

## SITE AND CONCEPT

The Waldorf school asks for organic philosophy and energetic spaces.

We see a challenge to create a new inspiring learning spaces on the tight plot within the grid of former military camp.

The greatest challenge is to find reasonable architectural solution, that fits within the budget and can let building happen. Too extravagant architecture can delay construction for years.

Traditionally organic architecture is free flowing curves and formal expressions, that are hand made and too expensive for economical building within contemporary society. Many hand made details demand highly experienced craftsmen on the building site and rise building costs extremely.

### **How to combine the organic character of building while delivering reasonable and economic building system, that could be constructed with minimum risk?**

We propose trusted timber building system and compact regular volumes. Compact volumes and shapes of the buildings provide eventually low energy consumption while regular repeating building elements are economical to produce. Each building has a specific section profile, that create the character of organic architecture. Shape of buildings allow sun to shine into all yards and minimize shadow on to other buildings. Sloping facade deliver instant feeling of traditional farmstead (TALU) and create sunny yards. The yard spaces open up to sky and seem more spatial.

We respect historical background, that is obvious on the site and the existing church and mess hall demonstrates it. New buildings find the optimum location in the plot despite tight site borders. New buildings relate to each other and form several urban spaces - yards. Yards are connected in sequence, that create varied urban experiences an deliver many small spaces for different activities.

Program of the planed buildings is too large to comfortably arrange within chosen site and within height and building area limits. Room program could be fitted into 3000 m<sup>2</sup> of building area of Pos 7 by designing social center on 3 floors with reduced room height and kindergarten in 2 floors. Both solutions are disputable from point of usability. Also, Estonian climate makes it complicated and nearly impossible to fit 3 floors within 9m allowed height due to thicker building envelope of energy efficient building. We decided to have kindergarten only on ground floor letting all kids to be on a same level, and social center on 2 floors with more spatial room height. Comfortable and usable spaces for kindergarten and social center are provided. In case it is not possible to allow 35% building area in Pos 7, the buildings could be planed differently without spoiling architectural concept and integrity.

## KINDERGARTEN

Building is located away from street and active public spaces. Playground area is located on the very sunny spot between buildings. There is close connection to playground area of school and vegetable garden.

Building's proportions are designed to the scale of children and section of building resemble family house. We believe it would help small children feel like at home. Kindergarten is planned in one level because of reducing hierarchy as much as possible, the same as the younger kids are in the same class as older kids according to Waldorf philosophy. Inside the children rooms there is a small second level area with window to central hall and roof light, that could be used for playing.

## SCHOOL

School is located in the middle of site. School entrance and assembly hall, cafeteria, church/mess-hall and main yard form the heart of Waldorf center. Both assembly hall and gym are deepened 3m under ground level. Solution gives possibility to have appropriate height for halls and reduces energy costs significantly. Cafeteria is accessible to public and create lively urban spot for people of Tartu.

## SOCIAL CENTRE

Building of social centre has rooms around perimeter with centrally placed common rooms, on upper floor grouped around patio. We propose 2story building for reasons of construction and usability for elderly and disabled people.

## STRUCTURAL CONCEPT

The demand for fast and high quality realization of the building challenges the structural solutions and building technology. We suggest to use prefabricated Cross laminated timber (CLT) panel system for building envelope, except for the basement (cast in-situ concrete), sports hall and assembly hall (glulam frame integrated with CLT structure). CLT is one of the most promising timber building systems, that is well developed in Europe and Scandinavia during last 10 years. CLT has very low carbon footprint even if transported by truck within Europe. Production of panels in factory on CNC machines deliver high precision building element, that is assembled on site quickly and precisely. CLT building system is dry building system - builders can avoid wet building processes during construction, which means there is no curing and drying time. Span is optimized to span different classroom spaces and halls with economically optimal dimensions of the floor and roof elements. The precise CNC cut panels are very fast to assemble on site and delivers high quality while reducing on site building costs.

Timber walls and slabs are very favorable to low energy buildings, because of no significant thermal bridges. Massive timber structure has very good thermal inertia. Low energy school in many ways are much easier to build from timber than from concrete or steel.

## MATERIALS

Simple and natural materials are proposed for new Waldorf school. By adding cutting edge technology and innovation to production and application processes traditional building materials are able to deliver top performance according to latest standards. We propose to use clay building board on CLT for walls and ceilings with integrated building services in floors. Ventilated exterior building shell - facade and sloping roof is proposed with larch cladding, but it also could be locally sourced heat treated timber. Sun shading for windows is integrated with facade and blends with building shell.

## SUSTAINABILITY ISSUES

The design of new buildings of Waldorf center takes into consideration important sustainability measures and defines strategies. During the further design process there should be extensive research carried out to determine solutions and minimize any risks to be faced during the life span

of the building. A careful evaluation of the technical building systems is necessary that leads to synergy of passive and active systems integrated in building. Combination of active and passive environmental control may be appropriate in this case. Passive environmental control has the potential to reduce the peak load capacity needed for mechanical environmental solutions, as well as reducing the operating hours these systems need to run. Besides environmental control and project management the organization of design process is very important to succeed in sustainable building.

Strategies for design process:

- Integrated planning process including all parties in the process right from the beginning according to advanced methods of concurrent engineering and integrated energy design.
- Local managing architect team members with knowledge of local building regulations and specifics of energy efficient building.

Strategies for environmental control:

- Maximizing use of passive environmental control. Efficient use of thermal mass of the main load bearing structure (CLT + concrete) to maintain stable indoors climate.
- Use of natural, heavy materials (concrete, cross-laminated timber, clay internal lining) that provide sufficient moisture and thermal inertia to buffer the changes of exterior weather conditions and setback phase during night.
- Possible use of local renewable energy sources as well as exploiting building specifics (for example, using skylights as natural exhaust ventilation during summer)

Strategies for building system:

- Simple and robust timber construction method to avoid unnecessary risks during construction and maintenance.
- Sophisticated analysis during design process that leads to simple and ingenious use of materials satisfying several requirements simultaneously.

Net area kindergarten	595 m <sup>2</sup>
Net area school (including spaces in church/mess-hall)	4490 m <sup>2</sup>
Net area social center	1385 m <sup>2</sup>

	Pos 7	Pos 8
Plot area	9872 m <sup>2</sup>	2278 m <sup>2</sup>
Building area (m <sup>2</sup> )	3540 m <sup>2</sup>	788 m <sup>2</sup>
Building area (%)	35,8 %	34,6 %
Green area (m <sup>2</sup> )	3025 m <sup>2</sup>	731 m <sup>2</sup>
Green area (%)	30,6 %	32,1 %
Paths, squares	3307 m <sup>2</sup>	759 m <sup>2</sup>