Gleneagles Community Centre

Comfort and Efficiency Powered by Green Energy

EARTH TECH

Gleneagles Community Centre, located in West Vancouver, British Columbia - Canada, is a prime example of Earth Tech's sustainable design capabilities. Earth Tech's close cooperation with the Architect and the rest of the design team resulted in an unparalleled synergy between the building and the mechanical system. The innovative design for this 23,000 sq.ft. recreational facility integrates all building components 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.

Client:	Municipality of West Vancouver
Project Manager:	Maurice Ouellette
Architect:	Patkau Architects
Mechanical/Electrical:	Earth Tech
Structural:	Fast & Epp Structural Engineering
Civil Engineering:	Webster Engineering
General Contractor:	Country West Construction
Project Value:	$6,500,000.00

Simplified Mechanical System Schematic

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Ground-Source Energy

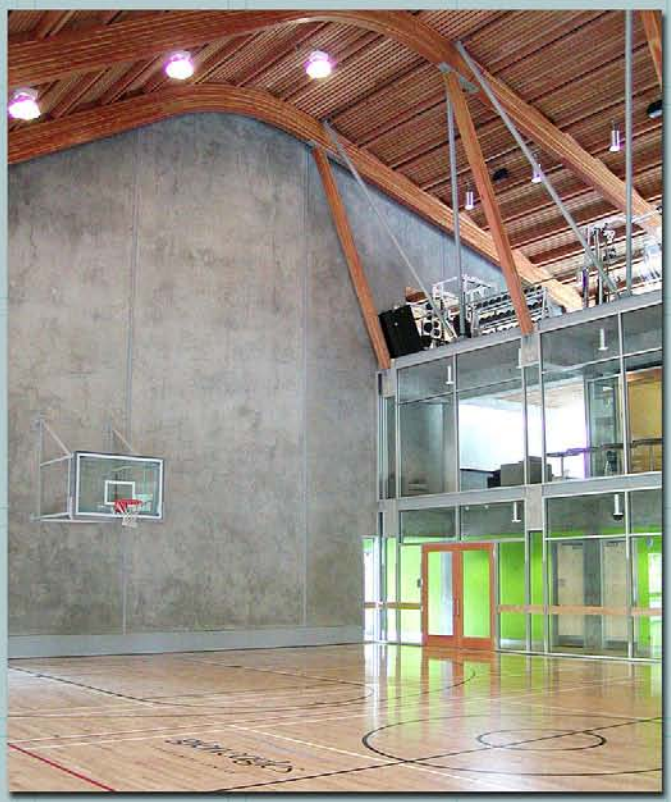
Ground-source heat pumps are tied to a horizontal ground heat exchanger consisting of 3,000 m of "slinky" coiled plastic piping installed below the parking lot. The ground-source heat pumps utilize the earth's stable temperatures as an efficient heat source, or sink, for heating and cooling.

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

Displacement 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 that 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 warmed up 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.



Comfort, Energy Efficiency, Cost and Environmental Benefits

This innovative mechanical system effectively separates the space temperature control from ventilation. The space temperature is maintained primarily by the radiant system, rather than with the air system, resulting in 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, as well as the overall annual energy requirements, 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.