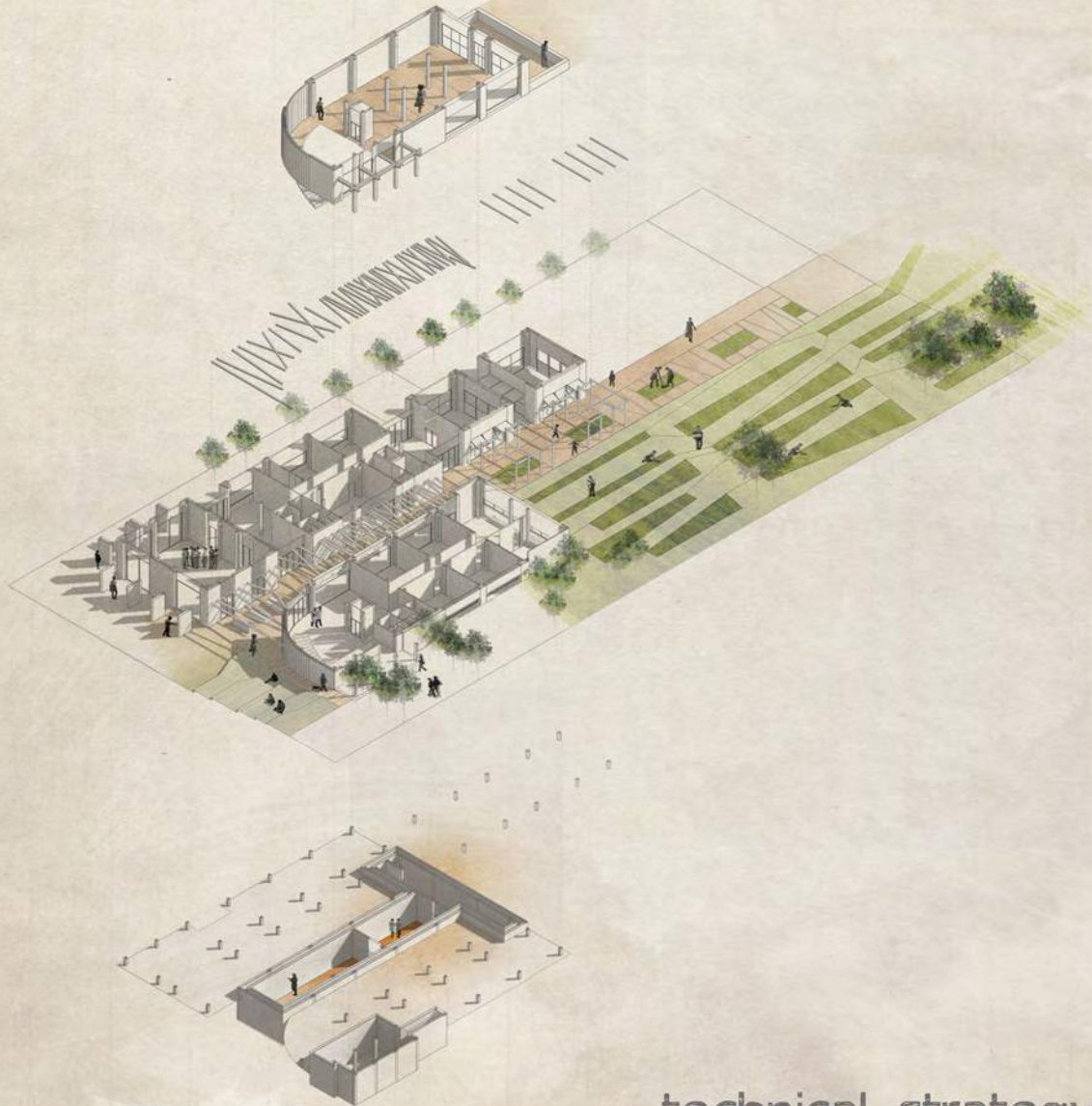


plymouth seed bank

a time capsule of life and culture

Plymouth Waterfront | Building Proposition | MArch Stage 1 | Sotiria Sarri



technical strategy

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CONSTRUCTION

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The original actions of giving form take place in relation to the ground: laying a foundation and weeding, construction and cultivation.

The philosophy of *Gestell*, a key concept established by Martin Heidegger, drives my approach to structure, construction and tectonics, as well as design. *Gestell*, Heidegger's notion of the essence of technology, is that it is fundamentally **enframing**; it is an all-encompassing view of technology, not as a means to an end, but rather a mode of **human existence**. "Enframing means the gathering together of that setting-upon which sets upon man, i.e. challenges him forth, to reveal the real, in the mode of ordering, as standing-reserve" (Heidegger, 1977, p.20).

The human ground in its totality is the field which architecture ought to manage, doing away with the demarcation between city and country and even more so today with the new conditions of metropolitan habitats in the post-industrial period.

Within the fore mentioned theoretical framework, my building generates a dialogue between *Being and Time*. We find ourselves "always already" fallen into a world that already existed; but as Heidegger insists, we have forgotten the basic question of what being itself is. This question is posed via the formation of the seed bank and it is what defines our central nature.

The structure of the building addresses the **duality of juxtaposed fixed and adaptable elements**, while **thresholds** create conditions of intensity and interplay between **enclosure** and **exposure**. Each provides distinctive perceptual, behavioural, social and symbolic affordances.

As Bourdieu underlines, the threshold then "is the site of a meeting of contraries as well as of a logical inversion and ... as the necessary meeting and crossing point between the two spaces, defined in terms of socially qualified body movements, it is the place where the world is reversed" (1992, pp.281-282).

_STRUCTURAL THEORY

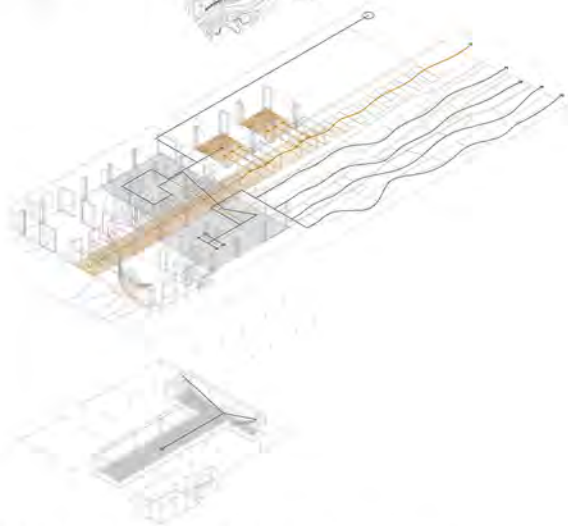
In the seed's genetic program is contained the entire process of its transformation. Nature as development, evolution and unfolding (Heidegger), as the being's continual modification, all this is inscribed in the seed, with the particular environment of its cultivation as a cofactor in the evolution of its species. The seed embodies regional specificity, it encapsulates adaptation to the particular and the specific. In the same way, the concept of individual customisation is vital in assuring that the user projects his/her own meaning and function onto the building itself.

The seed bank is a life investment project and in order for it to last in time, it requires the local community's support and passion; it needs to transform into a **mirror** which will reflect and embody the community's ideals.

The standardisation of the building's components allows for repetition, future extension and adaptation. Different configurations of the space are created by providing a fixed standardised framework for appropriation (see community training part). Moreover, the green spine embracing the city will provide the building with fixed resources (seeds, compost, food) to utilise.



The seeds revealed, "Seed Cathedral", Heatherwick Studio



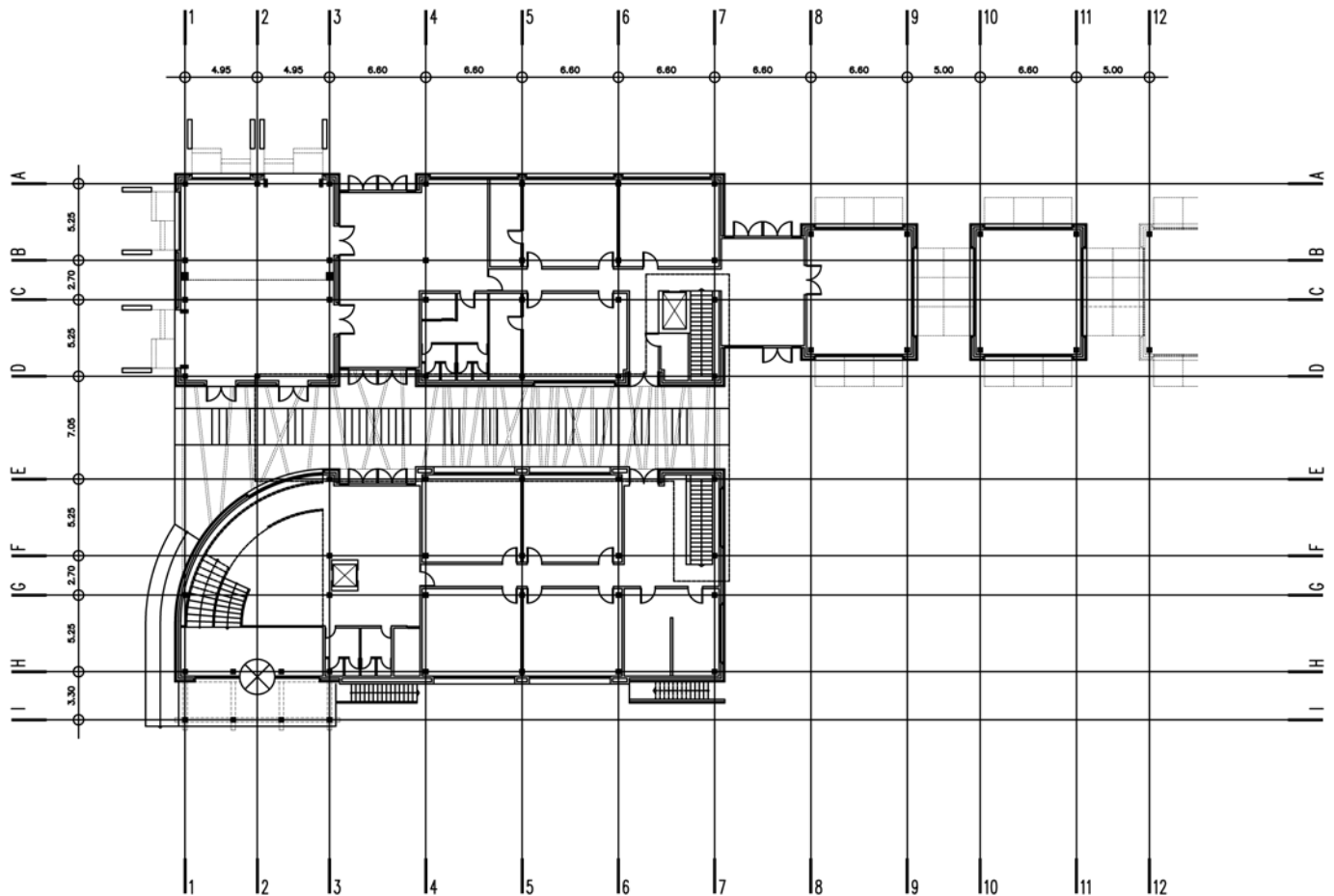
Seed circulation within the building's structure

_STRUCTURAL SELECTION**Structure: Steel Frame**

Steel has been chosen for the frame due to its readily-portable nature and prevalence as a material source in the immediate area. The steel frame structure is ideal for a flexible structure in the industrial character of the area, allowing for plant and equipment to be easily bolted to and removed from it. The steel frame runs on a grid with maximum span of 12.90m.

This is braced and acts as a stiff element to the frame which prevents racking under wind-loading or due to operational activities.

Steel is also an important element which will be more successfully assimilated within its social and physical context. The building therefore, will achieve its aim of empowering the community as well with the ability to adapt and control their landscape.



Plan depicting the seed bank's structural frame

Scale 1:500

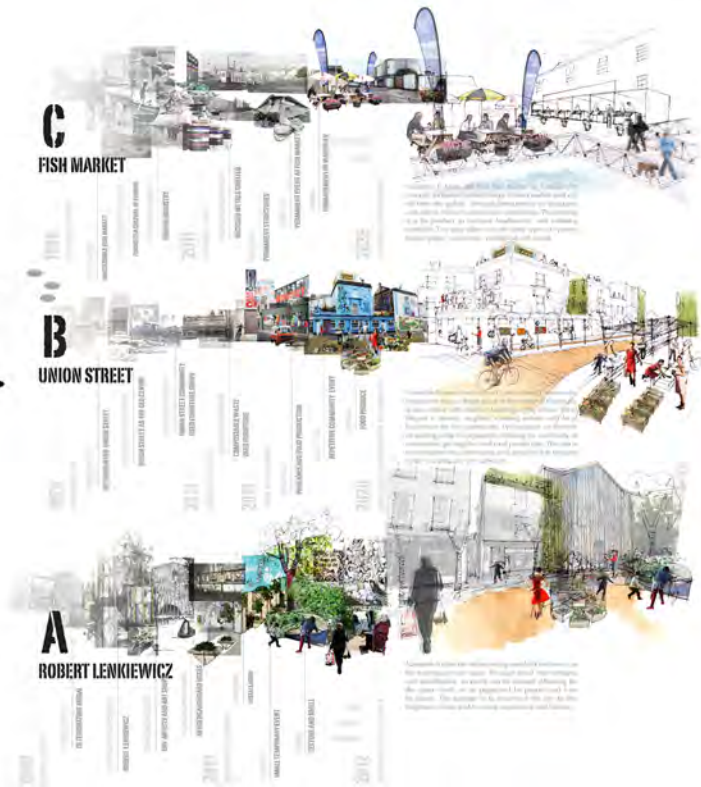
_STRATEGY DEVELOPMENT

Plymouth consists of recycling and business networks, some of them which include resources of disused steel, embodied in buildings, ships and abandoned vehicles. The urban strategy drew upon the Panarchical framework, connecting natural ecosystems with sociological issues. The strategy starts with the idea of remembrance, using the elements Plymouth has and consequently continues with revolt via small scale change.

Three types of seeding are proposed, depending on the narrative type (A, B or C). These types adopt a circular metabolic system to assure their own long term viability, whereas the proposed seed bank 'protects' the existence of urban/rural environments on whose productivity it depends. Outputs from type A become inputs for type B, and the latter consequently becomes input for type C. Recycling of paper, metals, plastic, glass, and the conversion of organic materials, including sewage into compost, returning plant nutrients to the farmland which feed the city.

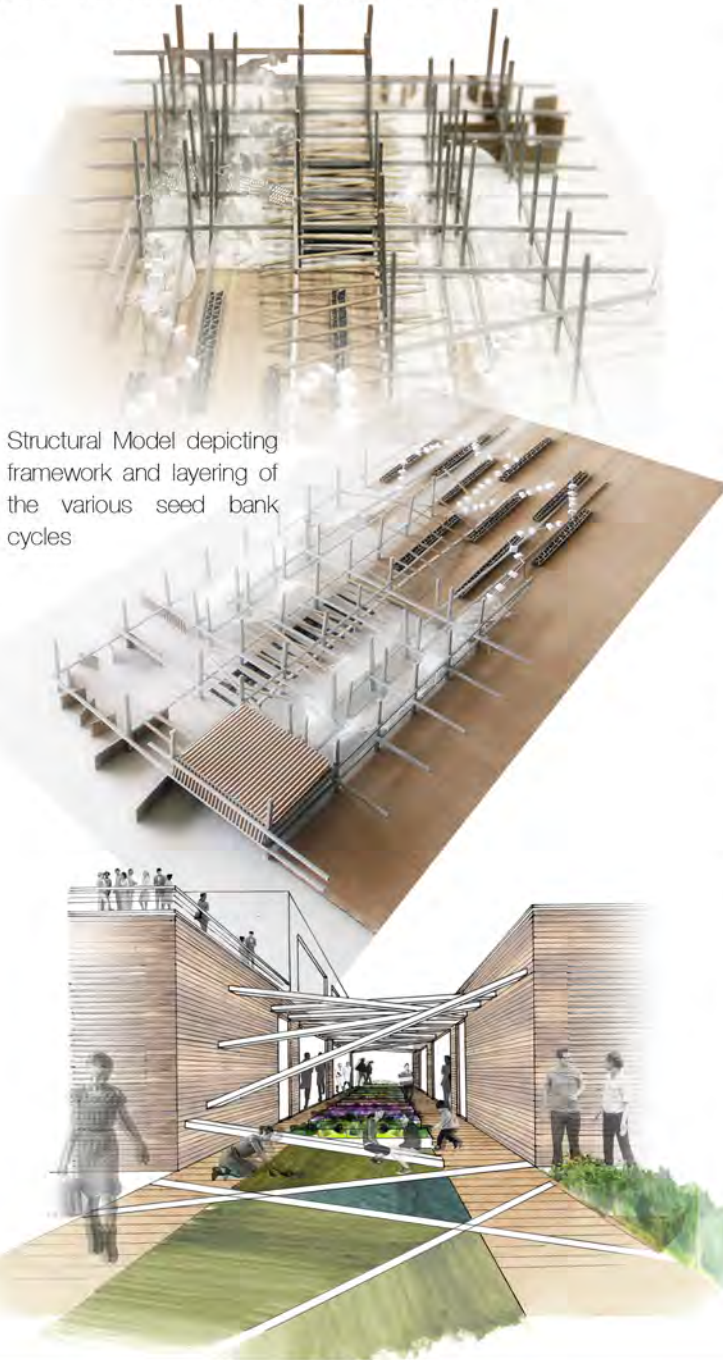


Recycling and business networks feed into voidal spaces



The system is connective and each programme feeds into another

_THE SEEDS OF THE FRAMEWORK



Structural Model depicting framework and layering of the various seed bank cycles

FRAMEWORK

The oldest meaning for the activity of building, **ktisis**, is "weeding, preparation of the soil for sowing, planting", while the meanings of 'foundation' and 'construction' are subsequent. **Sowing** and **Construction** introduce at the outset a dual function for architecture as the activity of organizing both buildings in space and, also, of open, natural spaces. The proposed seed bank seeks to reintroduce in the industrial area of Cossida a space of culture in its double meaning, of agriculture and of civilization.

LAYERING

The responsibility of the seed bank goes beyond the bounds of the constructed edifice. It is being defined anew as a **set of practices** for the planning and management of land spaces, as well as and for the control of information flow. Land is tantamount to cultivation: **cultivation of seeds and plants but also of civilisation, interconnections, communication and exchange**. All these elements and values, the one **layered** on top of the other, within the given spatial field are expressed via the building's structure.

DECONSTRUCTION

The building **engages** with the land, the former depending on the existence of the latter and vice versa. This evolving **dialogue** is shaped via the creation of the external courtyard, as illustrated on the perspective. Above the seed bank area, where planting for exhibition takes place, the wooden beams are **dense**, implementing **protection** and **distinction**. However, as the beams **extend** in the landscape, they **deconstruct**, merging with the land and transferring the 'inside' out and the 'outside' in.

_STEEL FRAMEWORK



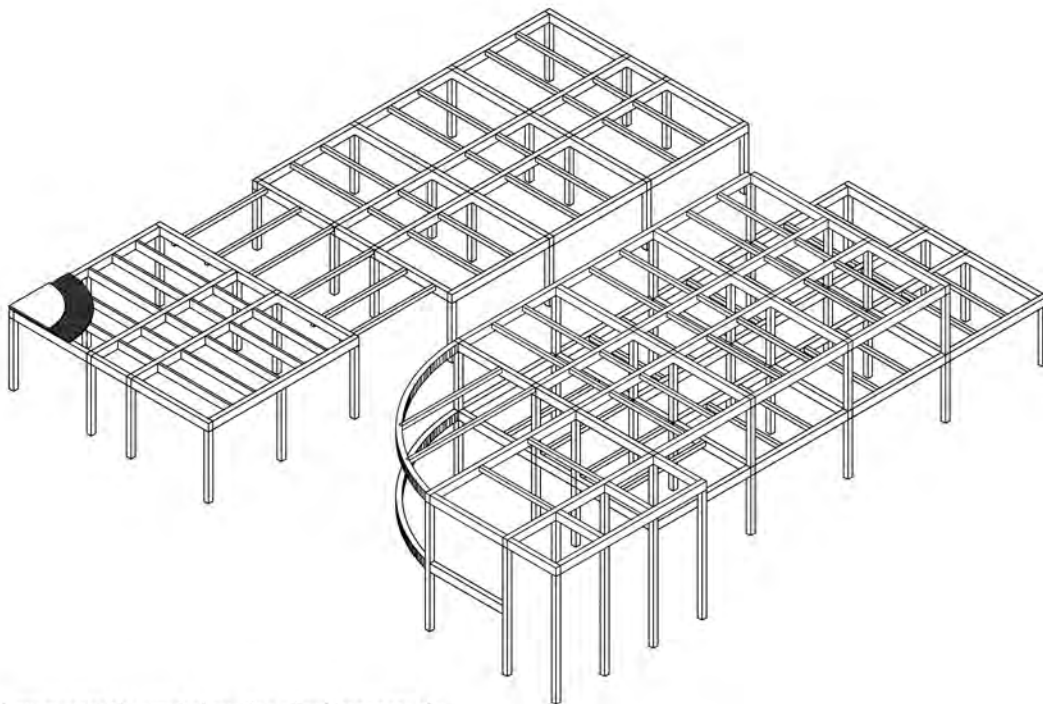
Initial experimental model from which the building's structural framework was generated

The structural design was initially generated from an experimental model trying to map the building's processes.

The design provides a framework to be infilled and extended in the future with temporal community training units and additional permanent research laboratories.

The framework extends on the back of the site to form the planting platforms, which are in constant dialogue with the rest of the building.

Steel has been chosen for its ease of erection and swiftness. Steel is also locally available and is a familiar material the local labour workforce works with.



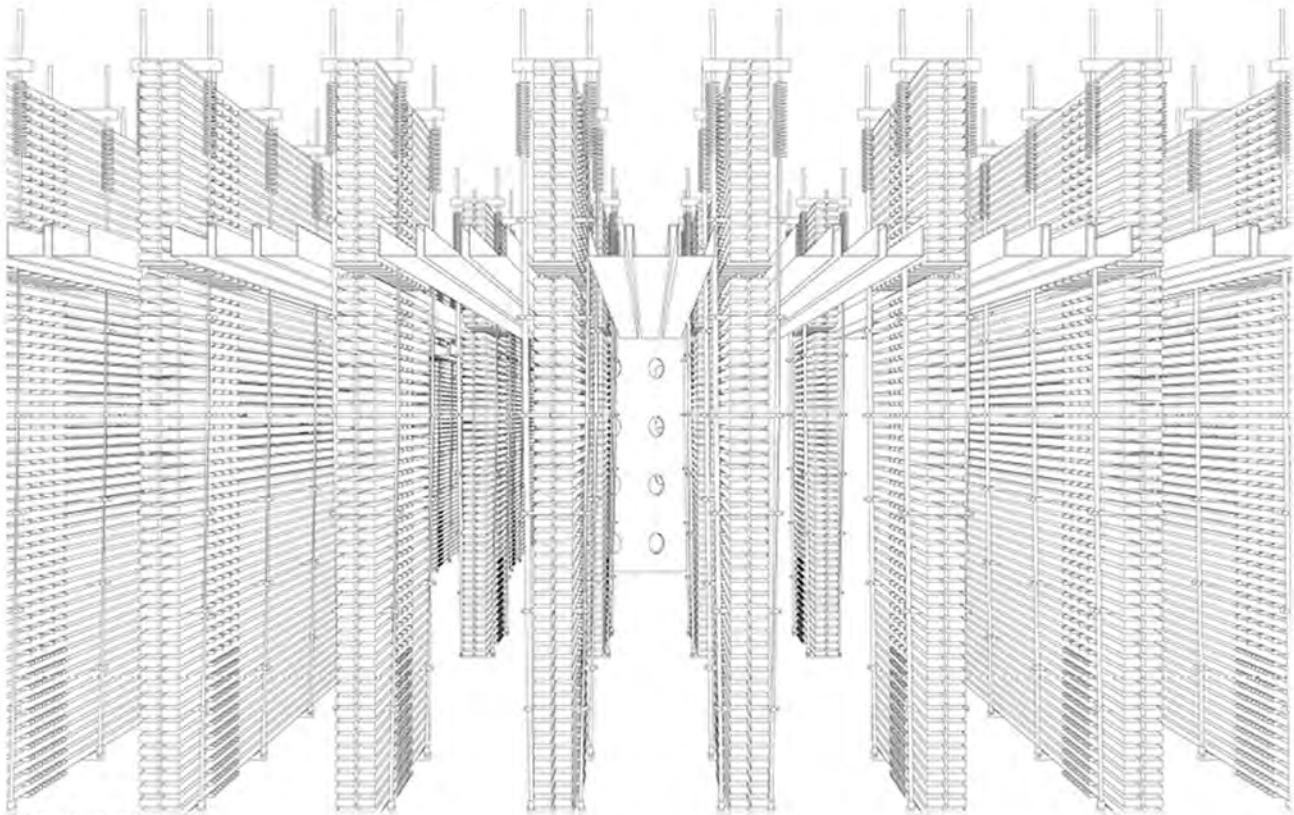
Structural axonometric exploring the steel framework

_PRECEDENT STUDY: STRUCTURE

Swiss Sound Box, Swiss Pavillion, Expo 2000, Hanover
By Peter Zumthor

Similarly to the proposed design, the structure is braced with steel columns which also create a framework for the construction of space internally and for future extension externally. It is assembled without glue, bolts or nails, only braced with steel cables, and with each beam being pressed down on the one below. After the closure of the Expo, the building was dismantled and the beams sold as seasoned timber.

In the proposed scheme the steel columns are also purposely left exposed to indicate the future extension of the laboratories and community units. The latter is a permanent, low cost construction. It is also made up of timber and can be easily assembled and disassembled by the community



INTERIOR VIEW

STRATEGY SELECTION

The building's spatial program is influenced by environmental considerations such as daylighting conditions. The building uses passive strategies for heating, cooling and ventilation in order to minimise its energy consumption.

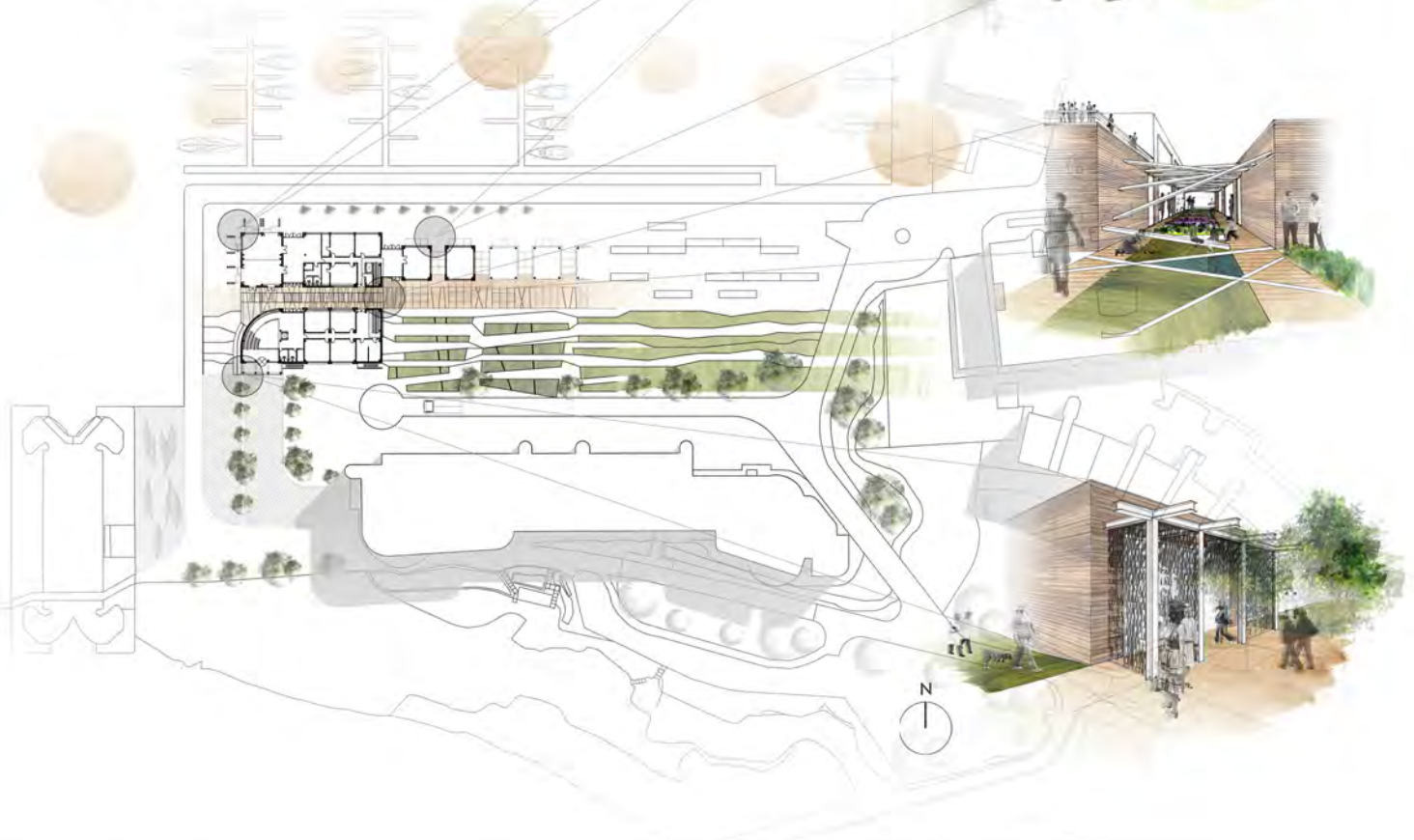
Furthermore, the building's key space, the **seed bank**, is placed at **water level**, since its temperature facilitates the cooling of the space, minimising therefore the cost for additional installations.

NORTH FACADE CONDITIONS

lower light levels
less exposure to prevailing winds
less solar glare and gain

SOUTH FACADE CONDITIONS

greater daylighting requirements
less control of daylighting
naturally ventilated spaces



PASSIVE STRATEGY

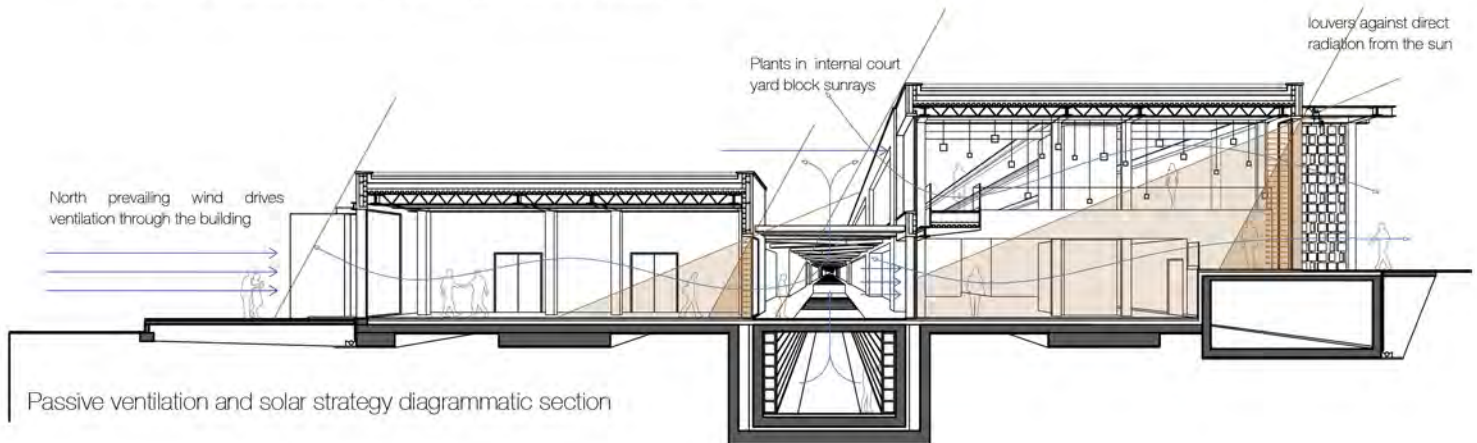
The building utilises passive technologies as a primary response to environmental control. The following section illustrates how daylighting and airflow are being manipulated to regulate the indoor environment.

Throughout the building an ingenious control system (BMS) is installed using top-grade technology for lighting, building management, communication and security. All features are discreetly intergrated into the design and are user-friendly.

The required air volume flow is controlled by a system of flaps. The ventilation is based on the principle of cross-ventilation and provides comfortable ventilation with low air velocities. When outdoor temperatures are low, the air is prewarmed as it passes through the geothermal tunnel, thereby reducing the heating energy requirement. Conversely, when outdoor temperatures are high, the supply air is cooled in the tunnel. The components of the low energy system comprise a ventilation system with heat recovery and a geothermal heat exchanger employed to pre-warm or pre-cool the supply air.



Preliminary experimental diagram illustrating key opening intentions

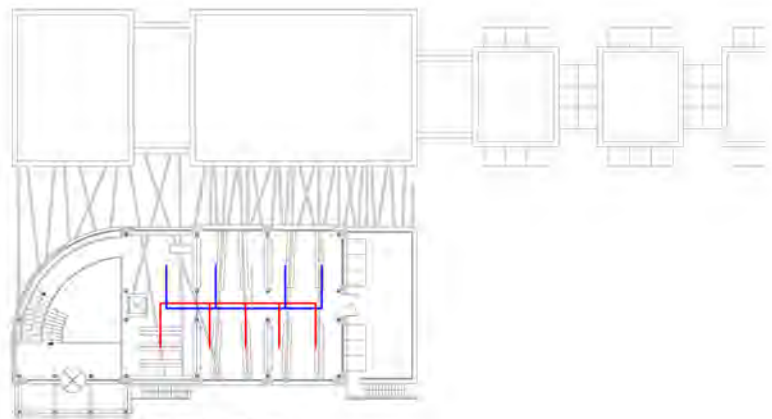


Passive ventilation and solar strategy diagrammatic section

_MECHANICAL STRATEGY

VENTILATION

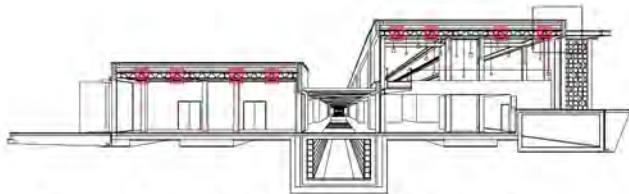
The building unavoidably requires mechanical ventilation, which is situated on the roof of the buildings. The water which is used to regulate the air in the right temperature is being cooled or heated depending on the weather conditions using the central geothermal pump situated on the basement of the seed bank. Parallel ductwork, running straight on top of the ceiling, provides the higher air-changes provided in these spaces.



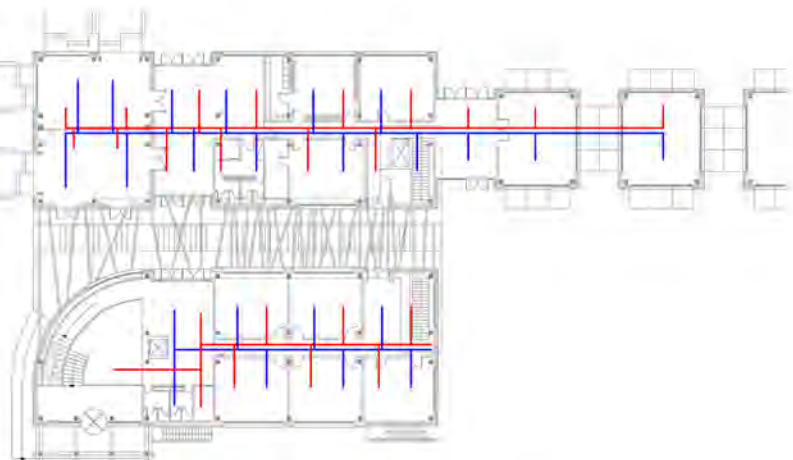
First Floor Mechanical Ventilation Plan

ELECTRICAL CONNECTIONS

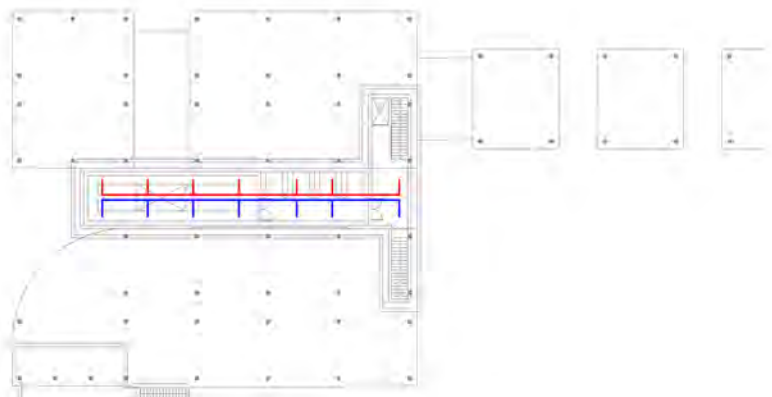
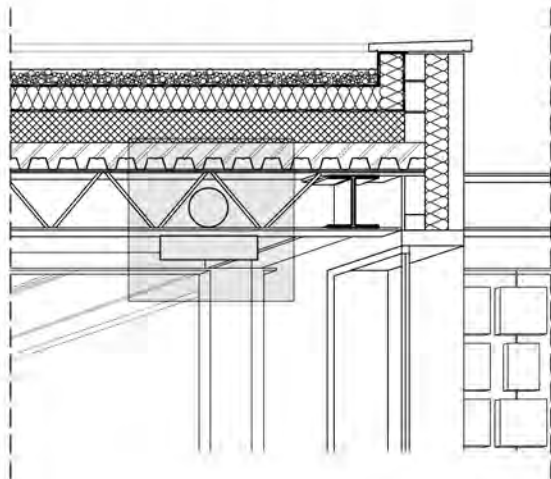
A perimeter system runs around the floors and ceiling channels for flexible connections as required. The provided details illustrate their installation.



Diagrammatic Section depicting the fitting of the ventilation ductwork

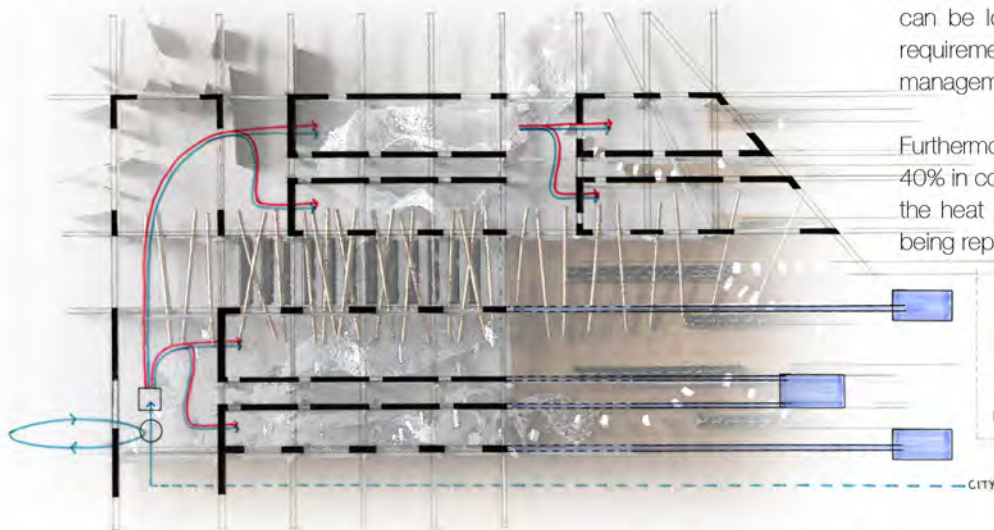


Ground Floor Mechanical Ventilation Plan



Basement Mechanical Ventilation Plan

environmental strategy
_HEATING STRATEGY

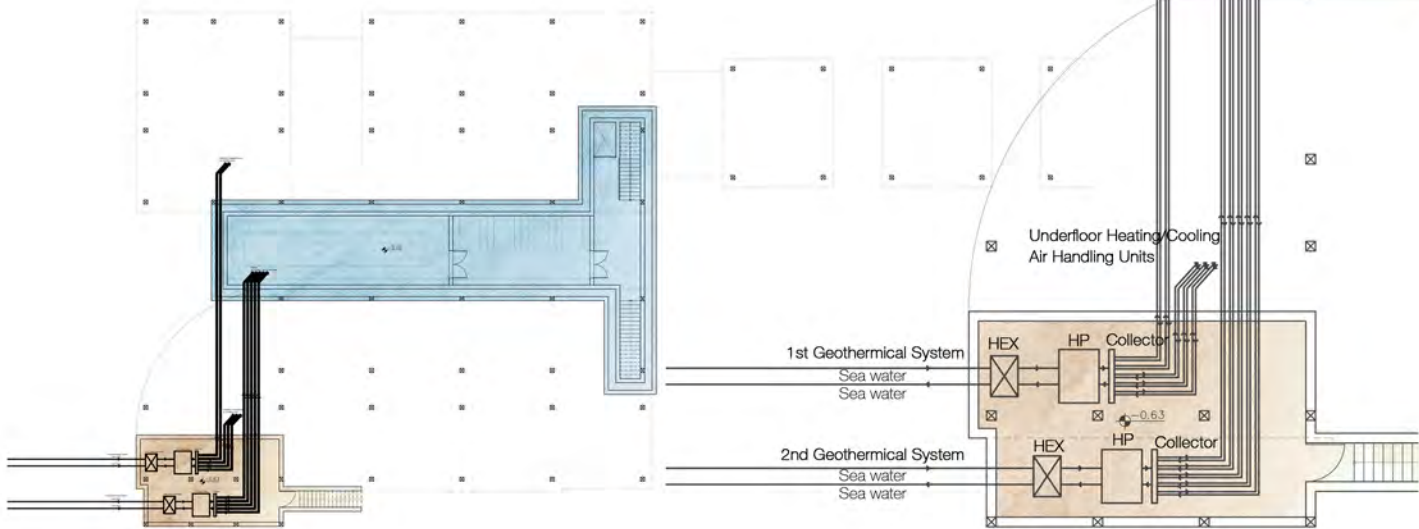
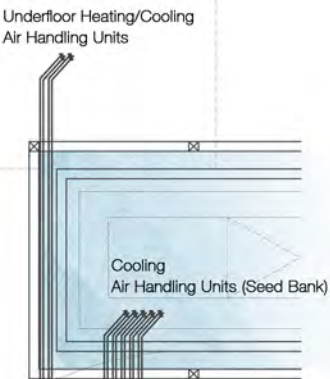


Preliminary experimental diagram emphasising on the geothermy of the building with rainwater collection systems on the back

UNDERFLOOR HEATING

Underfloor heating is suitable for the building, since it can be localised to specific loops according to the requirements of the space and controlled by a building management system.

Furthermore, cooling via utilising sea water, saves up to 40% in comparison with air cooling systems, while with the heat pump the conventional heating systems are being replaced.



Basement Plan_Plant Room and Seed Bank
Diagram depicting heating-cooling strategy

Detailed diagram depicting heating-cooling circulation

SEQUENCE OF CONSTRUCTION

G. External Works

1. Site works [Embankment fill, Landscape planting installation (StabiliGrid System), Installation of wooden decks]
2. Drainage
3. External services

F. Services

1. Sanitary applications
2. Disposal installation
3. Mechanical installation
4. Geothermic installation
5. Electrical installation
6. Lift installation

E. Internal Finishes

1. Wall finishes
2. Floor finishes
3. Ceiling finishes

D. Superstructure

1. Metal frame
2. Upper floors
3. Roof
4. Stairs
5. External walls
6. Windows and external doors
7. Internal walls and partitions
8. Internal doors

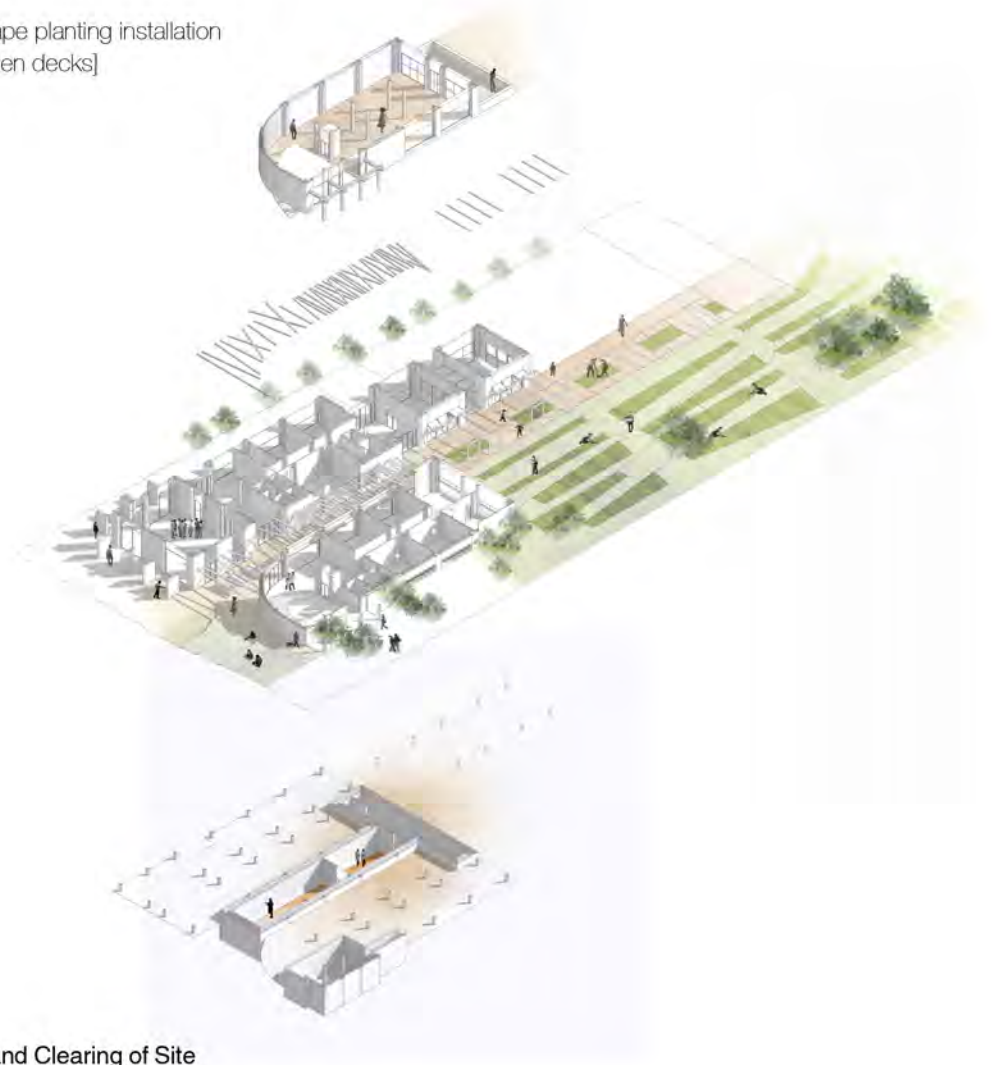
C. Substructure

B. Excavation Works

A. Site Reconnaissance, Demolition and Clearing of Site

Economics

The construction sequence allows the community training workshops and research laboratories to expand, appropriating more space for people to get involved in training, testing, planting and conserving seeds.



_CDM CONSIDERATIONS

SITE

The site and building are structured to keep noisy, heavy industrial activity from the fish market situated to the northeast, while collaborate with the national marine aquarium to the south. The delivery of seeds take place to the rear of the site and can be stored directly in the seed depository offices to avoid unnecessary interaction of the public and replanting processes.

ADAPTATION

The greater risk associated with a building of this nature is the control of public circulation during times of operation, as well as the security of external plants and cultivations when closed.

AWARENESS

Functioning as a research and community centre, part of the building's responsibilities should be to, not only train but also educate the workforce in health and safety best-practice and procedures. provision for first-aid facilities, locker rooms and a full-time site manager are located in the reception/administration area.

Furthermore, laboratory clothing should be worn by those operating the research laboratories and protective clothing by community members at all times during the replanting and landscape maintenance.

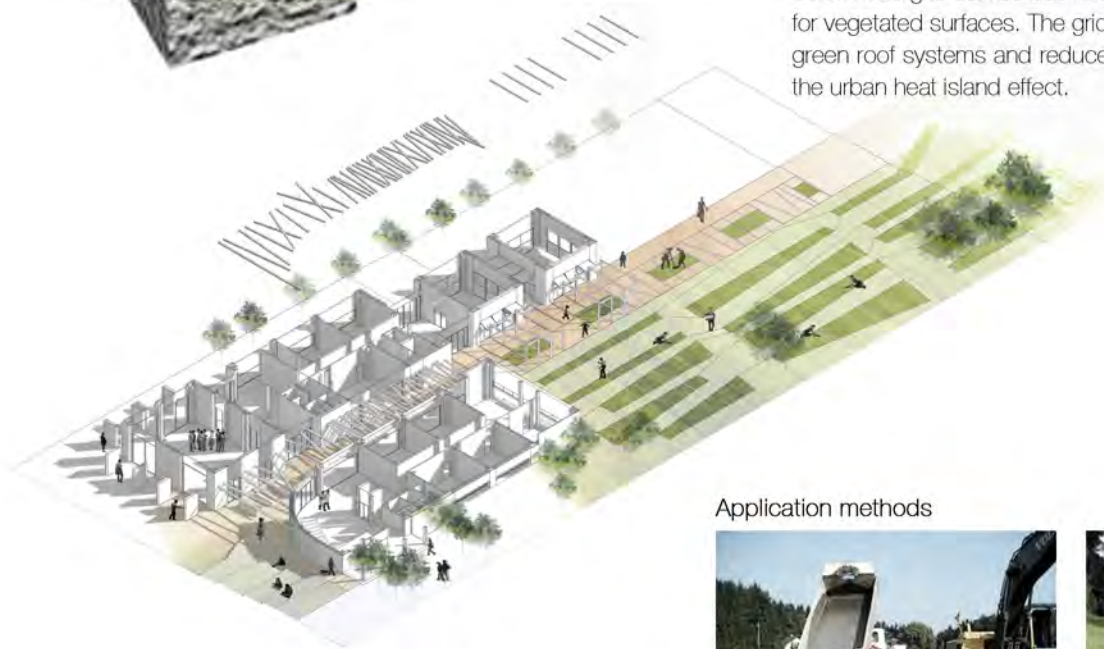


LANDSCAPE CONSTRUCTION SYSTEM

RECYCLED-PE PERVIOUS-PAVEMENT GRID SYSTEM

Stabiligrd is an economical, easy-to-install, load bearing pervious-pavement lattice grid. It is an environmentally sound alternative to pavement, effectively reducing storm-water runoff and allowing the underground soil to absorb and process environmental toxins, such as cadmium, copper, lead and zinc, and preventing the contamination of ground water. Stabiligrd also reduces soil erosion, preserving vegetation and natural habitats.

It is lightweight but highly durable, and may be adjusted to fit existing contours using standard tools, such as an angle grinder or circular saw. The grids are typically laid on a 1 to 4 inch gravel base, depending on the porosity of the substrate below. The grid can be backfilled with gravel, sand, or top soil for vegetated surfaces. The grid facilitates a structural base for green roof systems and reduces both storm-water runoff and the urban heat island effect.



Application methods



Since landscape is both an important functional and aesthetic part of the scheme, stabiligrd is an ideal solution for its low-cost and fast construction.