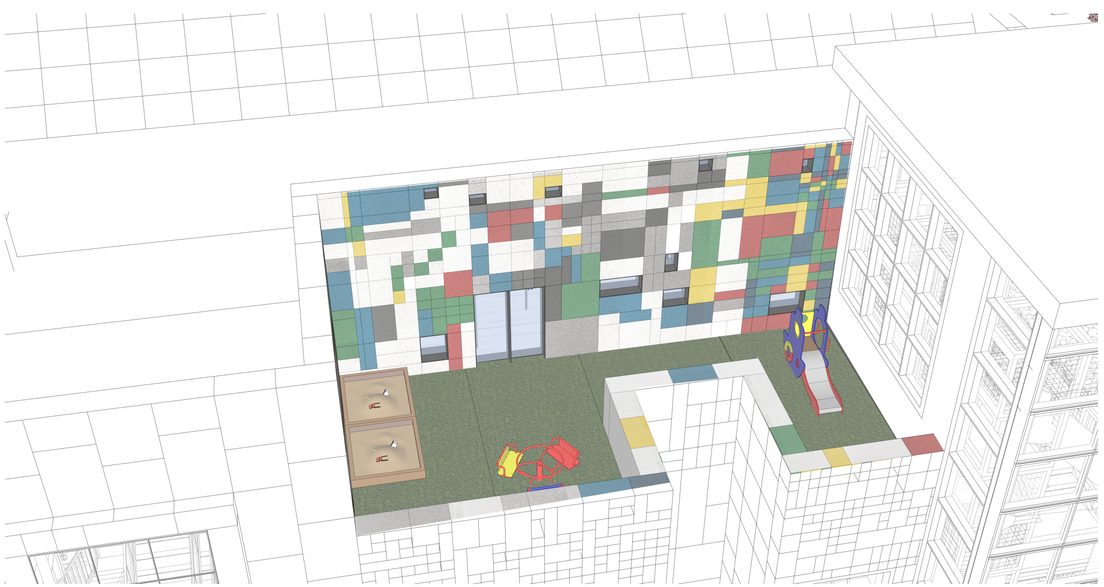




ACCESSIBLE GREEN ROOFS AND LANDSCAPE ELEMENTS

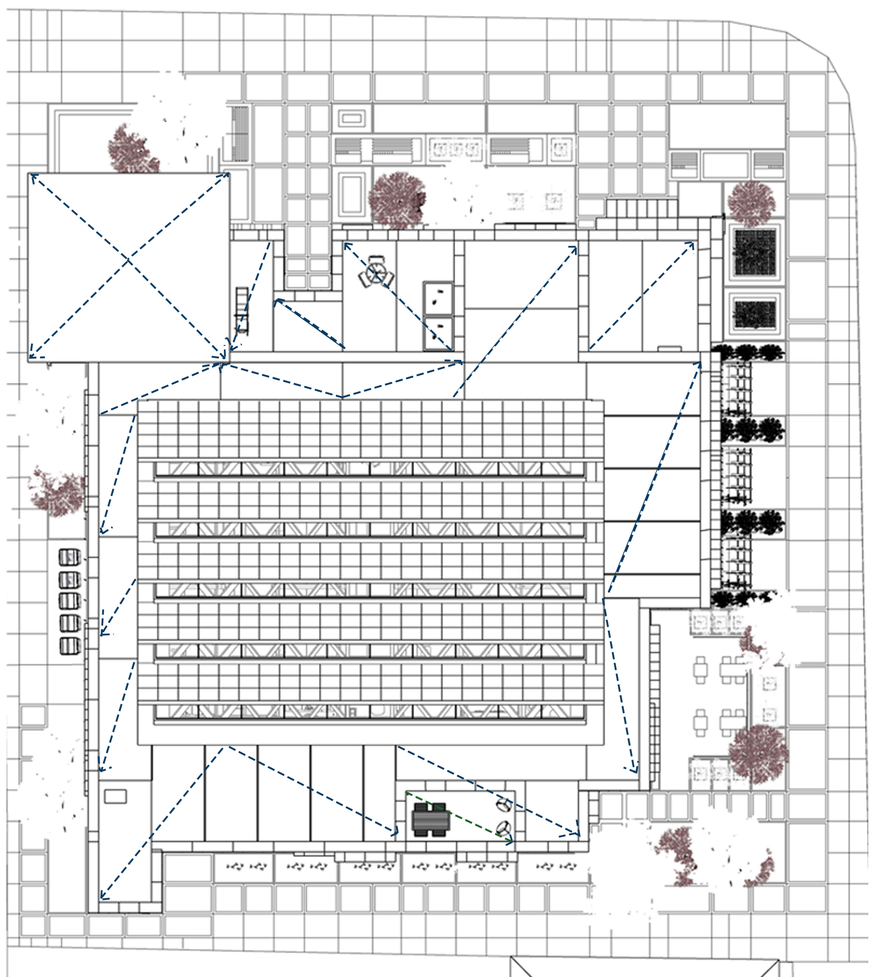
The green roof balconies on the first and second floor are made of an intensive green roof system allowing recreational use.

In the first floor they provide a picnic area and a reading space for times of good weather and in the second floor provide a large outdoor play area for the children to ensure they get some daily outdoor activity as per Canadian laws



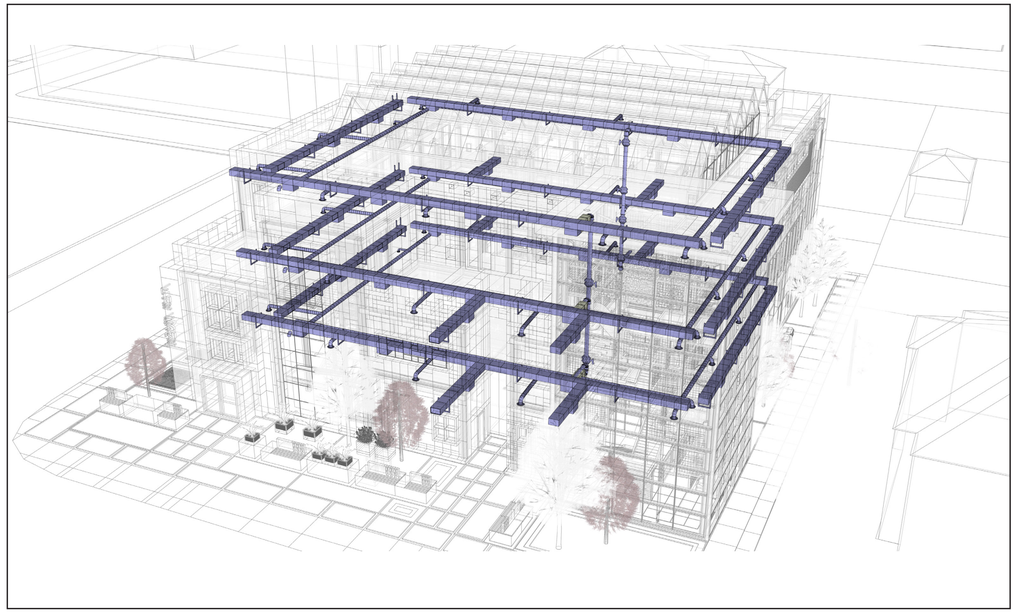
DRAINAGE AND RAIN MANAGEMENT

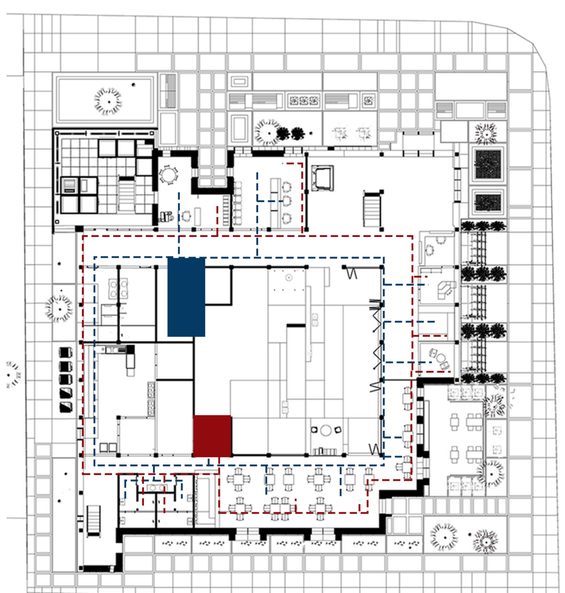
The roof plan on the left shows the division of the prefabricated roof panels that create the CLT + Green roof system. It also shows the drainage paths and slopes that lead to varous cisterns allowing the water to be drained on the drainage plane behind the rainscreen panels as shown in the detail in the previous sections

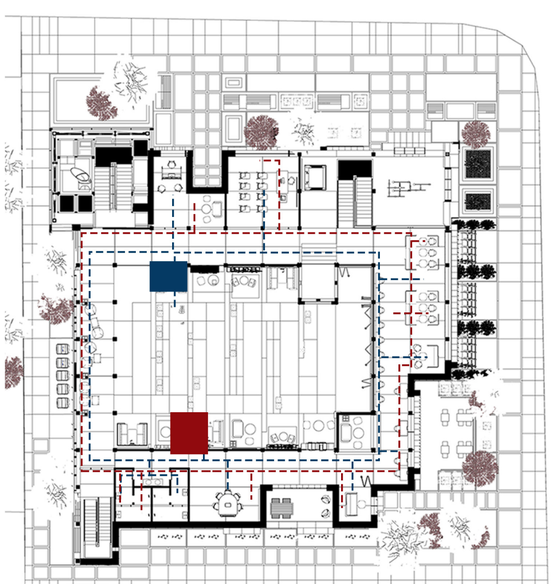


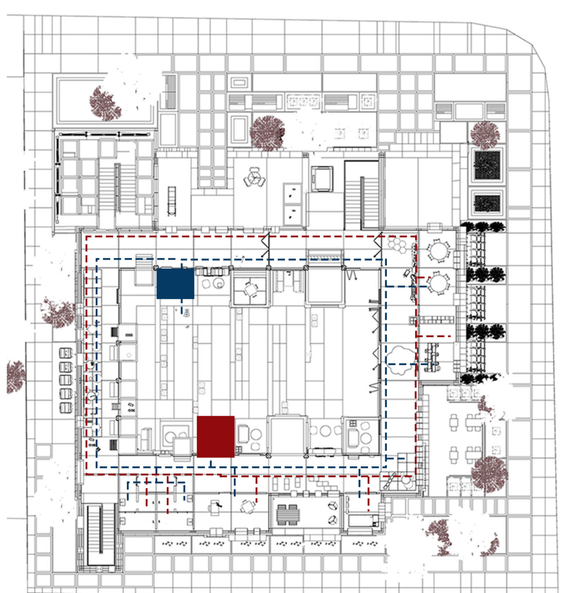
HVAC SYSTEM

The HVAC system provides primarily the needed cooling for various parts of the building. There is one system on each floor, all linked by exposed piping in the atrium that leads to a large mechanical room on the ground floor that hosts both the supply system and the return system in seperated areas.



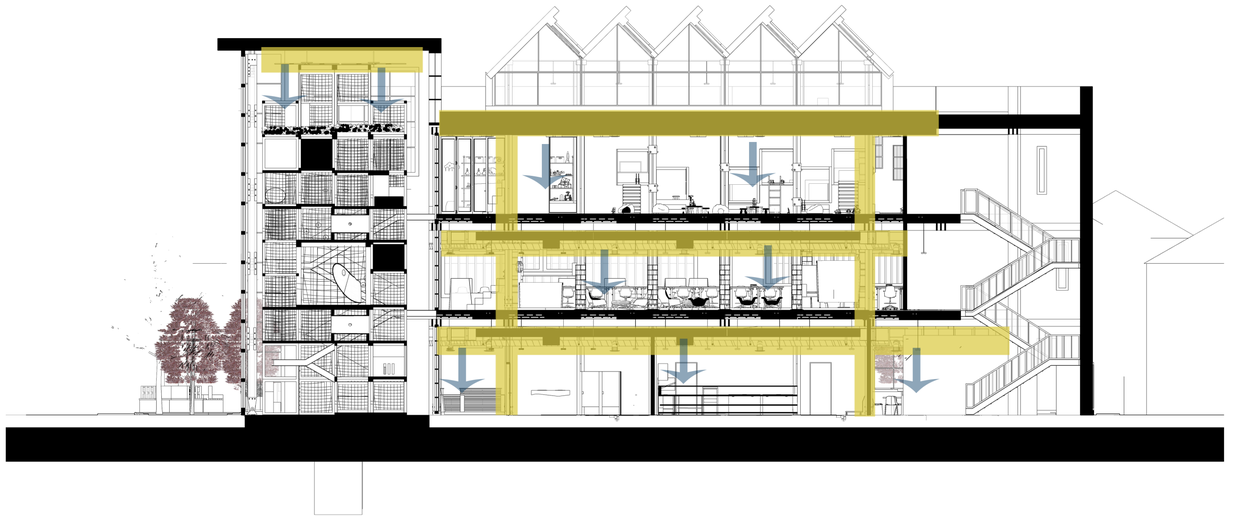






MECHANICAL AND RADIANT SYSTEMS

In the following diagrams the mechanical systems are shown in yellow while the radiant systems are shown in red.



LIFE SAFETY

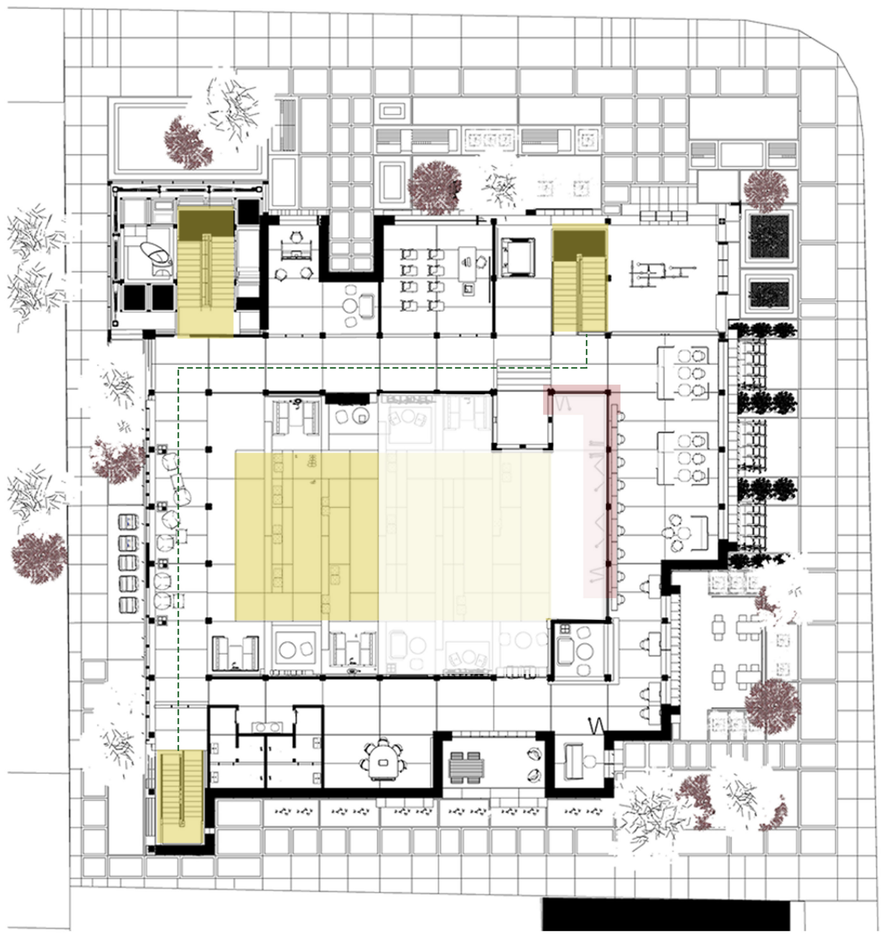
There are two main access points that are direcly adjascent to the stais that are located on the North Eastern and South Western sides of the building.

The atrium and the playhouse stairs can also be used as exits as they are both close to doors exiting the building (The Day-care drop off door and the main entrance of the building.

The kitchen has a direct exit to thr backdoor and the restaurant has a direct exit onto the main street.

In case of fire, the movable doors in the atrium can be closed to contain the fire once everyone has left the building.

There are integrated sprinklers in the staggered CLT floor system that turn on automatically in case of fire at the sound of the alarm.

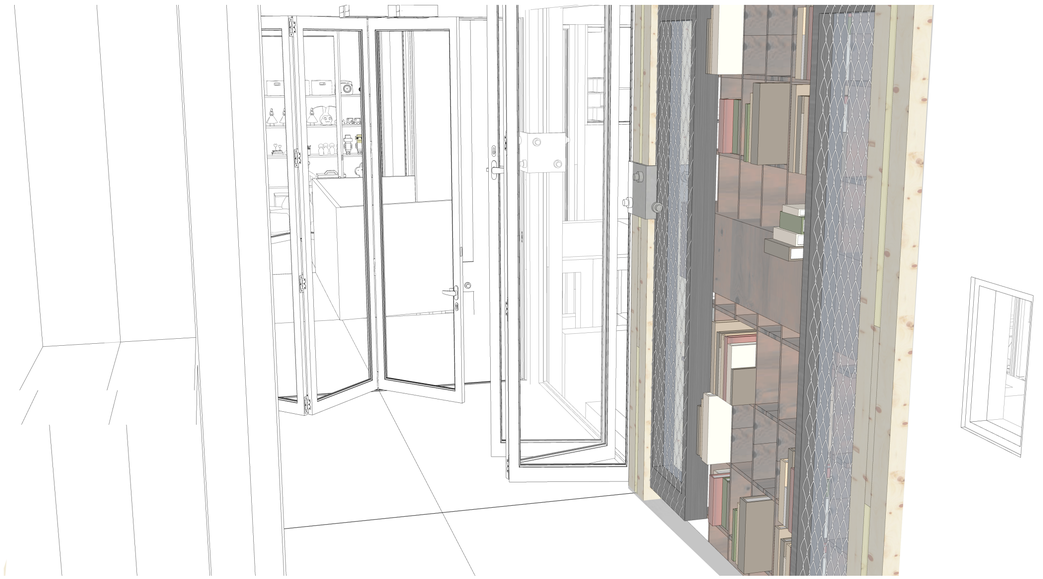


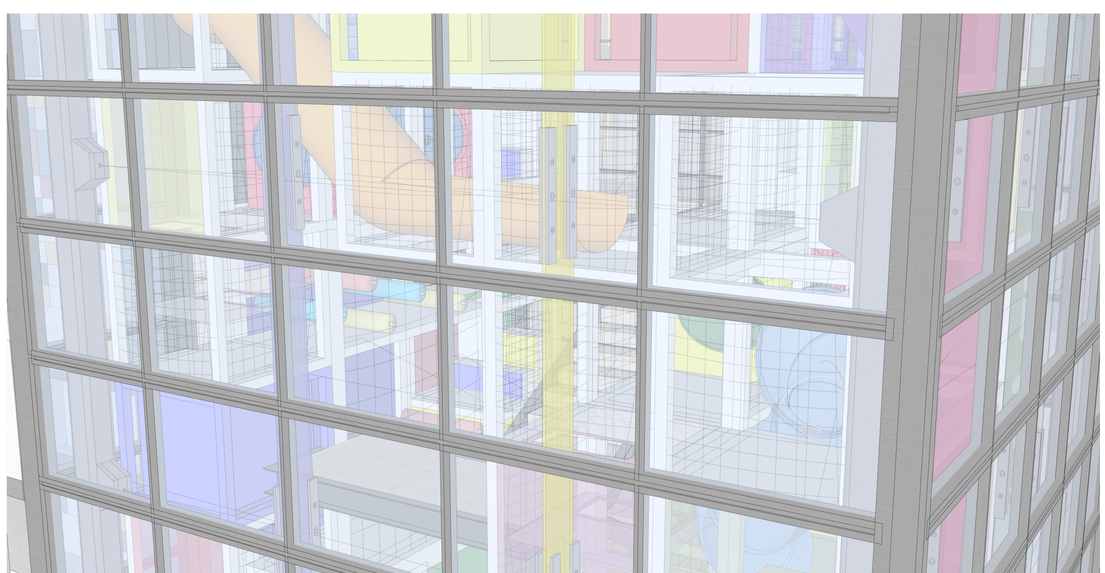
OTHER LIFE AND SAFETY MEASURES

Since children are a very important user in my design there is a variety of extra safety measures that have been taken.

In the first diagram showing the open library, the re is a glass and wire mesh system that is added on the side to block children from climbing the library. In this area the library shelves are closed off from the atrium side when there are books.

In the playhouse, the boxes are encased with a wire and nylon mesh that ensures that children cannot fall out or climb out of the designated route.



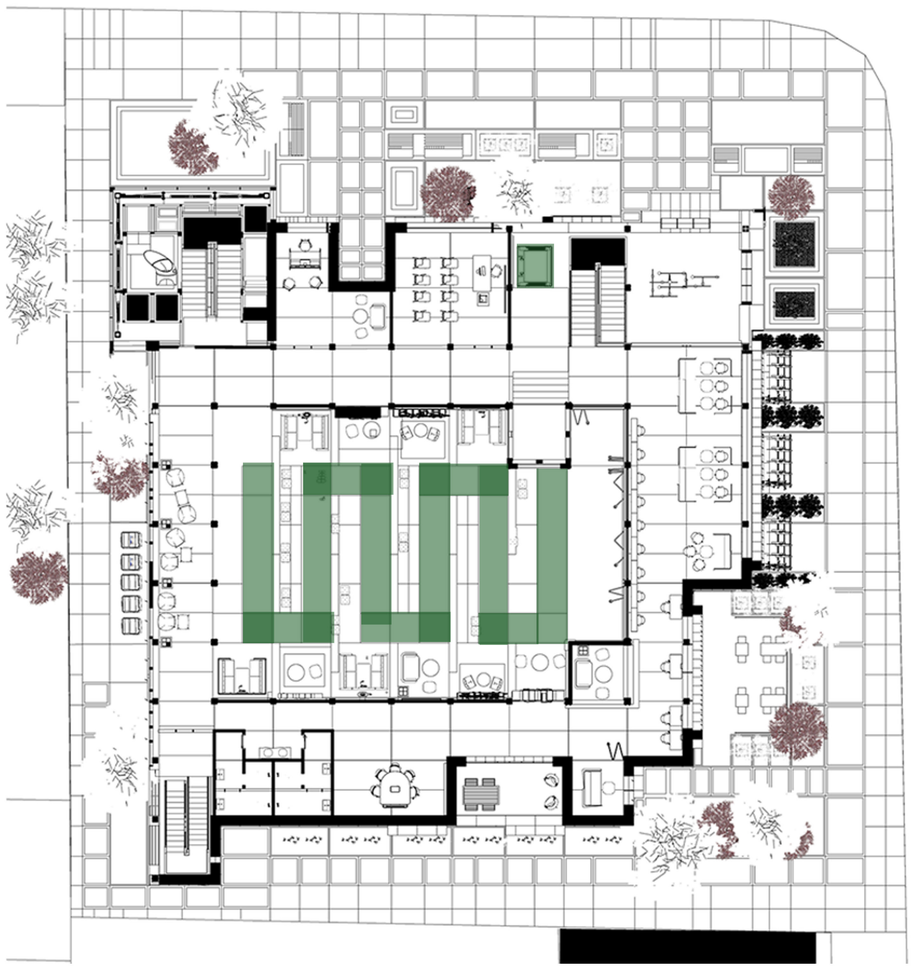


BARRIER FREE DESIGN

The building is accessible on all floors by an elevator that leads to the various spaces.

The stairs in the atrium are surrounded by a ramp that leads to all seating areas to ensure continuous accessibility for all users

All bathrooms have one accessible stall.



LEED ELEMENTS IN DESIGN

The building was design to meet all LEED requirements as an integral part of the deisgn and constuction. Various considerations were made to ensure that the elements required were part of the design and not only additions.

The building and its relationship to the site was enhanced in order to satisfy efficient ventialtion and energy strategies as well as accessibility and life and safety strategies as explored in the previous sections.

The building satisfied many LEED criteria as shown in the follwoing section which ensures that it is environmentally friendly, sustainable and efficient.

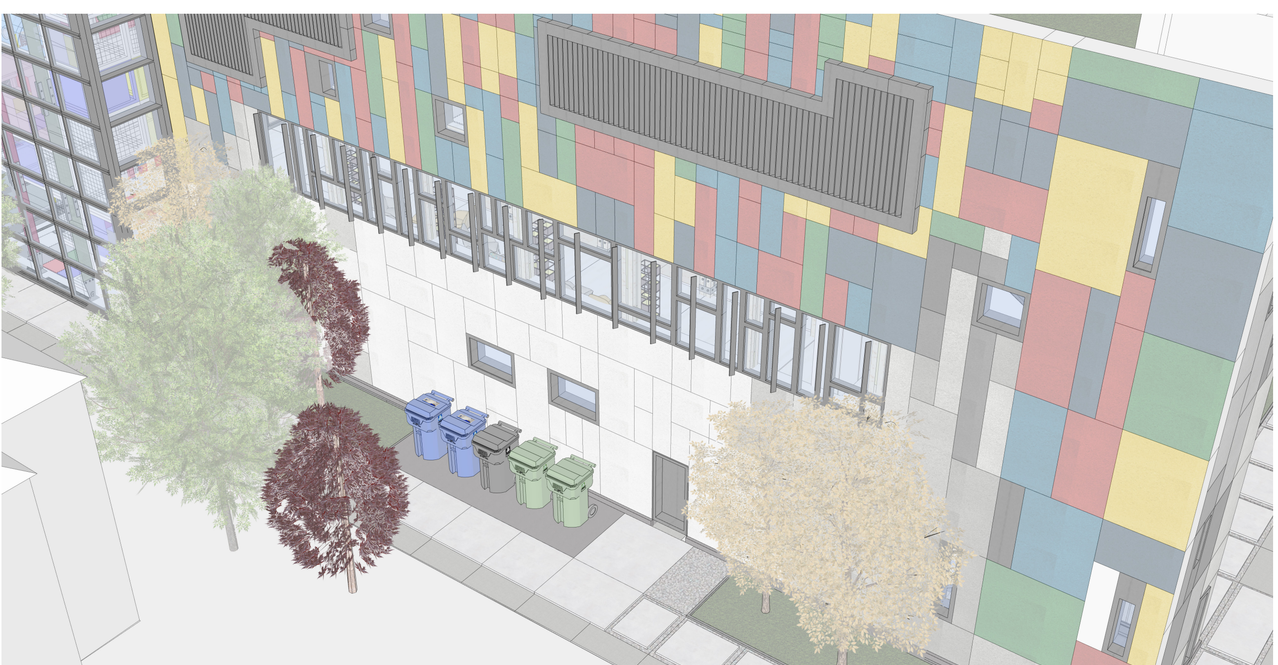
The materials chosen are mostly locally sourced to decrease transportation costs and the structure is mostly prefabricated which decreases construction time and energy waste.

The design as a whole provides a comfortable learning and socialization environment suited for New Canadians and their integration into Canadian society.

It promotes activity, good health, movement, education and services and provides a building where one can feel at home while still being productive and carry on tasks that could otherwise be very bureacratic and tedious.

Efficient design strategies were taken into consideration to ensure an effective environment that meets the LEED criteria while maintaining overall comfortable environment in the building.

The following section contains the LEED criteria and the points claimed for the purpose of this project.



LEED

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: The ZONE Center for New Canadians

Date

Y	?	N		
1			Credi 1	Integrative Process

The building is designed to be cost efficient and high performance

				Location and Transportation	Possible Points:
			Credit 1	LEED for Neighborhood Development Location	
1			Credit 2	Sensitive Land Protection	
		2	Credit 3	High Priority Site	
2			Credit 4	Surrounding Density and Diverse Uses	
		5	Credit 5	Access to Quality Transit	
1			Credit 6	Bicycle Facilities	
1			Credit 7	Reduced Parking Footprint	
		1	Credit 8	Green Vehicles	

Not a protected site
Not a sensitive land (wetlands, farmlands etc.)
Not a high priority site
Existing Density within 400m radius is 5050
Closest public tranist within current infrastructure does not meet standards
Bicycle facilities integrated in facade design
No parking available on site
No outlet for Hybrid or Green Vehicles

				Sustainable Sites	Possible Points:
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Assessment	
2			Credit 2	Site Development--Protect or Restore Habitat	
1			Credit 3	Open Space	
3			Credit 4	Rainwater Management	
2			Credit 5	Heat Island Reduction	
1			Credit 6	Light Pollution Reduction	

Most elements are prefabricated
Site Assessment completed and taken into design considerations
Local plants used on sites and native plants preserved and integrated into landscape,
Compacted soils meet requirements,
Open spaces are an integral part of the design and exterior landscape provides a variety of seating for users and passer-bys
Rainwater management system encorporated into roof and facade design
Extensive and Intensive green roofs used in building, trees are also used to provide shade in the landscape
Exterior lights are either embedded and diffused or pointing downwards

			Water Efficiency	Possible Points:
Y			Prereq 1	Outdoor Water Use Reduction
Y			Prereq 2	Indoor Water Use Reduction
Y			Prereq 3	Building-Level Water Metering
2			Credit 1	Outdoor Water Use Reduction
3			Credit 2	Indoor Water Use Reduction
		2	Credit 3	Cooling Tower Water Use
1			Credit 4	Water Metering

The facade has a drip irrigation system that enables collected water to be used for the landscape and the type of plants used in the landscape and the integration of stone and bark in the design eliminate the need for water.
Water saving, low flow faucets are used in all interior fixtures
No cooling tower used
Water meters are installed for indoors and outdoors water metering

			Energy and Atmosphere	Possible Points:
Y			Prereq 1	Fundamental Commissioning and Verification
Y			Prereq 2	Minimum Energy Performance
Y			Prereq 3	Building-Level Energy Metering
Y			Prereq 4	Fundamental Refrigerant Management
6			Credit 1	Enhanced Commissioning
18			Credit 2	Optimize Energy Performance
1			Credit 3	Advanced Energy Metering
		1	Credit 4	Demand Response
2			Credit 5	Renewable Energy Production
1			Credit 6	Enhanced Refrigerant Management
1			Credit 7	Green Power and Carbon Offsets

The commissioning authority follows the mechanical, electrical, and plumbing activities, and the building's thermal envelop in accordance to ASHRAE Guideline
Passive deisgn strategies are used in combination with a PVP roof system that decreases the energy consumption and increases production for a variety of functions.
Advanced Metering is included
N/A
PV Panels on the saw tooth roof
No use of refrigerants
Energy harvested into the Tesla Batteries is used as a secondary source for the infloor heating systems

			Materials and Resources	Possible Points:
Y			Prereq 1	Storage and Collection of Recyclables
Y			Prereq 2	Construction and Demolition Waste Management Planning
3			Credit 1	Building Life-Cycle Impact Reduction
2			Credit 2	Building Product Disclosure and Optimization - Environmental Product Declarations

Use of Glulam Beams and CLT slabs (both forms of recylced wood) decreases carbon footprint. Combined with natural ventialtion strategies to decreases need for energy.

Environmental product decleration and review of lifecycle confirmed to ISO

			Credit 3	Building Product Disclosure and Optimization - Sourcing of Raw Materials
			Credit 4	Building Product Disclosure and Optimization - Material Ingredients
2			Credit 5	Construction and Demolition Waste Management
2			**Indoor Environmental Quality**	**Possible Points:**
Y			Prereq 1	Minimum Indoor Air Quality Performance
Y			Prereq 2	Environmental Tobacco Smoke Control
			Credit 1	Enhanced Indoor Air Quality Strategies
			Credit 2	Low-Emitting Materials
2			Credit 3	Construction Indoor Air Quality Management Plan
3			Credit 4	Indoor Air Quality Assessment
1			Credit 5	Thermal Comfort
2			Credit 6	Interior Lighting
1			Credit 7	Daylight
1			Credit 8	Quality Views
3			Credit 9	Acoustic Performance
1			**Innovation**	**Possible Points:**
			Credit 1	Innovation
1			Credit 2	LEED Accredited Professional
1			**Regional Priority**	**Possible Points:**
1			Credit 1	Regional Priority: Specific Credit
1			Credit 2	Regional Priority: Specific Credit
1			Credit 3	Regional Priority: Specific Credit
1			Credit 4	Regional Priority: Specific Credit
			Total	**Possible Points:**

86

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

Use of recycled materials. Other materials sourced to be mindful during the extraction process

Materials used have a Health Product Declaration [e.g. drywall], building products are sourced from product manufacturers that are in place to optimize health and safety. Natural materials and recycled materials are the main components of the project

Waste limited due to pre fabricated elements

Humidifiers and CO^2 detectors located throughout project.

Wood is the primary material used

Moderated Air control during construction

Building will under-go a flush out with required volumes

Radiant floor heating and HVAC system regulate heat levels

Manual and multi-zone lighting systems that are adjusted according to use, lighting integral in the design process.

All spaces are naturally lit

Views available from all rooms and designed landscape enhances outdoor elements

Floors have an accoustic sealant layer to decrease noise from wooden floors

Performance Achieved

Supervised by Terri Boake

Construction waste management provided

Local plants used and enhanced landscape with drainage system for rain

Recycled materials used for primary building frame and floors

Water-use reduction in fixtures

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