

# Gleneagles Community Centre



## Powered by Green Energy

**Opening**  
**January 2003**

### Project Team

**Architect**  
**Patkau Architects Inc.**

**Mechanical Engineer**  
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**Project Manager**  
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**Manager**  
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### What's Happening at the Gleneagles Site?

◇ Check the web site  
[westvancouver.net](http://westvancouver.net)

◇ Call the Project Info Line  
604-925-7125

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The design of Gleneagles Community Centre innovatively integrates structural, mechanical and electrical systems to foster energy-efficiency and environmental sustainability, while creating a comfortable environment for users of the facility. This is the first system of its kind in North America.

#### Radiant slab heating and cooling

Heating and cooling is provided by a low intensity radiant temperature control system with its elements incorporated into the concrete slab walls and floors of the building.

The heavy concrete structure with a high-performance building envelope is used to create essentially a "constant temperature indoor environment." Exposed concrete surfaces absorb or radiate low-intensity heat from, or into, the occupied space to compensate for instantaneous cooling or heating gains inside the building.

The concrete slabs are maintained at a virtually constant temperature (ranging from 19-25 °C depending on the season) by circulating heated or cooled water, generated by two ground-source heat pumps, through 6,800 m of plastic piping cast in to the concrete slabs.



#### Ground-source energy

Ground-source heat pumps are tied to a horizontal ground heat exchanger consisting of 3,000 m of "slinky" coiled plastic piping installed below the parking lot. The ground-source heat pumps use the earth's stable temperatures as an efficient heat source, or sink, for heating and cooling.

Since the facility will require more heating than cooling, a biodegradable 10% propylene glycol water solution is used as a working fluid to prevent the ground loop freezing during extreme winter conditions.

The ground source heat pump system has the capacity to meet all building cooling requirements. A

Below: Tilt up concrete panels and slab floors of the structure incorporate radiant heating and cooling elements.



small gas-fired boiler is installed to provide domestic hot water and to supplement the ground source heat pumps during peak heating conditions.

*Building community recreation facilities  
Working together to bring vision to reality*

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Left and Above: 3,000 metres of coiled plastic piping is installed under the parking lot, to use the earth temperature as a source of energy.

## Ventilation

The building ventilation is provided by a “displacement ventilation system” and by natural ventilation through opening windows. Displacement ventilation delivers fresh outdoor air to the space at low level, at low velocity, and at a temperature only slightly lower than the desired space temperature. This allows the fresh air to “spill” evenly across the entire space. The fresh air is driven upwards by buoyancy forces around the heat sources (e.g. people) within the space. Eventually, the warm air rises up to the ceiling and is removed by the central air exhaust system. A large portion of the energy from the exhaust air is recovered to preheat the ventilation air being delivered to the building.

## System benefits people, environment and costs

This innovative mechanical system effectively separates the space temperature control from the

ventilation system. The space temperature is maintained primarily by the radiant system, rather than with the air system, resulting in a comfortable environment for those using the building, as well as low energy use.

Because of the enormous heat absorption capacity of the radiant concrete slabs, the instantaneous peak heating and cooling loads are significantly reduced. As a result, the required size of the mechanical plant has been reduced to less than 40% of a plant size needed for a comparable conventional building (e.g. 70 kW versus 200 kW).

While the cost of installing the system is comparable to conventional all-air systems, the high energy- efficiency will save as much as 50% of the energy use when compared to a conventional “all-air” heating and cooling system.