



**Lappeenranta Western Area Service Network Reform and Sammontalo**

In the next few years, the city of Lappeenranta is prepared to modernize its services to repair and build new public buildings in the western part of the city. In accordance with the decisions of the City Council, approved in 2016, the service network reform covers not only the nurseries and school locations but also other city services such as youth facilities, libraries and sports facilities. At the same time, new space solutions for social and health care services will be explored in the area.

The new building Sammontalo will be built and put in use partly and in full operation in 2023. Sammonlahti School is devoted for comprehensive education in the western part of Lappeenranta from nursery to 9-grade which cater 1000 students, 80 teachers and 10 school instructors. The key objective is to create a functional, economically efficient, healthy and safe operating environment that supports new learning and teaching models, serving multiple users, allowing space sharing to increase their utilization rate.

**Location & history**

The center of Sammonlahti is the regional center of the western region of Lappeenranta. The main buildings have been completed within a relatively short period of time and the area is unified in architecture. The buildings represent a style inspired by postmodernism in the 1970s, which includes the use of red bricks and references to historical themes.

**Site analysis**

The northeast of site locates historical public buildings, including community church and an old business center, relating to history of the area, that should be preserved. Northwest and southeast axes are multi-storey housing projects, which will be cut through by green area and public spaces of the direction of northwest and southeast in the future orientation. The Southwest is forest and community sport yard.

Gross area in calculation, required for a school of one thousand students is about 26.000 m<sup>2</sup> consist of

- (1) School building: 8.600 m<sup>2</sup>
- (2) Green area (5m<sup>2</sup>/pupill): 5.000 m<sup>2</sup>
- (3) School yards (5-10m<sup>2</sup>/pupill): 5.000 m<sup>2</sup>-10.000 m<sup>2</sup>
- (4) Sport yard (40m x 60m): 2.400 m<sup>2</sup>

Area of site is about 52.000 m<sup>2</sup> (excluding the artificial grass field). There are three pre-existing buildings, namely, kindergarten, primary school and sport hall on the site. According to city's plan, those building is backward and not enough quality to keep serving. Besides the cost of renovation is not economical in comparing with the new buildings. Therefore, it is quite demanding to replace them except the sport hall due to lack of indoor sport area in Lappeenranta, but, only for temporary use.

**Objectives**

Beside changes of pedagogical method, flexible connection between school and public building possibly affect urban planning of the region where it located to some extends. In the current planning, schools are located within residential area so they probably are divided to fit the population of specific areas, i.e. kindergarten, primary school, secondary school, etc.. In the new trend when small schools are combined with a large number of students or even schools combined with community service facilities, which makes better use of available resources instead of having to serve each need for each individual group. Thank to advanced convenience of modern public and private transportation, resources would be used more efficiently, better community shared and guaranteed democracy. Therefore, those new multipurpose buildings should be located in the central area where connecting smoothly to other region.

The objective of the project is to form Sammontalo as a whole to support the development of the center of Sammonlahti. The project, together with the Sammonlahti Church and Sammontori-commercial building, form the core and functional area of the regional center. Sammontalo is connected to secure and smooth connections to the surrounding transport and green area network. The goal is to create a city center of high quality, where massaging of buildings and the squares and street spaces and squares that form them form interesting and finished urban space.

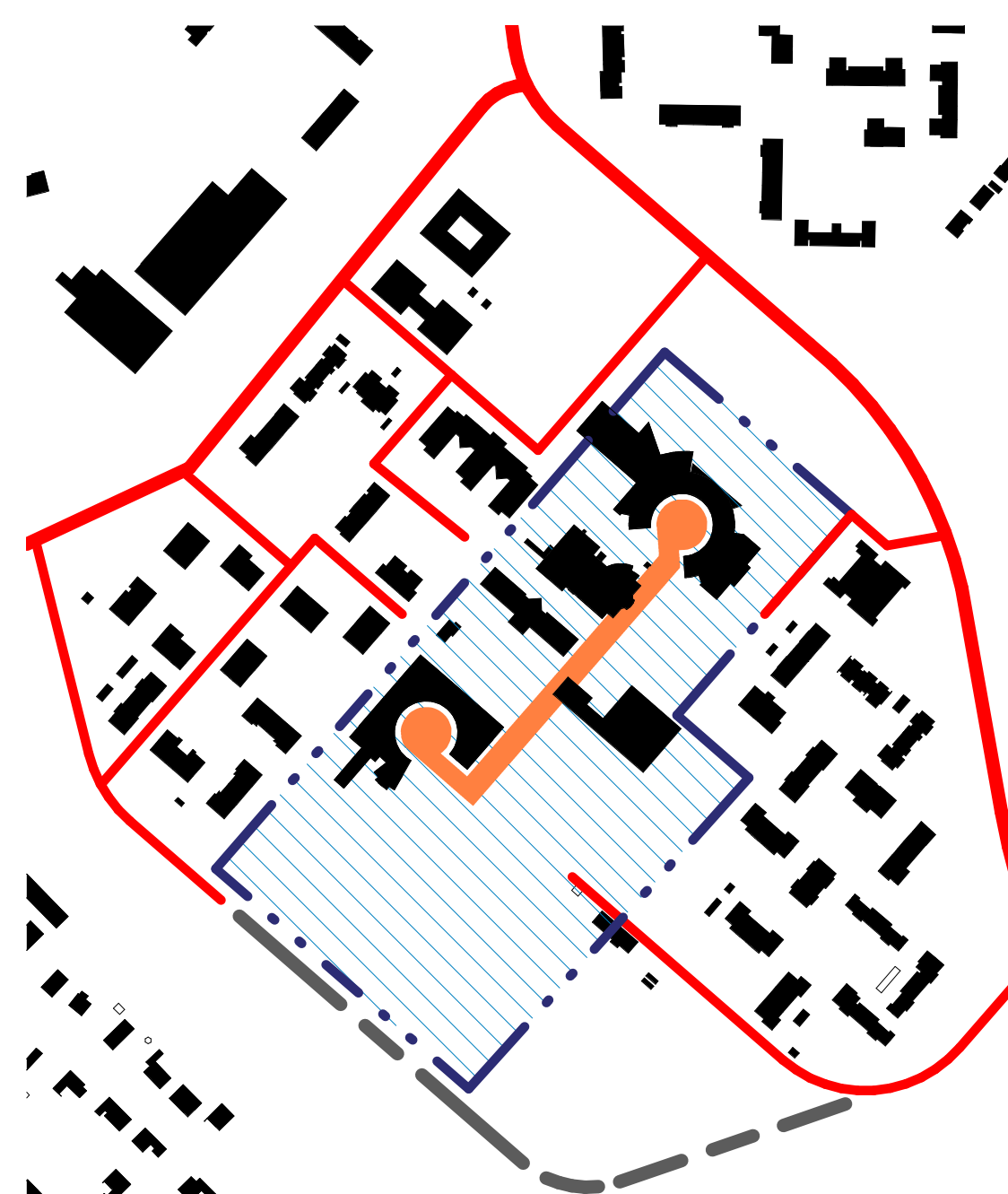
The overall look of the area must be improved and the building stock and the transport network renewed.



Master plan perspective - Before



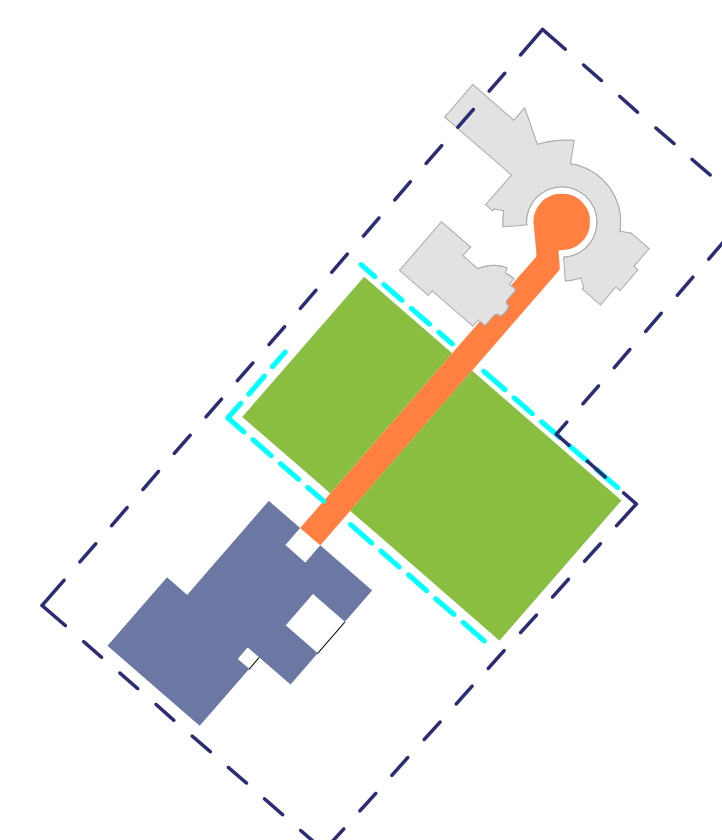
Master plan perspective - After



**Present context of urban planning**

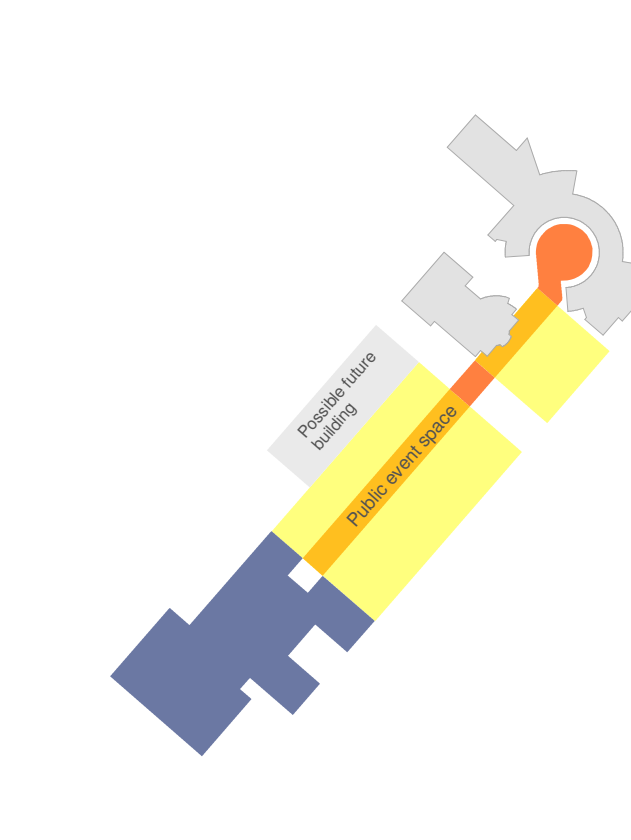
Traffic planning and development of access road to the center of Lappeenranta open possibilities to eliminate motor vehicle to central zone in the future. That enhances conveniences and safety for encouraging pedestrians, in addition, create new services, square, efficient public space etc.

In the present, the main axis of the region was planning and existing, however, not play enough of its role to unify the whole area to provide needed spaces for community interaction. Those pre-existing buildings on the south were not actually designed in the orientation to the main core. The main street are too small - only for transport function - to present itself as the core and identity of Sammonlahti's center.



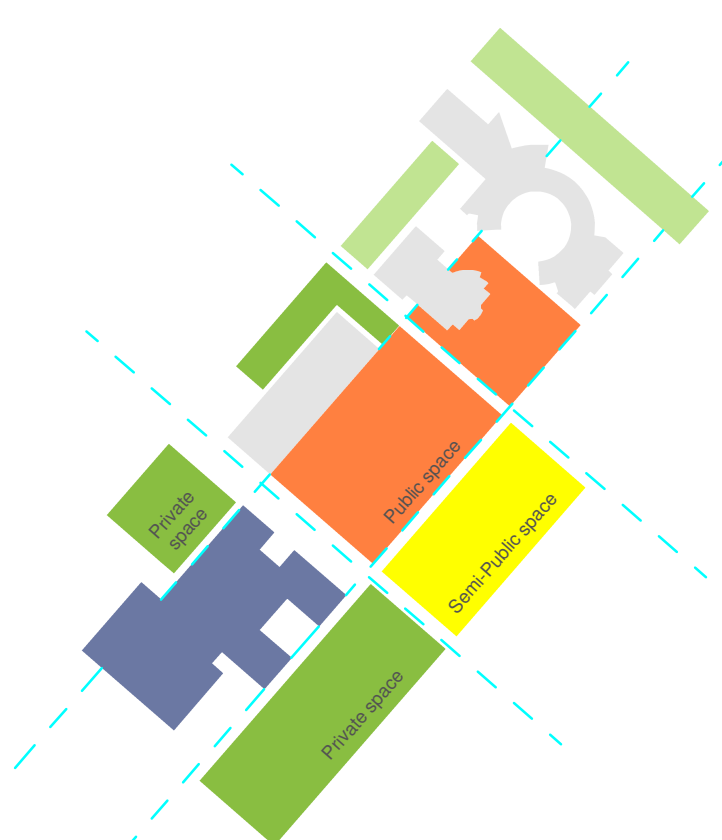
**Sammontalo in urban plan strategy**

If the new building rose up at the middle of site, near pre-existing buildings, it might immediately improve identity of urban space in between three buildings, however, on the other hand, obstruct the connection and development of urban planning. All behind area would be, certainly, yard, but soulless, due to lack of plentiful amount of residents. The design responses to that situation by skipping the immediate satisfaction to archive the future wholeness of central Sammonlahti. As a result, Sammontalo shall be located at the far South of site to devote the center of site for a municipal park which shall be thriving due to ability of openness for all residents's engagement.



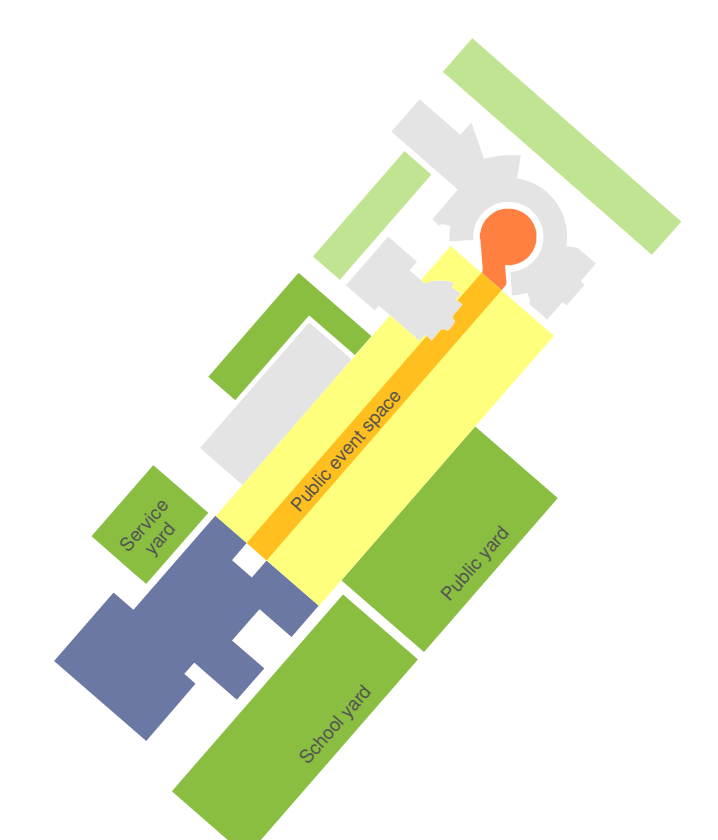
**Municipal park and urban contiguity**

The municipal park would sew together all buildings within the central of Sammonlahti by thriving the common access space. In addition, the central village-like boulevard can offer a public events zone to support a range of outdoor activities such as a playground, sport yards, a dog run, a taco stand, lawns and plentiful seating. Seasonal change, day to night, cultural events and the spontaneity of different persons enjoying the park amenities are intended to allow familiar, but changing experiences. In case of future demand of community services, reserved area from the park could be a wonderful place for new building.



**Hierarchy of outdoor spaces**

In considering the community park as the most public space, a scheme of hierarchy of outdoor spaces was study in the sense of publicness. Form this scheme, the design can elaborate further functions of outdoor spaces

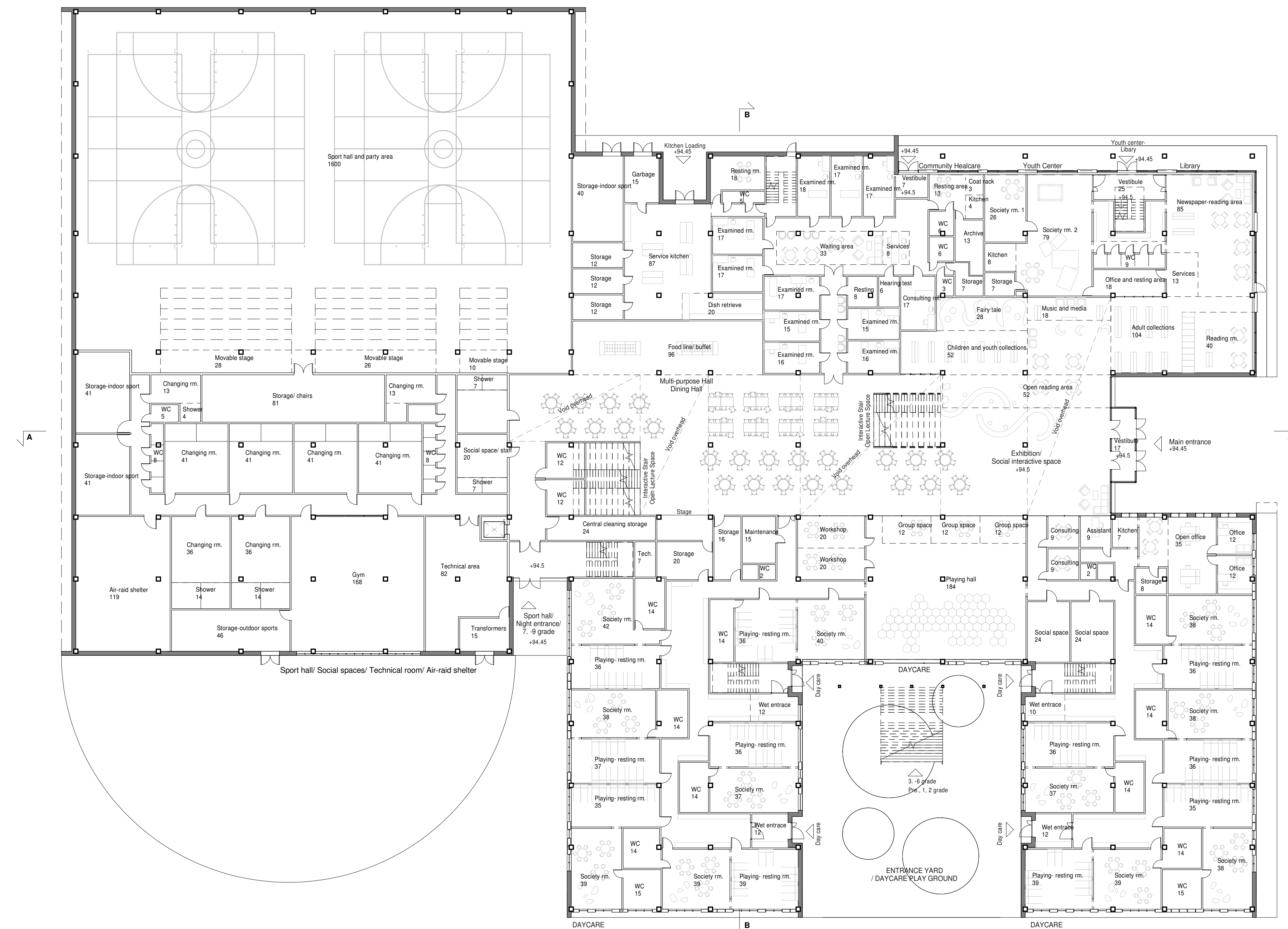


**Connection of outdoor spaces**

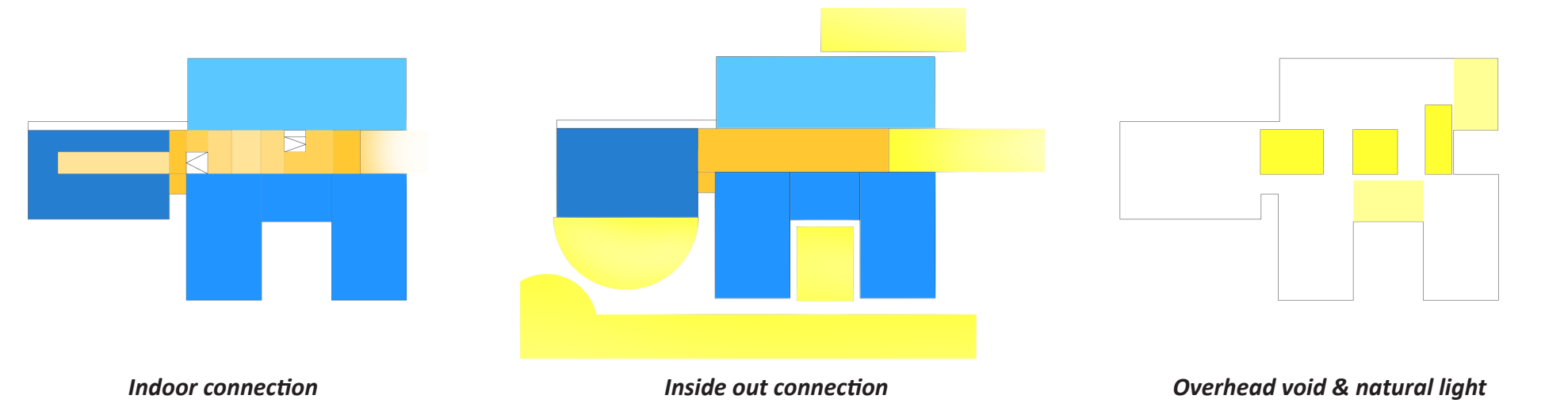
Although every space have different characteristics of publicness, which serve specific purpose and specific group, all outdoor and green area can be linked to each other by community sharing. The yard on both side of Sammontalo aims to provide playing and learning ground for a variety of student activities. Public yard, which consists of community sport yard and forest, is dedicated for outdoor learning and recreational use of residents. Social interaction between school and community can find plentiful versatile places on that yard where could be walking, resting, exercising places, forest teaching and gathering. From the central square, diversified community collaboration might create more social values for urban development in the future

MULTI-FUNCTIONALITY BUILDING - SAMMONTALO  
**SAMMONKYLÄ**





Ground floor plan 1:250



**Indoor connection**  
Open-central multipurpose hall, accessed directly from the main public square is placed along side of the whole building at the middle of all functions, the main core orientation of a series of contiguous space.

**Inside out connection**  
Each function has their own outdoor area to support their features.

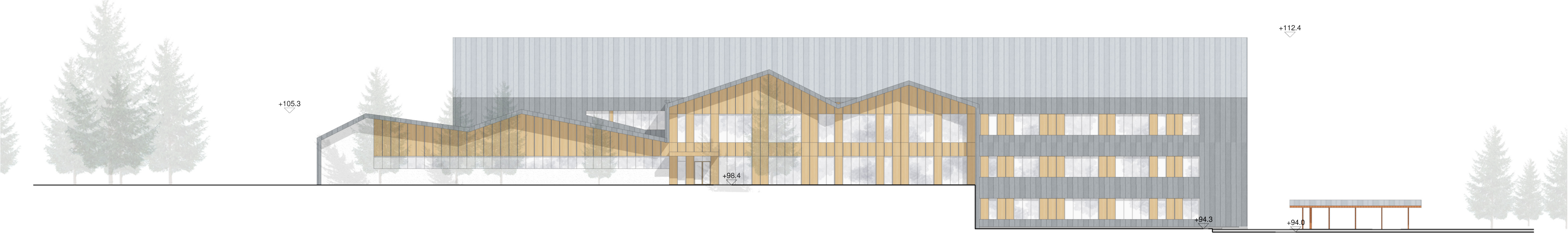
**Overhead void & natural light**  
Overhead void run along the multipurpose hall to enhance the vertical and horizontal continuity

**Ground floor plan: Society orientation in the form of space**

The main idea of plan layout is to bring the continuity of municipal square into the central atrium. By keeping the same size with square and, more or less, sharing a similar community quality, people shall feel that they have incidentally moved from one public space into another interesting one, rather than into a small boring box of functions. As a thankful result, the first sight of users shall be welcoming feelings with a large front lobby, in this place, hosting multipurpose social interactional activities, for example, open reading area of library, exhibition or community events.

The atrium's intention acts like a vertically-centered buffer zone dividing building into two parts with different features. Public functions are on the left side such as: library, youth center and community healthcare service, together with a private yard for their own outdoor occupation. On the right side, two branches of kindergarten, connected by children playing hall which looks out indirectly atrium. All kinds of activities could find their places inside that central atrium. It could be a team huddling to discuss about a project, a group chat sharing their works, an individual sitting quietly in a corner to read. All of these create a picture of social interaction without unable occupied spaces.

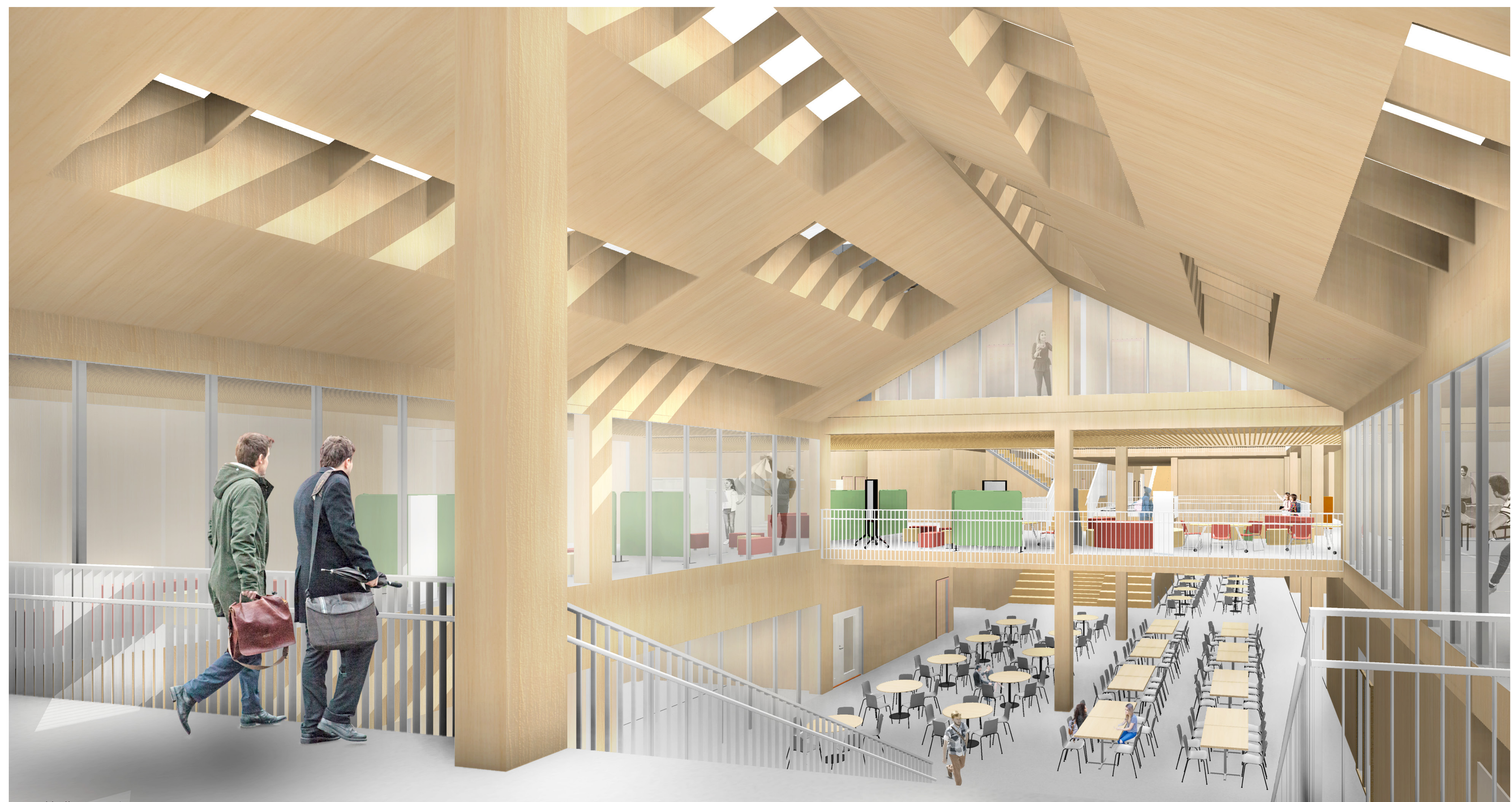
Although there is no wall within, level of privacies still exist though unofficially. Demarcated by two central staircases, front hall is the most public space while the center hall is slightly semi-public where is a canteen. That multipurpose spaces arrayed around two central staircases with themselves double as social meeting areas or lecture seats.



South-west elevation 1:250

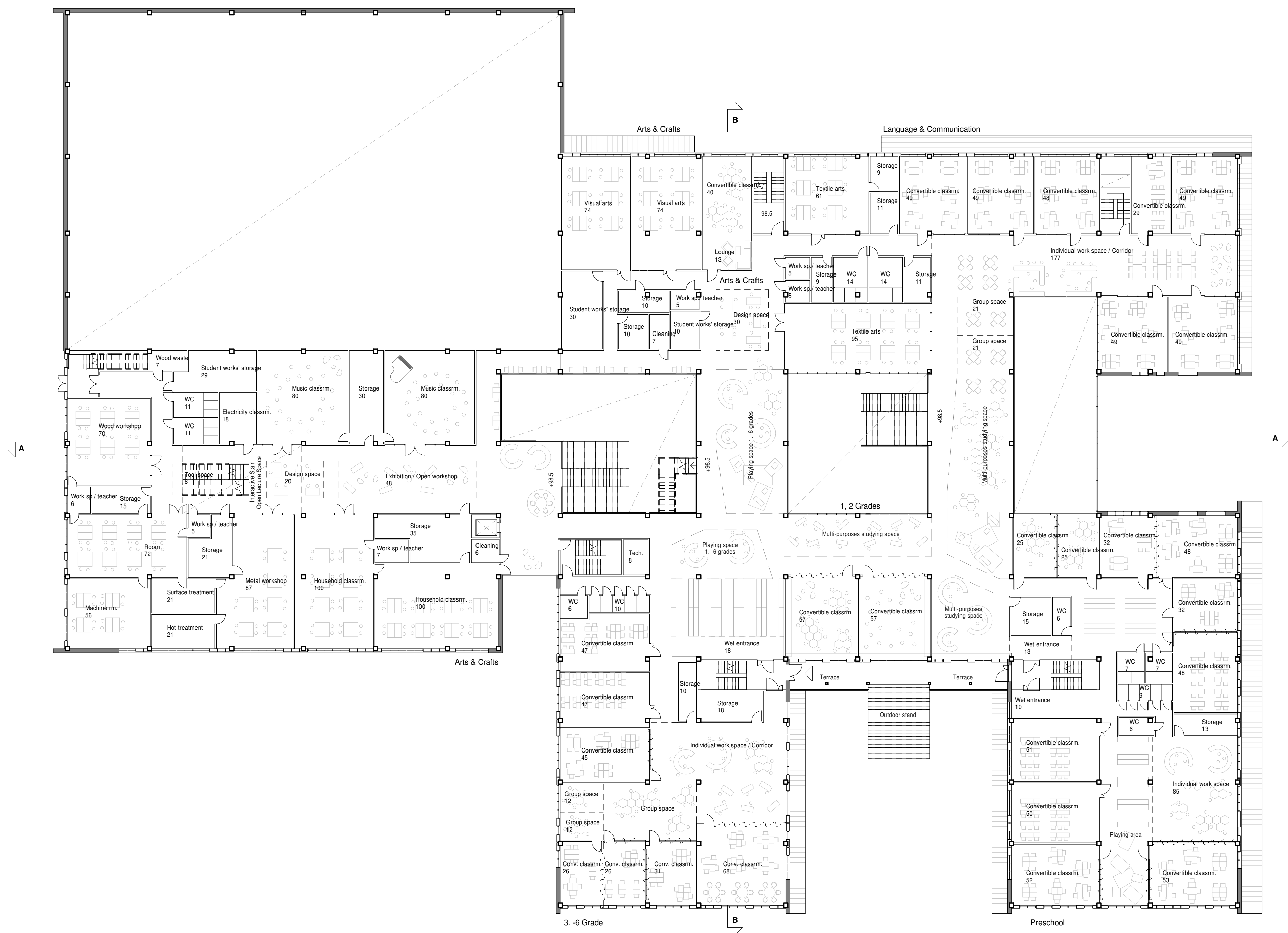


North-east elevation 1:250

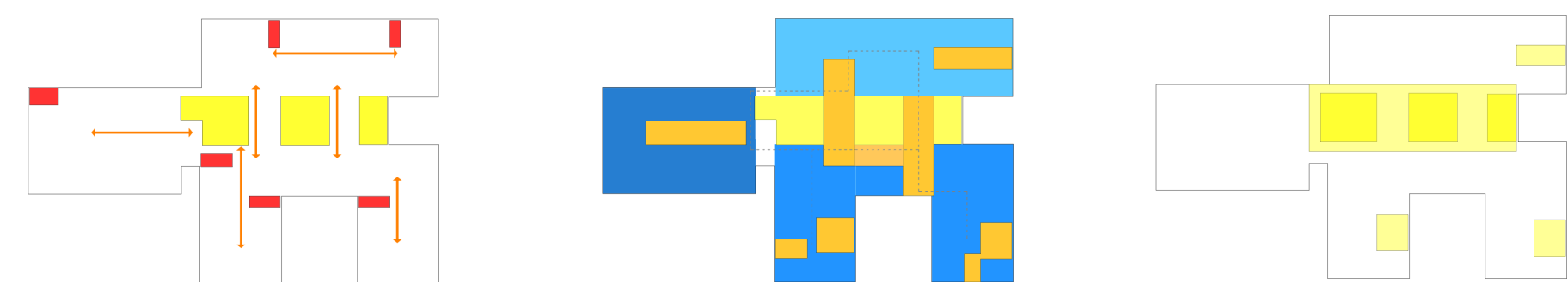
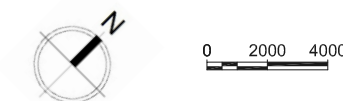


Central hall perspective





1<sup>st</sup> floor plan 1:250



Indoor accessibility

All parts of the building can be accessed conveniently by the main core in between.

Hearts of learning space, multipurpose teaching space, individual working space

The open space of bridges are quite suitable with multipurpose learning-teaching pedagogical method while other individual working of each home area are at quite private at the center of each home

Skylight window and open space with natural light.

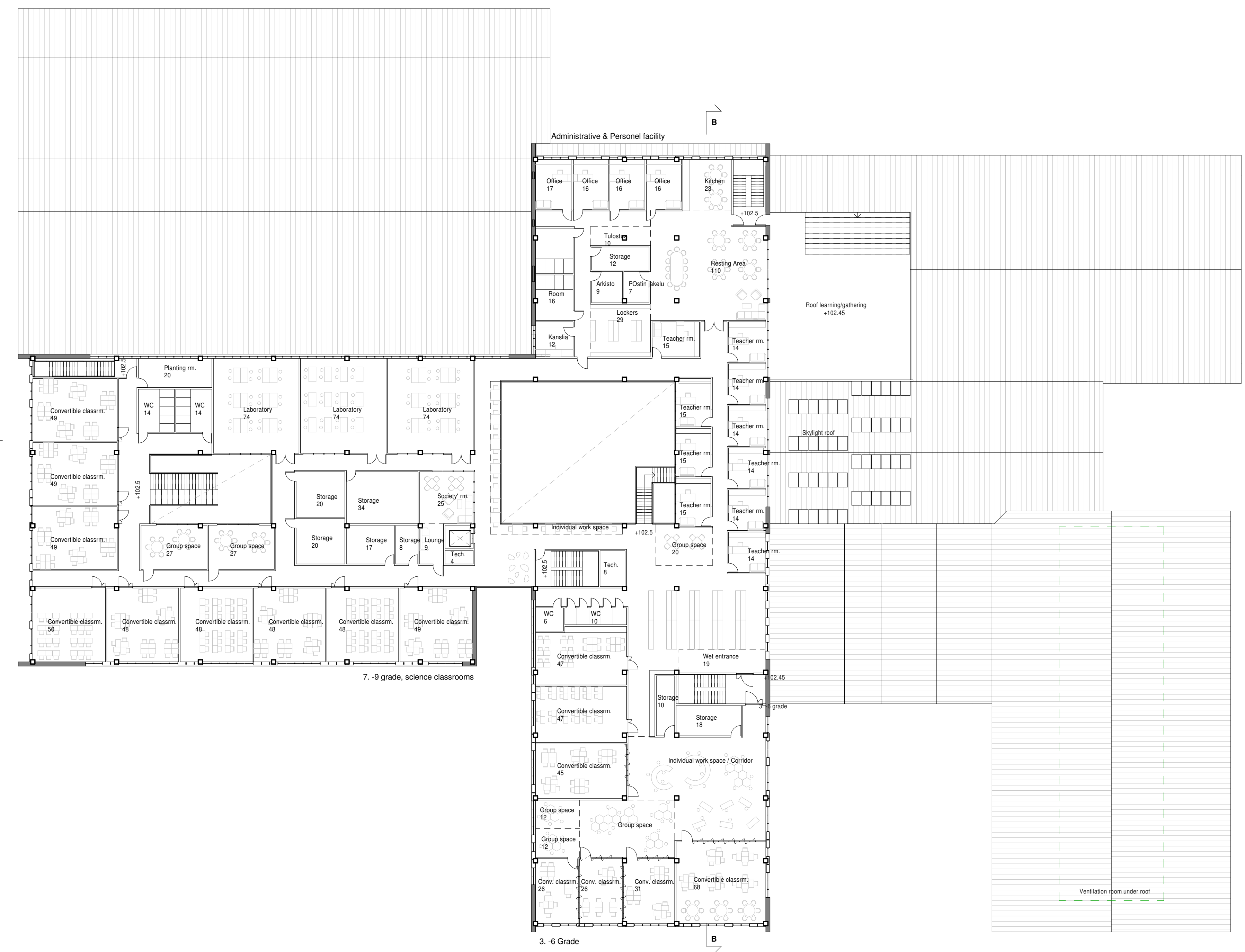
Natural light can penetrate deep inside building thank to the skylight system at the roof of central hall

**1st floor plan: Informal learning - Society orientation in the form of space**

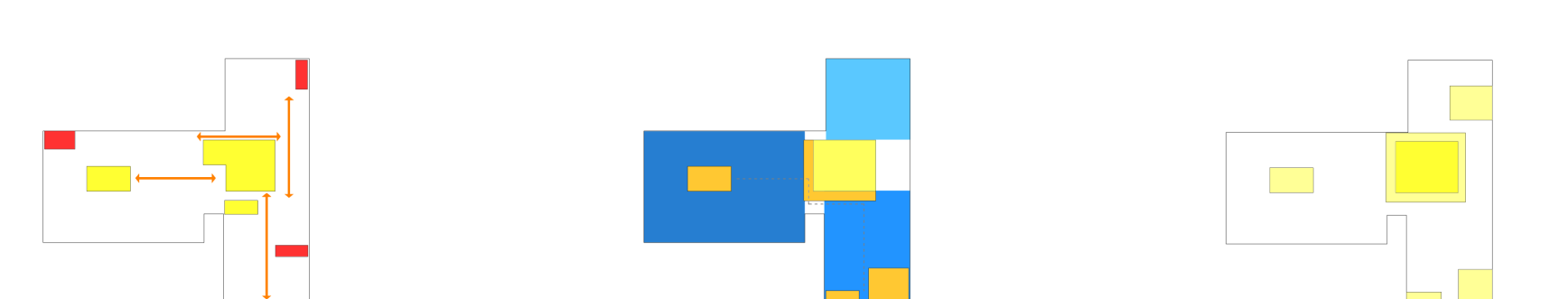
Together with emergence of informal learning, teaching space are gradually expanding outside narrow classroom, with a part or full of teacher's control, including variety of individual or group work. Therefore, it could be said that the most essential factor of informal learning operation is flexibility, then "The physical learning environment needs to be equipped with both modular workstations and areas with comfortable seating, hence supporting individual learning. It should also be possible to adapt the furniture to different configurations: this flexibility is vital for sustainable environments. Similarly, teaching and information technology tools facilitate flexible teaching, therefore, it should be easy to move equipment and wireless terminals for different subjects and work methods." (Perspectives from Finland - Towards new learning environments 2014)

In the plan design, the two bridges play a major role of multipurpose socialized, open learning space these are spacious enough for various informal educational paradigm. The first bridge, nearest the main entrance, has more public interactions to adhere communication of home areas and language center. A large staircase heading to that bridge, where students can find some of incidental spaces for pair works. The second bridge, though having the same purposes, is organized more private than the first one, possibly for group learning spaces or studios. Those group activities could find supports and flexibility from the design area of Arts & Skills training beside them.

By positioning the private home areas on one side and public functions on other side then interconnecting them with a buffer zone, the solution might from a very useful interactive place for informal education and foster collaboration between teachers and students.



2<sup>nd</sup> floor plan 1:250



Indoor accessibility

The second floor plan continue the void from the ground plan at the intersection of three branches

Hearts of learning space, multipurpose teaching space, individual working space

Skylight window and open space with natural light.

**Formal & Informal learning process in the form of space**

Despite emergent educational paradigm of informal learning, formal classroom still have many advantages in practice and the most outstanding one might be putting teacher as the easy sources of learning experience in the classroom. Though that kind of one way teaching might be, to some extent, efficient on imparting knowledge from teacher to students, it is, conversely, obstruct student from creating their experience, personalized learning and metacognitive learning. Beside advantages, the disadvantages can be solved by improving independence and collaboration to allow student to express their perspective in classroom. In that case, the classroom itself should be versatile in difference pedagogical learning strategy not only individual's perspective but also building common perspective in pair or group work. The instruction from educational instructor of competition have pointed out that they think rectangular classroom as the most convenient way for their flexible pedagogical paradigm.

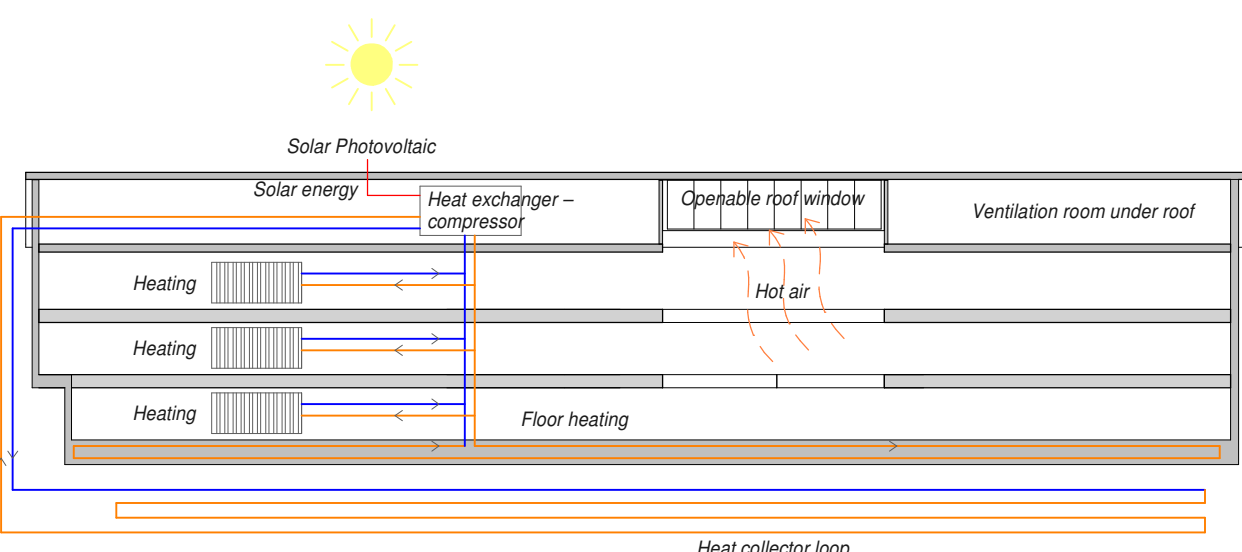
In addition, according to the view of Blyth & al (2012b, 57) "Classroom are more flexible when they are connected into central multipurpose space". That is also the major consideration in designing the private home area. Personalized learning space are place in the middle of home area. Hence, student have more choices to study in their home area hall with better privacy or more collaborative in the central atrium. For further flexible usages and expanding classical classroom toward self-studying pedagogical orientation, the rigid walls between the most possibly flexibility needed, rooms have connection with individual working space or multipurpose hall way, were replaced by movable system. That expansion aims to encourage pupils participating better within community and supporting among education works.

**Energy saving**

In the winter time, most of energy produced is to keep warm inside buildings. Therefore, Ground source heat pump (GSHP-geothermal) could be a sustainable solution to help saving energy by providing both heating and hot water production for all year round. In addition, power supplement for GSHP system could be collected from Solar Photovoltaic, thus they provide a full process using renewable energy.

In a brief Ground source heat pump procedure, the heat is collected by collector loop buried underground in parallel array or via a vertical borehole. "This temperature of earth remains fairly constant throughout the year, which is why ground source heat pumps provide such an efficient means of heating, even during very cold winter conditions" (Finn geotherm. Ground source heat pumps). The heat then would be extracted through the heat exchanger and compressor. The procedure is quite the same as refrigerator's work but inversely instead of release the heat it collects heat. "The released energy is passed into a thermal store - which is a large body of stored water, causing the water to get hotter. The cycle of collector loop, heat exchange, compression and energy release continues until the water in the thermal store hits the temperature required to heat your radiators and hot water." (Finn geotherm. Ground source heat pumps)

Due to severe weather of Finland, building should be closeness as tight as possible to keep heat inside but tightness is also disadvantaged in summer while hot air can not circulate properly. Therefore, operable sky light systems would be installed along side roof of central hall and voids to let natural sunlight penetrate deep inside the building throughout the dark-cold time of year. On the other hand, in summer the roof windows act as naturally passive ventilation for the building premises.



Central bridge perspective



Le Vo Thanh Hoai

Multi-functionality Building - Sammontalo 6/8





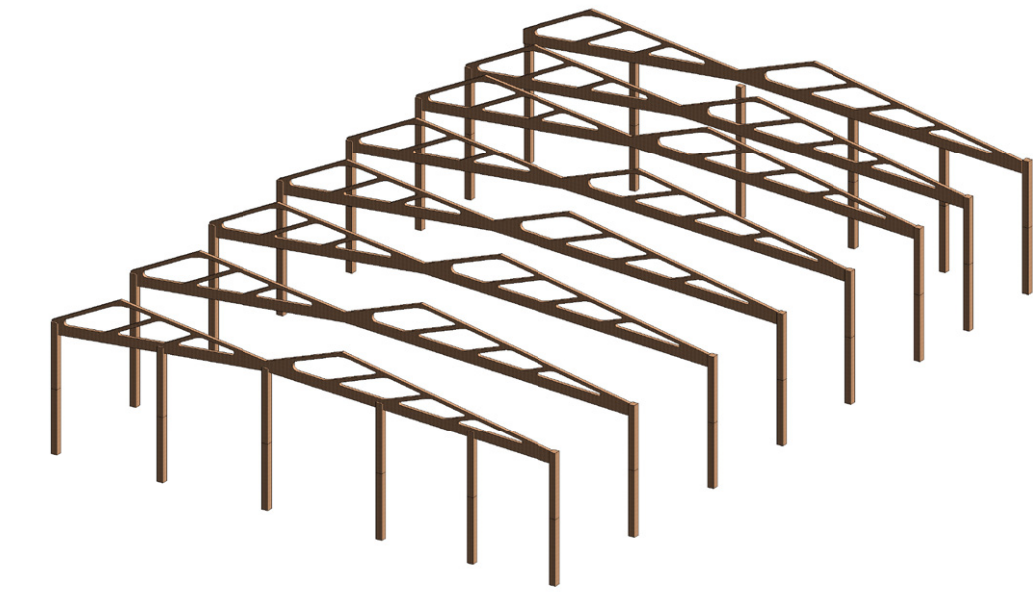
**Structure**

Ecological and sustainable ideas have also entered the building by exploring new technology of contemporary timber construction. Cross laminated timber (CLT) could be considered as an unlimited construction material, store carbon by production process and easy for recycling.

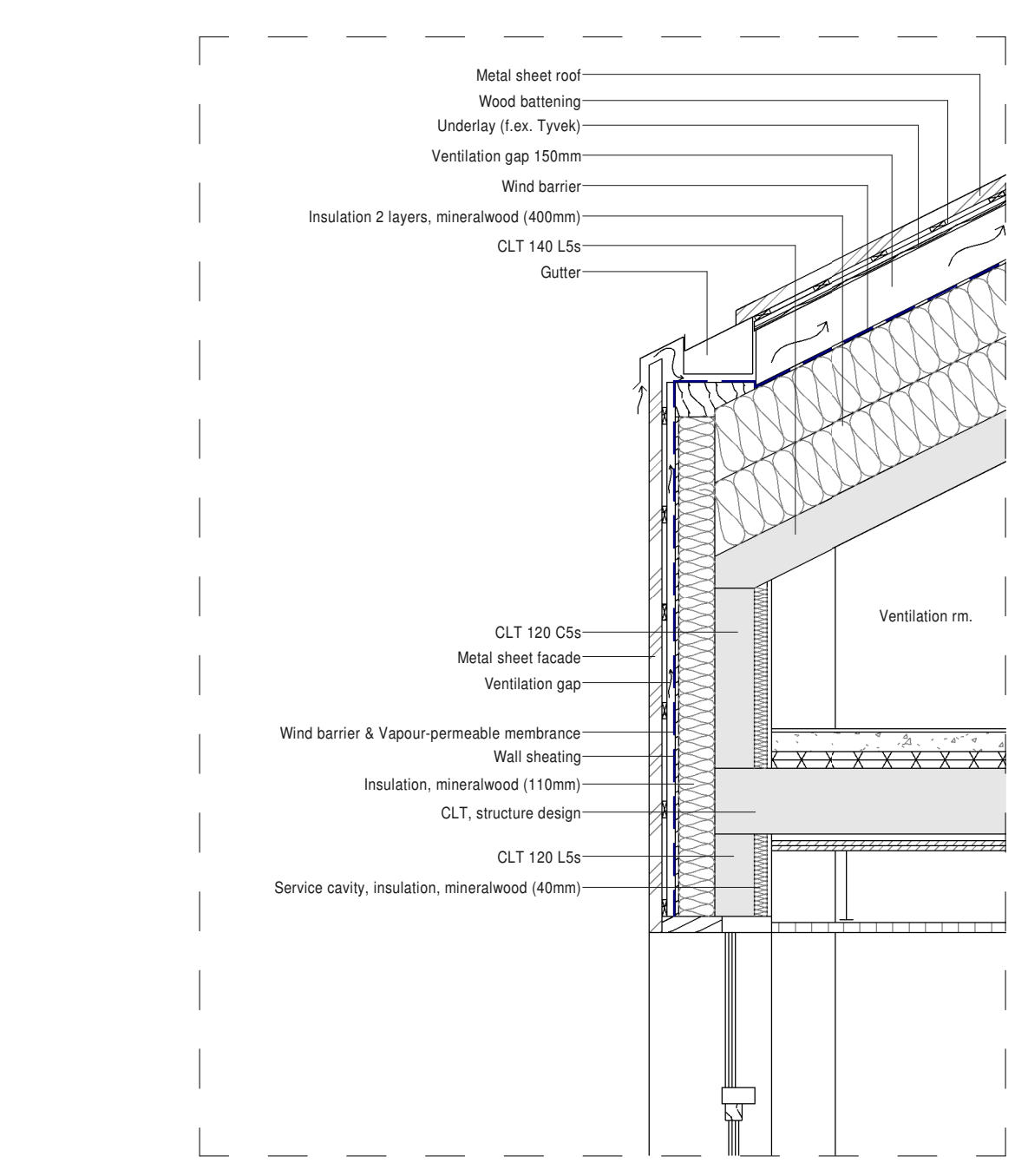
Exterior wall is 400mm thick with 150mm thickness of insulation and brick or metal facades. Roof is 740 thick with 400mm thickness of insulation. Instead of one single thick insulation, the insulation layer of exterior wall is divided into two thinner layers (110+40 mm). One of them is outside of CLT panel and one is inside of panel which inside is also the service cavity serving for technical installation. On account of poor fire rate of wooden structure, the CLT panel in the core of exterior wall should be at least 140mm.

Proposal aims to express continuity from traditional wooden sloped-roof structure by surrounding, moreover, to contemporary feature with undulating multiple roofs in the concept of correlating with its hilly landscape behind – a new paradigm in an old form and material. The material also plays a highlight role in great traditional of wood construction material, fabricated locally in Finland.

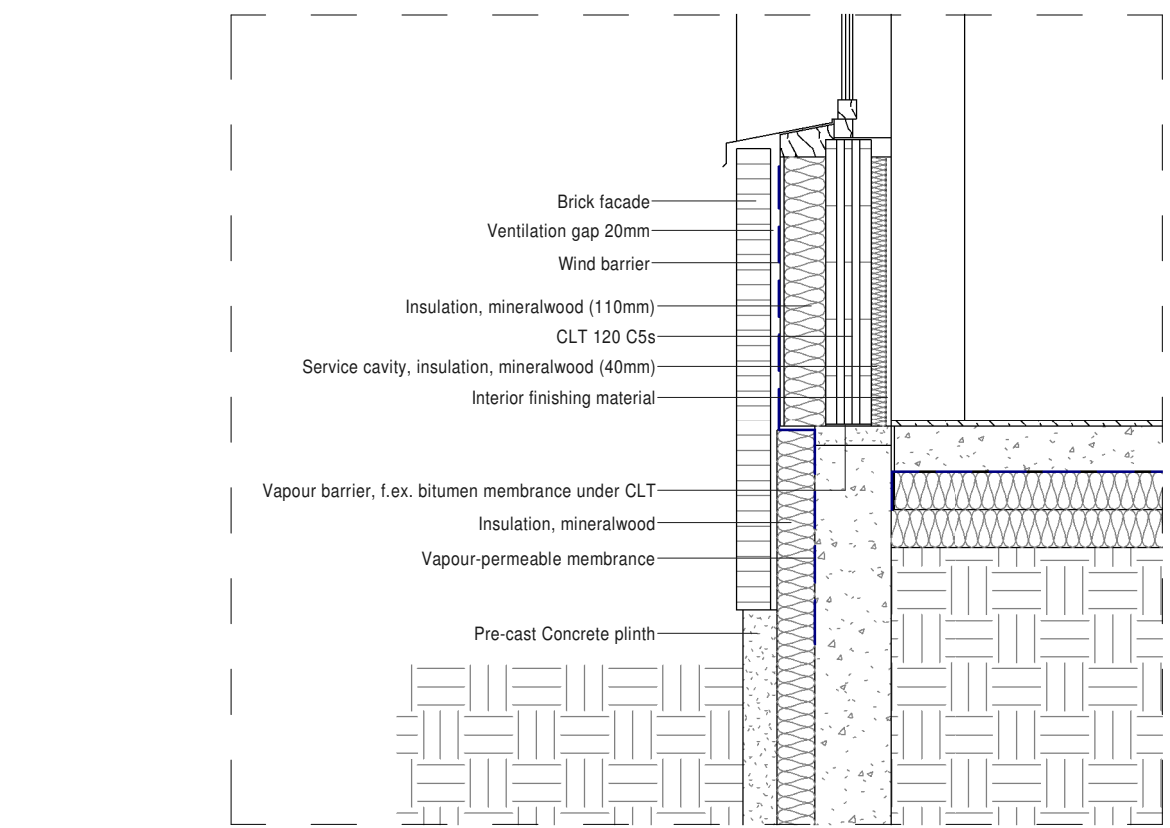
All structure including column, floor and roof of the building would be made out of CLT even sport hall. Following the allowable bending stress, shear stress or vibration, all columns span are under 8 m. Besides, because of wide span, Sport hall have to use a wooden truss structure consist of two rectangle trusses connected together, supported by columns. All structure system forms a wooden frame. Many frames are braced by wood beam under roof and diagonal bracing at wall to create large sport hall.



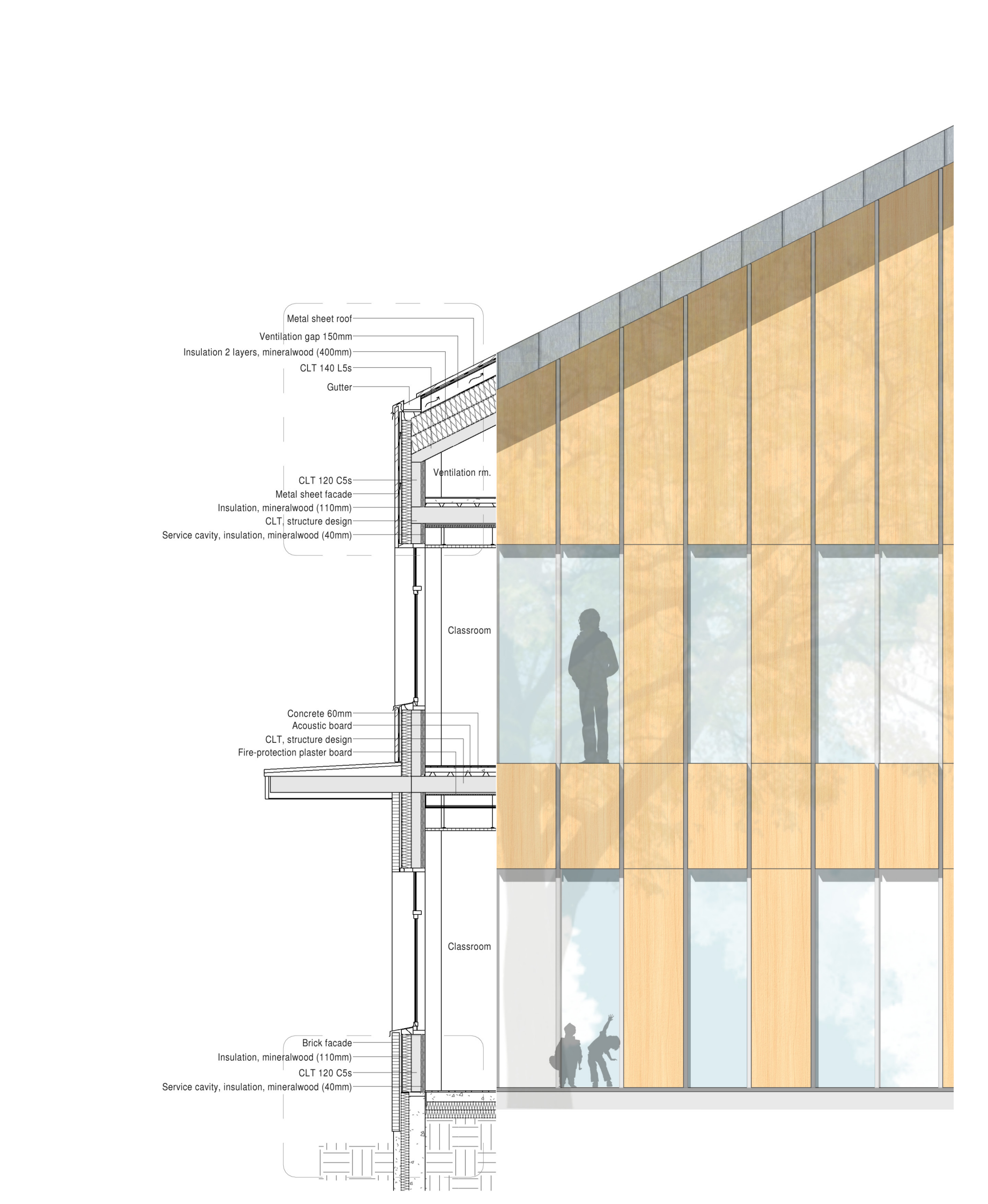
Sport hall structure frame model



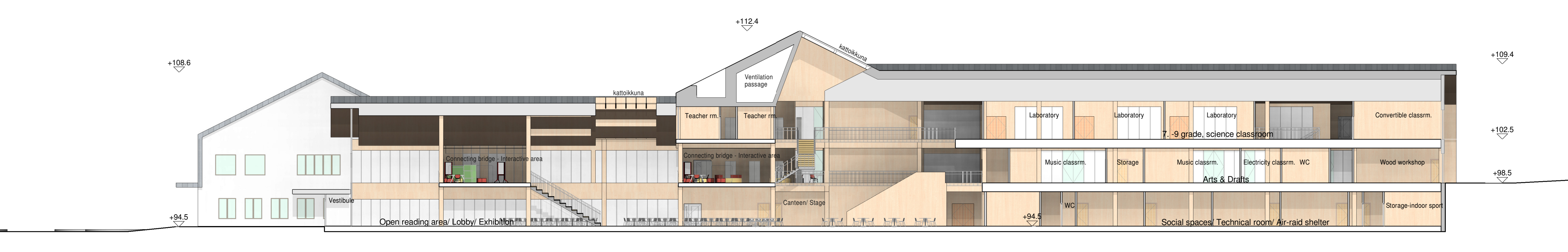
Roof detail 1:20



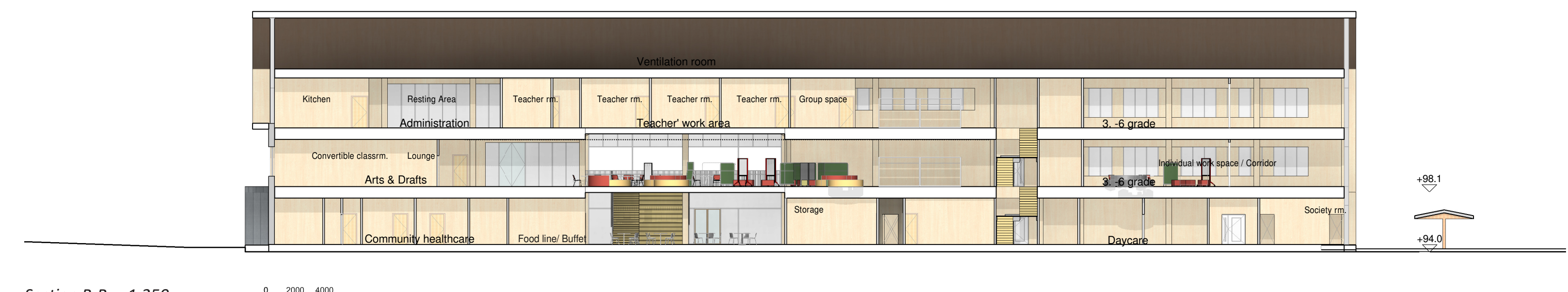
Exterior wall detail 1:20



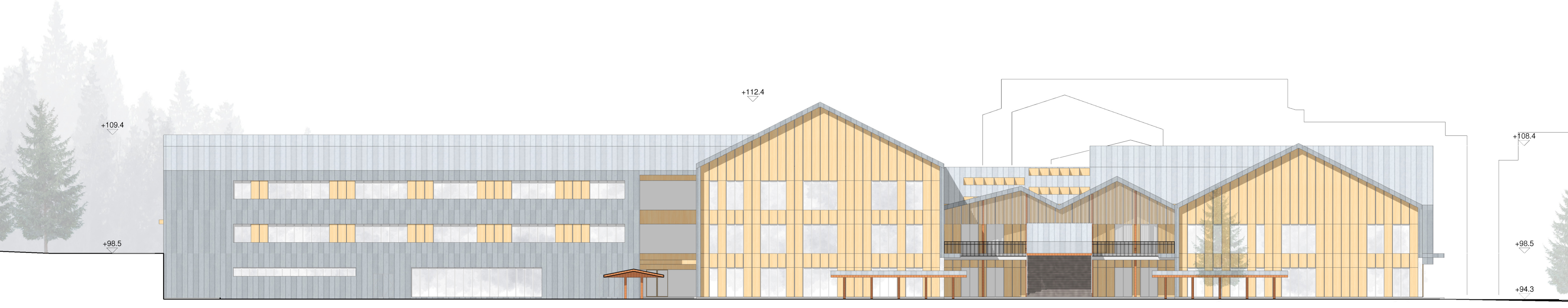
Foundation to Roof detail 1:50



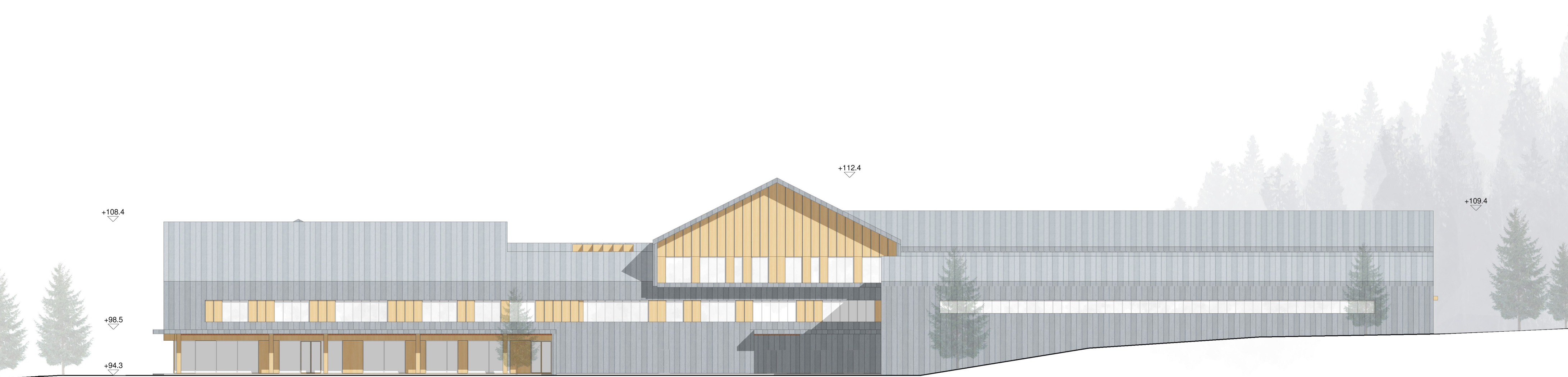
Section A-A 1:250



Section B-B 1:250



South-east elevation 1:250



North-west elevation 1:250



Hall perspective - 3., 6 - grade