

Citadel High School

FAST FACTS

The winner of an architectural design competition, Citadel High School was designed to replace two existing high schools in downtown Halifax. It is nearly three football fields long and almost 200,000 square feet in area. At the foot of historic Citadel Hill, it occupies one of the most significant sites on the peninsula and has many unique features. These include a modern, curving west facade, transparency through to and into the three main wings of the school (academic, arts and athletic), steam heat from the adjacent QEII hospital complex as the source of heating, and other energy and water saving features. Completed by September 2007 and aiming to be LEED Silver certified, the three storey building also includes an additional community gymnasium and the shell for a soon to be completed community theatre.

Construction Waste Management

Ninety percent of the debris and waste generated from the construction of Citadel High School was diverted from landfill disposal sites and redirected to recycling facilities.

Recycled Building Components

Citadel High School incorporates some salvaged materials from the former community college on the site and both former high schools. These include the stone medallions from QEH and the exterior stone and gymnasium bleachers from St Pat's. From the former community college building, the glass block in the gyms and the glazed wood doors into the library were salvaged and reused.

Roof Collects Rainwater for Toilets

Rainwater is collected from the roof of Citadel High School and stored in an underground cistern. The rainwater is then used for flushing the toilets and is estimated to save 1.2 million litres of water per year.

Waterless Urinals

Waterless urinals are used throughout Citadel High School and save an estimated 980,000 litres of water per year.

No Irrigation Required

No potable water at Citadel High School is used for landscape irrigation. Native landscapes that have lower irrigation requirements tend to attract native wildlife including birds, mammals and insects, creating a building site with natural surroundings. In addition, native plantings require less fertilizer and fewer pesticides and consequently reduces water quality impacts.

White, Heat Reflecting Roof / Grass Roof

A white, heat reflective roof covers most of Citadel High School. This light coloured roof reflects light and heat and is able to release absorbed heat energy quickly which greatly reduces air conditioning loads and subsequent energy requirements. The grass roof over the cafeteria reduces and treats stormwater runoff and reduces air conditioning

loads, while also providing an appealing view from the Art Rooms as well as the adjacent Citadel Hill.

Energy Conservation

The building has a highly effective and efficient envelope. Wall insulation has been installed that reduces heat loss, depending on location, by 18% to 34% more than required to meet the Model National Energy Code for Buildings. Similarly, roof insulation reduces heat loss by 20% to 44% more than required. All the building's windows have spectrally selective coatings that have 10% to 26% less heat loss and also reduce solar heat gain which saves on air conditioning loads.

Heat recovery wheels have been used that are capable of removing 67% of the heat from exhaust air streams and transferring it to the incoming ventilation air. Occupancy sensors are used to control classroom lighting to automatically turn off lights when the room is not occupied. Overall, the energy consumption for the building is 27% less than a similar building designed to the requirements of the Model National Energy Code for Buildings.

Unique, Exposed Steel Design

Citadel High School is the first new building to be able to expose all the steel structure without the need to cover it to protect it from fire. This was permitted by using fire-modelling software to prove compliance with the building code requirements as an alternative to the traditional methods of fire protection.

Recycled Content in Materials Used for Construction

Citadel High School incorporates materials with a recycled component into the building design which reduced the environmental impact resulting from the extraction and processing of new virgin materials. Moreover, using recycled materials in the building by-passes the energy and greenhouse gas intensive industrial manufacturing process. Examples include gypsum board that is 85% from recycled materials, and structural steel that is 80% from recycled scrap metal. Fly ash, a by-product of coal-fired electrical generation, was added to the concrete mix.

Low Emitting Materials

Many materials and building products have negative impacts on human health, indoor air quality and the Earth's atmosphere. Citadel High School incorporates low-emitting paints, adhesives and sealants. Additionally, interior construction materials such as plywood wall panels and cabinetry have no added urea formaldehyde, all of which improves the indoor air quality.

Collection and Storage of Recyclables

An easily accessible area in the building is dedicated to the separation, collection and storage of materials for recycling including paper, corrugated cardboard, glass, plastics, metals and compostable materials. By creating convenient recycling opportunities for building occupants, a significant portion of solid waste can be diverted from landfills.

Translucent Glazing

To enhance daylight in classrooms, but to prevent overheating from the sun, translucent glazing was used on the west side of Citadel High School.

Unique Ventilation Distribution

The ventilation ducts at Citadel High School are distributed to the building in a special spine on the roof. This reduced the height of the building which saved construction costs and reduced the building's visual impact from the surrounding streets and Citadel Hill.

No Fossil Fuels

The source of heat for the building is steam, taken from the nearby QEII Health Sciences Centre. This, along with a new Department of Education policy of eliminating gas in the science labs, has allowed the entire school site to be completely free of any fossil fuels which eliminates any potential environmental contamination as well as ensuring that the indoor air quality is as high as possible.

User Policies

Citadel High School and the Halifax Regional School Board have added additional environmental features to the operation of the building including a no smoking policy, a scent-free policy. A *Tools for Schools Indoor Air Quality* action kit is used by staff to monitor air quality. Educational components around '4-stream recycling' and energy conservation are specifically addressed with students and staff each September. Lights in classrooms and public spaces are not used when natural daylight will suffice. Citadel High also promotes alternative transportation strategies such as car pooling and provides prime allocated parking spaces for carpools.