

By Paul Sapounzi

Milton's New Town Hall

Green design aims to minimize impact on environment

A city hall expresses a community's aspirations in stone, glass, and steel. A century ago, their marble colonnades and bronze-roofed pediments evoked the stability, dignity, and stolidity of ancient architectural archetypes. Today's formal language conveys a message more in keeping with our times: Let's minimize the impact of new construction on the environment.

The new town hall in Milton, Ontario a half-hour west of Toronto, is the latest component in a civic campus of key heritage buildings. In 1985, the original municipal building, a castle-like historic courthouse and jail built in 1854, was restored and renovated, and a new wing was added. The complex functioned as the city hall until Milton's rapid population growth (it now approaches 80,000) mandated further expansion. The new, \$18-million project, completed in 2010, adds 75,000 square feet of municipal office space (including underground parking) and accommodates 200 city employees.

Last year, it won two important awards: the Ontario Public Works As-



sociation Project of the Year Award in the over-\$10-million historic restoration category, and the Ontario Masonry Design Award for Architectural Design.

Now, the "green" aspect of the town hall's design is up for recognition. The project has been submitted to the Canada Green Building Council for LEED (Leadership in Energy and Environmental Design) certification.

LEED recognizes sustainable performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

How does Milton Town Hall meet these demanding criteria?

Sustainable Site Development

It is more economical to build up than out. A compact footprint ensures reduced resource requirements because it is more efficient to build and to heat and cool than one that sprawls. The organization of the civic centre on the ground plane ensures that future development phases will be accommodated vertically rather



Paul Sapounzi, B.E.S., B. Arch., M.R.A.I.C., Assoc. A.I.A., C.A.H.P., is a Partner at +VG Architects (The Ventin Group) and in charge of the design of Milton Town Hall. The firm has designed over 40 city halls in Ontario, either as new construction, recycled and renovated heritage buildings, or – as with Milton Town Hall's 1985 and 2010 phases – both. Paul can be reached at <psapounzi@ventingroup.com> or 519-740-0671, ext. 24.



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than horizontally. This minimizes the project’s impact on the adjacent residential, heritage neighbourhood.

Parking requirements are fulfilled underground and offsite, minimizing surface parking. The service tower concentrates access routes and technical components to facilitate expansion from two to four storeys as Milton continues to grow.

Gardens throughout the site articulate the indigenous landscape of the rural Halton Hills farm valley. Native plant species and eco-lawn products require less permanent irrigation and maintenance. Generous setbacks also allow for the retention of important, mature trees along adjacent streets,

giving a “front-yard” quality, while wrapping the green space of Victoria Park Square around all the edges of the block. All that greenery contributes to air quality and a reduced carbon impact.

Water Savings

For irrigation, rainwater from the roof collects into two 43,000-litre underground cisterns. The water is filtered, then distributed through sprinklers, obviating the need for unsightly hoses.

Storm-water runoff from the parking lot passes through a Stormceptor, a vortex device that allows automotive

pollutants such as oil and suspended solids to settle out, preventing them from entering downstream lakes and rivers.

Inside the building, low-flow toilets use a third less domestic water than conventional counterparts.

Energy Efficiency

Natural Resources Canada’s EE4 energy-modeling software was used to model the building’s energy usage. EE4 checks parameters such as solar, ventilation, lighting, equipment, occupancy, and water-heating loads to verify design compliance against the requirements of the Model National Energy Code of Canada for Buildings.

Passive solutions reduce energy needs through building orientation and massing, by exploiting natural light and ventilation, and by topping off the building with a white roof.

A white roof is a cool roof. A white or reflective roof typically increases only five to 14 degrees Celsius above ambient temperature during the day; a traditional dark-coloured roof can increase as much as 50 degrees C, reaching temperatures of 70 to 90 degrees C.¹ This heat increase contributes to an increased air-conditioning load, higher hydro bills, and a shorter roof-membrane life. On an environmental scale, a dark roof causes a heat-island effect, which on a hot day helps make a downtown hotter and more uncomfortable than the suburbs.

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¹ Cary Black, chairperson of the technical committee of the Vinyl Roofing Division <www.vinylroofs.org> of the Chemical Fabrics and Film Association, writing in *Commercial Building Products* magazine.

ble-glazed windows. Filling the gap between the glass panes with a heavy, inert gas like argon minimizes convection currents within the space and reduces heat transfer between inside and out. Low-emissivity coatings are microscopically thin layers of metallic oxide bonded to one of the window's interior surfaces. It reflects radiant infrared energy, keeping radiant heat on the same side of the glass from which it originated, while letting visible light pass. So, in winter, indoor heat reflects back inside; in summer, the sun's heat reflects back outside. Low-e windows allowed a downsizing of the cooling system that will offset the window's additional capital cost. They also reduce the likelihood of condensation forming on the windows and causing damage.

The extensive use of structural glazing – representing transparency of civic operations – allows natural light to penetrate the interior, particularly into public spaces, reducing the need for artificial lighting. Shading devices control natural light levels. As a pleasant corollary, 90 percent of regularly occupied spaces boast access to outdoor views.

Jennifer Reynolds, Director, Community Services, for the Town of Milton, says, "The new Town Hall has strengthened cohesiveness and communication among all staff. Morale has improved because the space is very bright and welcoming."

Active energy-efficiency strategies include occupancy sensors for switches controlling lighting in enclosed rooms. In open areas, a programmable low-voltage lighting control system allows automatic shut off at night. Slim-line T8 fluorescent luminaires provide most of the lighting. These use half the energy and have less mercury inside than traditional T12 fluorescents, saving on disposal and environmental costs. They also last longer, saving on maintenance costs.

Sensors in the underground parking garage monitor carbon monoxide and carbon dioxide levels to manage the amount of fresh air and exhaust. Compared to fans turning at a con-

stant speed, this reduces energy consumption.

For heating and cooling throughout the building, a closed-loop heat-pump system allows energy that is not required in some areas of the building (cooling load) to be moved and used in areas that do require energy (heating load). Energy-modelling software indicates that this allows for a 40 percent energy savings.

Rooftop energy-recovery ventilators bring the incoming air closer in temperature and humidity to the exhaust air and reduce the load on the HVAC (heating, ventilating, and air conditioning) system by one third. The ventilators incorporate an enthalpy wheel, a fan with blades coated with a desiccant such as silica gel that continually absorbs and releases moisture. The incoming air travels through the wheel before it enters the rest of the HVAC system. The wheel is positioned so that adjacent supply and exhaust air streams flow in opposite directions through opposite halves

of the wheel. As the wheel rotates, it absorbs heat and moisture from the warmer air stream, and loses heat and moisture to the cooler air stream. The supply air is warmed and humidified in the winter and cooled and dehumidified in the summer.

Parking is limited to that required by the zoning by-law. This promotes bike-riding, which is further encouraged by the provision of bike racks for the public and staff, as well as showers and change facilities for staff.

Materials Selection

Over 15 percent of materials used have recycled content. Over 20 percent of the materials consist of regional content, which reduces transportation costs and supports area businesses. Over 95 percent of construction waste, such as drywall, metal, and wood, was diverted from landfill and removed to a recycling facility.

The stone walls reinterpret architectural motifs of the stone wall and arched openings from the adjacent

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19th-century courthouse, which was renovated as a municipal building in 1985. Their limestone blocks make reference to the big cliffs of the nearby Niagara Escarpment and were quarried by Owen Sound Ledgerrock in Owen Sound, about 150 km from Milton.

Much of the millwork, inside and out, uses engineered wood. This material, manufactured from fast-growing, underutilized, and less-expensive wood species, is usually hidden away in trusses and other structural under-pinnings. Polished to a high gloss, its unusual grain pattern gives an exotic appearance.

Portions of the building were made with fly-ash cement. Fly ash is a fine, glass-like powder recovered as a by-product in coal-fired power plants as flue gases pass through an electrostatic precipitator before escaping through the chimney. Used in construction, fly ash conserves energy by reducing the demand for lime, cement, and crushed stone, which take energy to produce. A ton of fly ash replacing a ton of portland cement, used to make concrete, saves the equivalent of nearly one barrel of imported oil and a ton of carbon dioxide, the main greenhouse gas.

Indoor Environmental Quality

During construction, the general contractor, implemented an indoor air-quality management regime. This included steps such as keeping supplies off the ground to make sure they didn't absorb water and get mouldy. The floor was constantly swept to minimize dust accumulation. Ductwork was sealed to keep contaminants out.

Zero- or low-VOC, EcoLogo-certified adhesives, sealants, paint, coatings, and floor coverings were used throughout; newly painted rooms had only a hint of "fresh-paint" smell. VOCs (volatile organic compounds) cause sick-building syndrome. This manifests itself as headaches, nausea, lethargy, loss of concentration, itchy or watery eyes, itchy or runny noses,

dry or irritated throat, dry skin, and even dizziness and bronchitis.

Office furniture was certified by an independent organization that tests products to ensure that they meet chemical emissions standards set by key public-health agencies. There is even a green housekeeping policy: cleansers and soaps in the facility bear the EcoLogo environmental sustainability label.

One of the goals of Milton's strategic plan is to demonstrate leadership in the areas of conservation and environmental best practices. "By paying attention to the 'green details'," says Jennifer Reynolds, "the Milton Town Hall project allows the town to achieve its targets related to leadership in environmental sustainability." *MW*

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