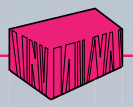
Ode to the Portuguese Islands

The community library emulates nature's work and man's interventions on the Azores Archipelago from which the first immigrants of Little Portugal came. The Mediterranean climate of the self-sustaining Portuguese islands has significant exposure to the sun. The region equally has high geothermal activity due to its location near the Mid-Atlantic Ridge where tectonic plates meet. Although Toronto has a different climate, the library can use the potential of sunlight through passive means and solar panels as well as heat from the earth through geothermal technologies. The meeting rooms and the office spaces are housed in the island-like mass whereas the library stacks are embedded below grade. To collect water, the island citizens built water canals, or levadas, on their mountains. From the rooftop, rainwater drains down an access ramp to the detention pond which acts equally as the water storage tank for the library. The main envelope frames the climate region like a porous sky with frosted glass, thus creating a microcosm of the world. Through these means, the design will use solar power and geothermal energy to offset the 934 600 kWh annual use for a 1 322 m² library.

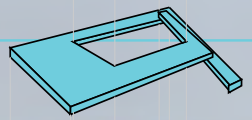
Portuguese Islands



Thermal Mass

This island core represents the Mediterranean region in which the first immigrants of Little Portugal came. It is a symbol of self-sufficiency.

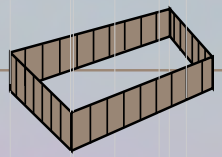
Water Canals/Levadas



Water Collection

Rooftop circulation in the form of levadas is an expression of the water system which treats all rainwater that falls on the site.

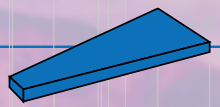
Commercial Rhythm



Envelope

The vertical rhythm of the surrounding commercial street façade on Dundas is repeated in the insulated glazing system.

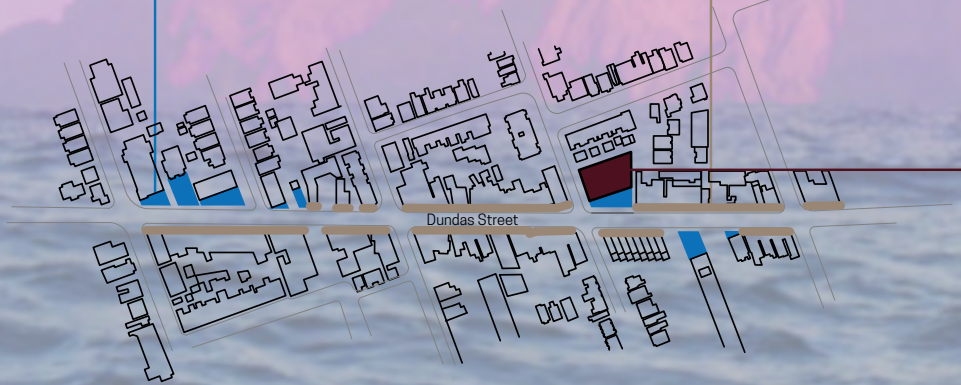
Institutional & Residential Angled Setback

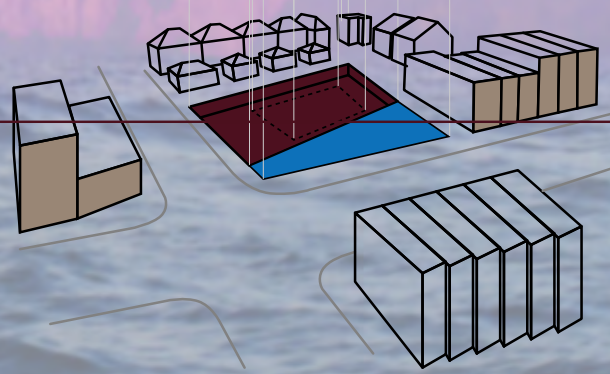


Water Filtration

The pond is a result of the contextual setback. Evoking the ocean, this water filtration system is integral to the library ecosystem.

Little Portugal, Toronto





Energy & Insulation

Embedding the building/program below grade substantially reduces the need for heating/cooling. This is furthered by the capturing of geothermal energy below.

Net Zero

Electricity Energy Use Intensity: 162 kWh/m²/year
Fuel Energy Use Intensity: 545 kWh/m²/year

Floor Area: 1 322m²
Total Energy Use Intensity: 707 kWh/m²/year
Total Energy Use: 934 600 kWh/year

Solar Power Potential: 63 100 kWh/year
Geothermal Energy Requirement: 871 500 kWh/year

Envelope

Emulating clouds, a frosted double-curtain wall glazing system is used to insulate and to diffuse daylighting throughout the space.

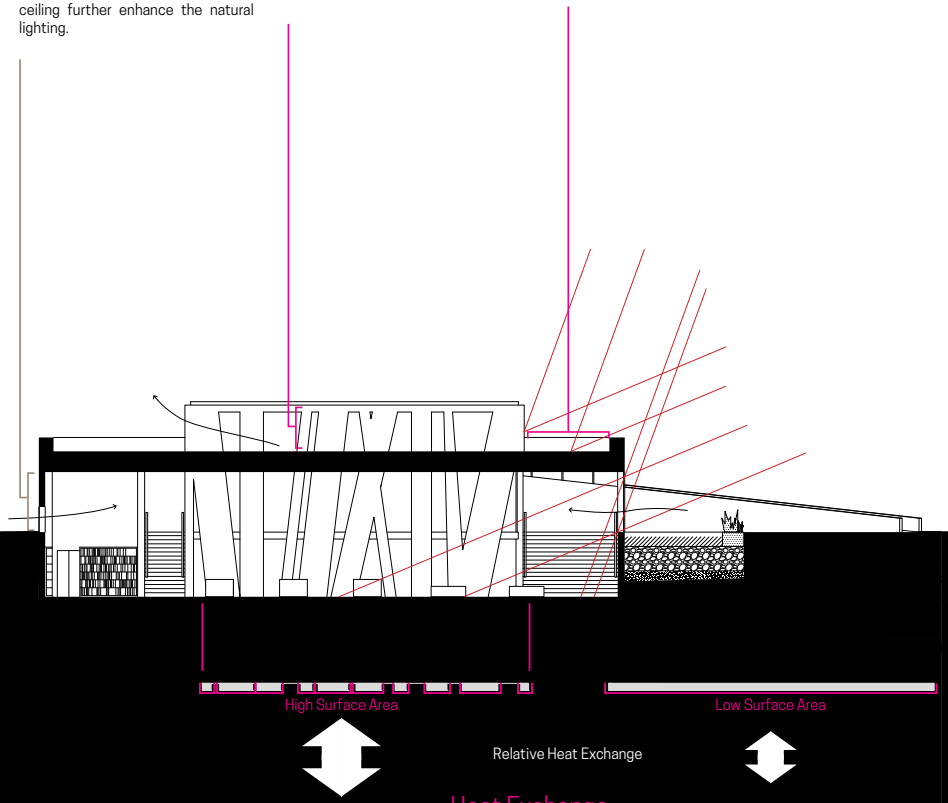
Reflective, white interior walls and ceiling further enhance the natural lighting.

Stack Effect

Although the island core breaks through the main volume in height, it provides natural lighting to deeper spaces, ventilation via the stack effect, and solar gain from the south.

Porosity

Evoking the island's thatched-huts, the thermal mass enables daylight to penetrate into the office and meeting spaces through its concrete structural members.



Heat Exchange

The irregular geometry of the concrete structural members accelerates the heat diffusion process. The geometry enables a higher total surface area exposed to air compared to that of a flat wall of the same thickness. This passive system therefore reduces temperature fluctuations.

Green Roof

Beyond insulation qualities, the variety of vegetation helps to offset the impact of the building on the natural environment.

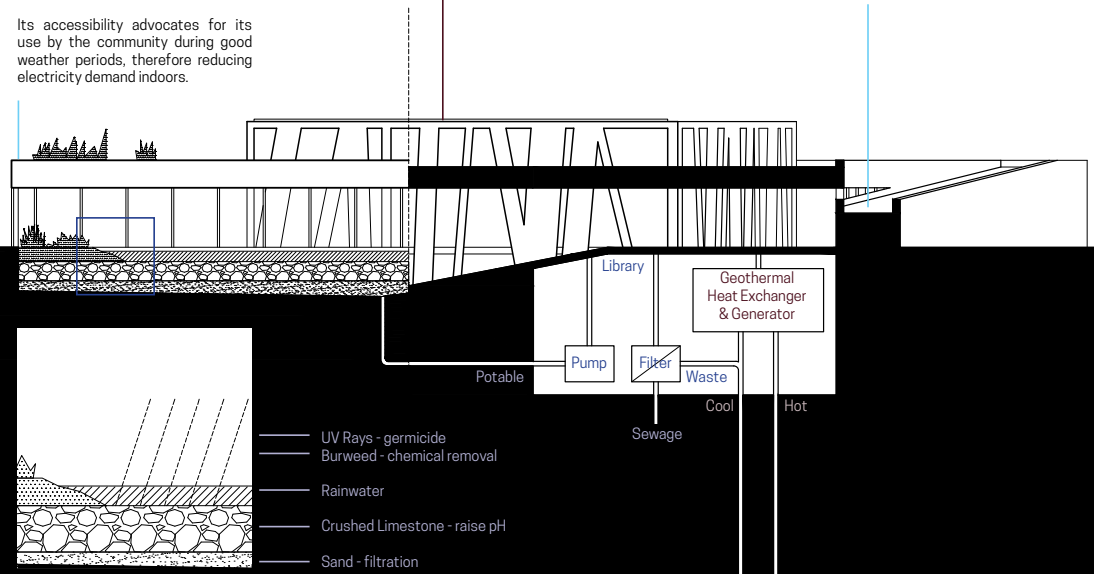
Its accessibility advocates for its use by the community during good weather periods, therefore reducing electricity demand indoors.

Solar Energy

Absorbing heat from the top of the island, the solar panels also offset energy use by 57 000 kWh/year.

Water Collection

Rainwater on the rooftop is drained down the levada and into the detention pond below.



Water Filtration

The detention pond is integral to the library water system. It supports plant life such as bur-weed which purify water of bacteria and chemicals. Simultaneously, the water absorbs the sun's natural UV rays to remove germs. The collected rainwater of pH 5.0-5.5 sits in crushed limestone raising the pH. Passing through sand and other filters, it is then pumped into the library for potable use.

In return, wastewater is filtered and combined with the cool water stream of the geothermal energy circuit to replenish the earth's crust.

Geothermal Energy

Hot water is pumped to the surface by a production well that sends it through a heat exchanger where the energy is transferred to a working fluid. The working fluid then goes through a generator that converts the heat into electricity, which is then distributed in the building.

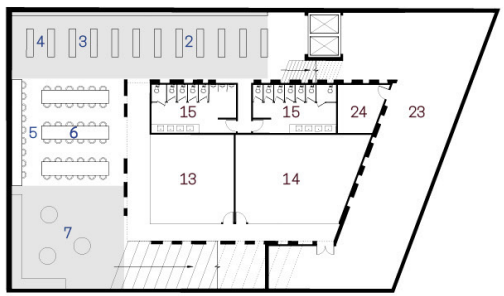
The cold water stream is combined with the wastewater and is sent back to the earth's crust.

Team 500

Spatial Organization

The lobby and conference reception space welcomes users on the ground level (or sea level). The library level is separated from the office meeting core. Resulting acoustical separation is achieved through height.

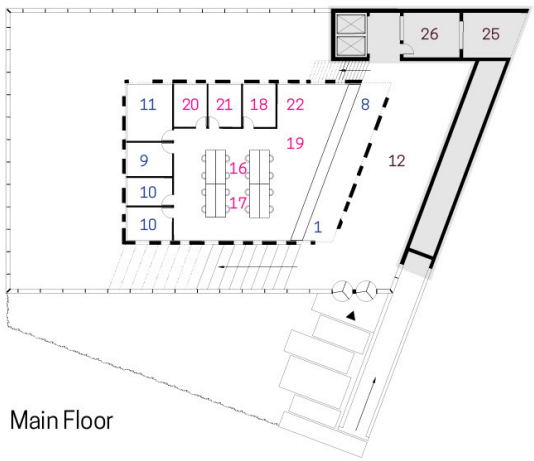
Library collections are placed on the north side where diffused lighting from the outdoors will not harm the reading material.



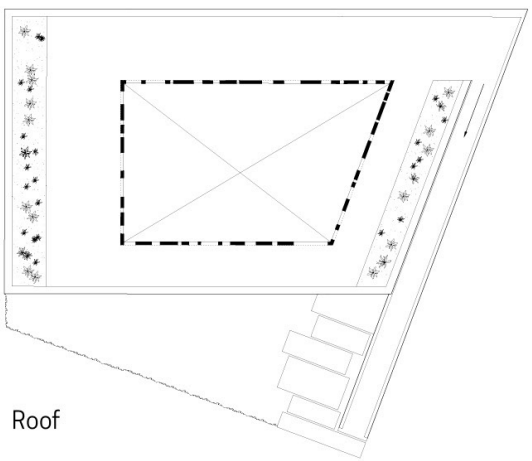
An informal work area has movable furniture that allows users to relocate themselves to favourable working conditions rather than resorting to electric lighting.

Lower Floor

The rooftop ramp access as well as the elevator/loading zone are outside of the insulation layer in order to reduce the volume required to heat/cool.



Main Floor



Roof

Library Facilities
1 Reception
2 Collections
3 Reference Collections
4 Periodical Collections
5 Catalogue Access/Computers
6 Information Commons
7 Informal Work Area
8 Checkout
9 Librarian Office
10 Assistant Librarian
11 Work Room

Meeting Rooms
12 Lobby/Conference Reception
13 Meeting Room
14 Multipurpose Room
15 Washrooms

Office Spaces
16 Open Office Space
17 Open Workstations
18 Small Meeting Room
19 Breakout Area
20 Store Room
21 Server Room
22 Print/Copy Area

Service
23 Mechanical Space
24 Janitorial
25 Loading Space
26 Loading Area