



# CONCRETE THINKING FOR A SUSTAINABLE FUTURE

## PROJECT PROFILE

### PROJECT DESCRIPTION

The Earth Rangers Centre is a 5800 m<sup>2</sup> wild animal treatment and rehabilitation, education centre

### OWNER

Earth Rangers

### LOCATION

Kortright Centre for Conservation,  
Woodbridge, Ontario

### CONSTRUCTION VALUE

\$23 million

### CONSTRUCTION TIME

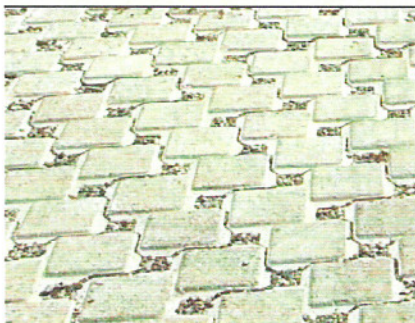
2 years

### COMPLETED

October 2004



10,000 square feet of  
Unilock Ecolock paver



## EARTH RANGERS CENTRE

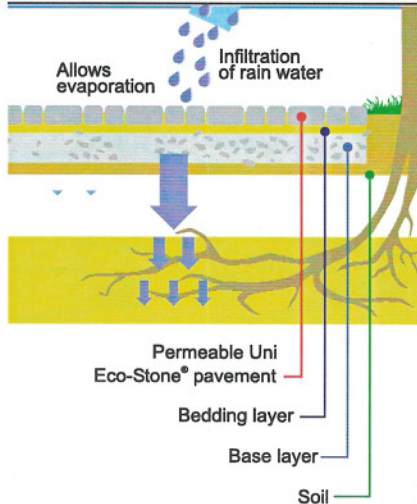
### WHAT CONCRETE PRODUCTS WERE USED FOR THIS PROJECT?

The building structure is reinforced concrete, with load bearing masonry walls in the animal enclosure areas to provide a durable, moisture resistant interior environment. All insulation is located on the building exterior, enclosing the 4000 m<sup>3</sup> concrete frame. This enables the large mass of the concrete and masonry to act as thermal storage, improving the comfort and energy performance of the building.

### PROJECT DESCRIPTION / CHALLENGE

The project has a number of challenging design requirements. The rehabilitation rooms and treatment areas had to be durable enough to: a) accommodate the tough patients—deer, raccoons, etc., b) offer no escape or hiding places for the small or flying patients, c) withstand the humid, wet environment of the waterfowl and beavers, and d) provide a healthy environment conducive to the speedy recovery of all.

Ventilation rates are high, which is typical of human health care facilities, yet energy use is as low as the best available technology allows—the target was to eliminate mechanical cooling and achieve a 50% energy reduction compared to Model National Energy Code for Buildings (MNECB), despite the fact that heating and cooling of large amounts of ventilation air is the major energy load in human hospitals. Another mandate was to demonstrate innovative technologies to achieve these objectives and to qualify for certification under the Leadership in Energy and Environmental Design (LEED) Standard of the US Green Building Council. The final annual energy use is calculated to be 63% less than required by the MNECB.



### WHY WAS CONCRETE SELECTED FOR THIS PROJECT?

Earth Rangers Centre is one of the most energy efficient education and health care facilities in Canada, and the use of concrete makes a significant contribution through:

- Exposed structural concrete slabs with embedded polyethylene tubing provide 100% of the space cooling and heating and act as thermal storage during the cooling season. The result will be an indoor environment with very stable temperatures
- The fresh air plenum for the air handling units is an underground air inlet structure of precast concrete pipes and a double foundation wall plenum designed for ground-to-air heat exchange that supplements the heat recovery ventilation system
- Concrete underground ventilation tunnels and a double foundation wall temper all outside air used to ventilate the building and allow the project to achieve its goal of eliminating mechanical cooling under most conditions
- A 310,000 litre cast-in-place concrete reservoir collects rainwater and treated wastewater for re-use in the building
- Concrete was selected the best roof material to withstand the weight of the green roof landscaping
- Permeable pavements allows runoff water to be returned to the aquifer
- The durability of concrete meant that it would stand up to the wear and tear from the animals. It also allows for easy cleaning and less maintenance
- Use of concrete floors for radiant heating and cooling
- Load bearing masonry walls in the animal areas provide a durable, moisture resistant interior surface
- The thermal mass of the concrete and masonry provide thermal storage, improving the comfort and energy performance of the building.

### SUSTAINABLE CONSTRUCTION FEATURES

Sustainable construction was achieved through conscientious design, architecture and material choices:

- Solar panels (alternative energy source) to heat domestic hot water
- Use of local materials (concrete etc.)
- Use of natural lighting to reduce energy usage and environmental foot print
- Energy efficient windows
- Highly insulated (R30 – floors & roof; R20 – walls)
- Water treatment on site for reuse (potable)
- Limited use of additional finishing materials on interior and exterior to retain exposed concrete
- Less energy use in maintenance as concrete is resistant to wear
- Eco-paver that charges the rain water back to the aquifer supporting LEED points towards maintaining property and soils.

### PROJECT TEAM

Owner:	Earth Rangers
Architect:	M. Architecture Inc.
Structural Engineer:	Internorth Engineering Inc.
Construction Manager:	Internorth Construction Inc.
Concrete Supplier:	Duffern Custom Concrete Group