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The Lucerne Hydro-Power Museum



in partnership with



PROJECT FACTS

Museum Building Use	Lucerne Location	1,400.9m² TFA
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PASSIVHAUS STRATEGY

- 100% energy self-sufficient building
- Additional energy production to the wider context (project supports 7,234 households annually in Lucerne) through the Old Traditional Waterwheels and Solar panels
- Minimum of 2% daylight to underground spaces through courts and skylights
- Ventilation via openings; courts and skylights
- Eliminate the need of mechanical heating and cooling; relying on natural heat transfer via surrounding water body and air (Concept: to keep coats on during cold weather)
- To achieve the concept of environmental friendly with a minimal impact to the surrounding, the materials used are carefully considered through the materials of low impact such as timber and portland cement mixed by waste and recycled products

DESIGN PHILOSOPHY

The concept of the project is to embrace the existing surrounding, by respecting its environmental aspects and users to create an integrated design which flawlessly stitches within the context, and yet become the city landmark by "THE LIGHTBOX." The project emphasizes on the use of three waterwheels, to support the museum (being a Hydropower Museum); and back up the energy production of the existing hydropower to the surrounding context.

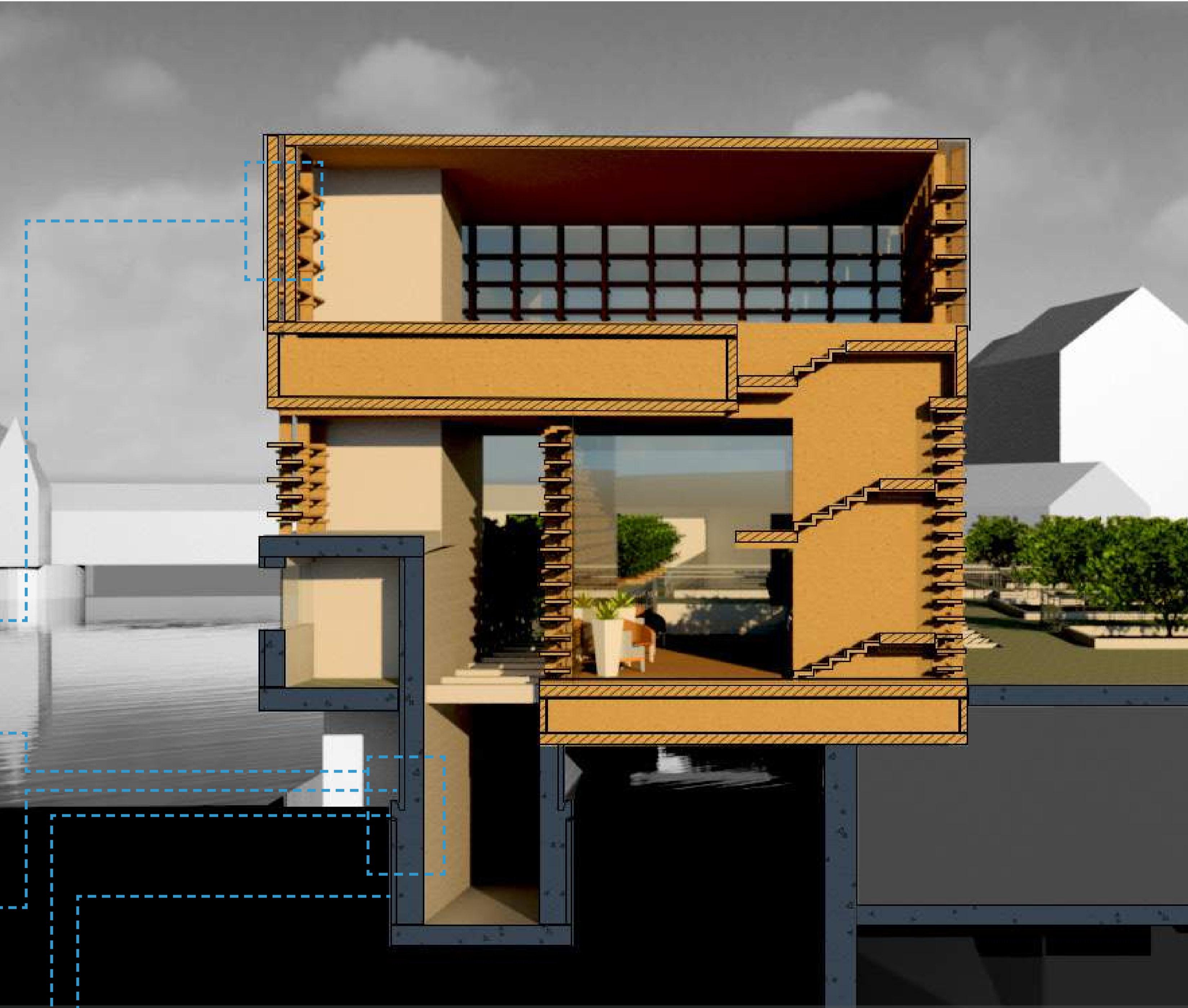
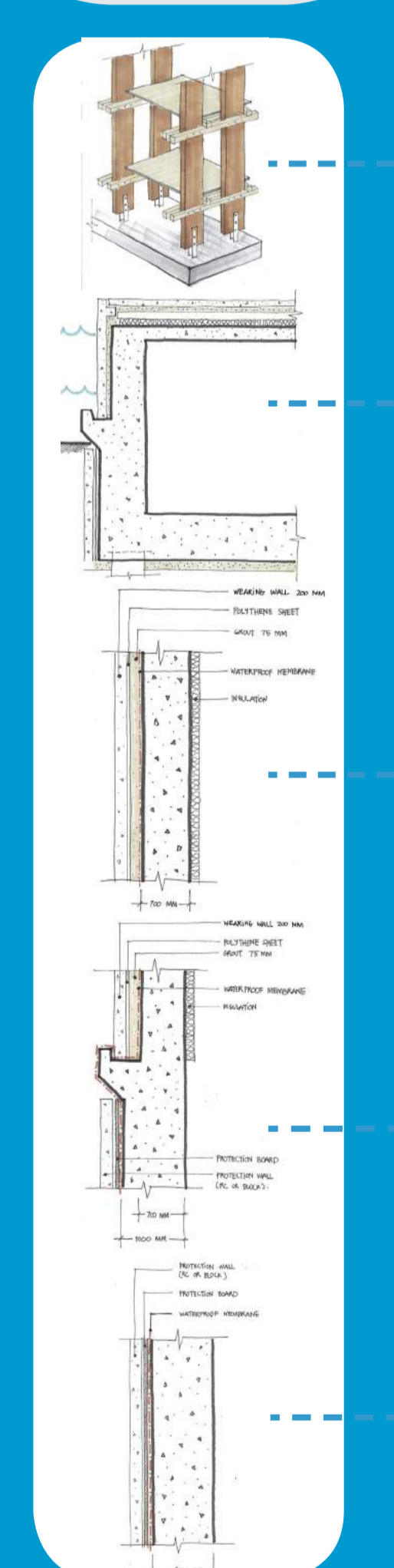
The primary environmental goals are oriented to the human comfort within and around the project. The design focused on using the natural surroundings (Air, water, and trees) to create a comfortable atmosphere for users; by ensuring a proper indoor temperature, daylight, and visual connections. Another primary target is to improve the surrounding context (giving back to the city) by increasing the area of the existing public square (currently being the central gathering square for yearly events) to extend within the river for multiple usages and future events; besides, to the increase of greenery.

PREDICTED PERFORMANCE

Above Walls 0.127
Under-water Walls 0.053
Timber Walls 0.640
Floor 0.180
Roof 0.140

Above 23 w/m²
Underwater 13 w/m²
Heating Load

2.56
Form Factor



Section perspective, showing the under-water construction and ground construction



MATERIALS

Due to the underwater construction, and the existing phase, the main material used is concrete as the material aids in:

1. Thermal mass
Helps to control the indoor temperatures, in addition to reducing or preventing the building from overheating.
2. Durability
Concrete has a long lifespan, it usually lasts till the building has no use anymore. Only then concrete is demolished but not due to failure in aging.
3. Flood resilience
Concrete is a robust structural build-up, which can be designed to be waterproof (functions as a water barrier) or water resilient.

Thus, the UK has pushed the concrete industry forwards, by encouraging technical improvement to reduce gases emission and endorsing an educational program to engineers and architects which pushes sustainable concrete. And in 2008, the UK concrete industry become committed to sustainable concrete strategies via the use of waste and recycled products as the aggregation, which differs from various products. Furthermore, the building above ground is mainly constructed by Glulam and CLT.

Under-water Building
Structure: Reinforced-Concrete
Building envelope: Concrete

Ground Level Building
Structure: CLT and Glulam
Building envelope: Tripled Low-e Glazing, Poly-Carbonate panel, and CLT

CONCEPT APPROACHING

THE LIGHT BOX

THE LIGHT BOX - STRUCTURE & SHADING

DAYLIGHT AND ILLUMINANCE

ENVIRONMENTAL CONCERN

GROUND FLOOR PLAN

Acknowledgements

ARC6842 Sustainable Design Project II
Aidan Hoggart, Paul Testa, and Andrew Lee



UK PASSIVHAUS STUDENT COMPETITION

