Strategies

Daylighting Strategies: Monitors and Shading

Thermal Strategies: Sunspace and Trombe Walls

Green Roof and Living Wall

Photovoltaic Integration

Site Conditions

Strategies

Thermal Strategies:
Sunspace and Trombe Walls

Photovoltaic Integration
Green Roof and Living Wall

mnZed Labs and the CSBR

Building an awareness of seasonal dynamics, climatic changes, and developments in sustainable energies.

Place In Time
In Minneapolis
In University of Minnesota
In Rapson Hall

March 21
June 21
September 21
December 21

Strategies

Daylighting Strategies: Monitors and Shading

Thermal Strategies: Sunspace and Trombe Walls

Green Roof and Living Wall

Photovoltaic Integration

East Elevation
5/8" = 1'-0"
Plan of Site Integration

Sections

Labs (75 ft² min.)
Classrooms (30 ft² min.)
Offices (15 ft² min.)
Utility (3-5 ft² min.)
Two basic shading strategies are utilized. Okasolar shades are used on east and west facing windows as well as the sunspace skylight. These premade insulated glass systems include a set of internal fixed fins that deflect hot summer sun to prevent heat gain and mediate ambient light into the space year round. Moveable shade panels are used indoors to provide extra control while encouraging users to interact with the shading systems and be more aware of the effect of sunlight on their space.

Monitors run the entire length of the second floor to provide ambient, steady light to the labs. They scoop light from the east and west while blocking some of the intense, high noon sunlight.
Other Strategies

**Ventilation**

- **Summer**
  - Hot sun rays shaded in summer
  - Chilled air supplied through ductwork under floor
  - Air stratification reduces amount of chilled air required
  - Hot air exhausted through ceiling and monitors
  - Air pulled through old Rapson courtyard up through exhaust system for ventilation
  - North: Windows allow for breezes to ventilate passively in nice weather

**Photovoltaic Panels**

Photovoltaic panels are integrated into the green roof design. They are placed on an trellis system to provide shading for pathways and gathering spaces on the green roof. They are also used to create a PV garden on top of the existing courtyard to be viewed from select interior second floor locations as well as placed in patches throughout the rest of the roof garden so that users can get up close to appreciate how this technology works.

**Green Roof**

An intensive green roof has been placed over much of the existing roof of the Cerney part of Rapson Hall as well as part of the first floor of this addition. This green roof, planted with native groundcover, provides recreational area, takes carbon out of the air, and provides extra insulation for the spaces below, reducing heating loss.

**Living Wall**

A woodbine vine, native to Minnesota is to be planted in a pot system at the base of the North and part of the West and East walls. This will serve as a banner to subtly announce the presence of the center to passers-by while also providing additional shading and insulation to these areas. The vines also remove carbon from the air.

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**Other Strategies**

**Photovoltaic Panels**

**Green Roof**

**Living Wall**
Passive Thermal Strategies

Trombe Walls

Stationary

Rotating

Sun Space

Ventilation

Winter

Heat radiates through thermal walls in sunspace and trombe walls and also convects around them.

The trombe walls exhibit how the minZED lab users may interact with the thermal strategies in the center. The trombe walls made of hydradic salts change from opaque when cool, to transparent when warm because they change phase from a solid to a liquid at 27 degrees C. The thermal properties achieved in 3" of this material equal 12" - 18" concrete. The resulting walls are considerably lighter, and may be easily adjusted seasonally with the assistance of wheels. Opening the walls in the summer permits access to windows for ventilation and closing them again in winter allows optimal thermal gain and insulation. The daylighting of the labs is primarily achieved through overhead monitors, thus the adjustment of the trombe walls does not interfere.

The sun space works through isolated gain. Unlike a trombe wall, the sun space can be inhabited, allowing inhabitants to experience a flux in temperature from the surrounding Minneapolis conditions. The space exists outside of the thermal envelope of the Rapson Hall addition. When it naturally heats in the winter, vents may be opened to incorporate the heat gain into the active systems. During these times the thermal tile that line the sunspace will change to a warm color that informs people passing that the environment would be pleasant enough to sit and enjoy. In the summer, the thermal tile continue to inform occupants of comfort levels. The sun space will be opened to invite a summer breeze that is fueled by the release of air from the courtyard.