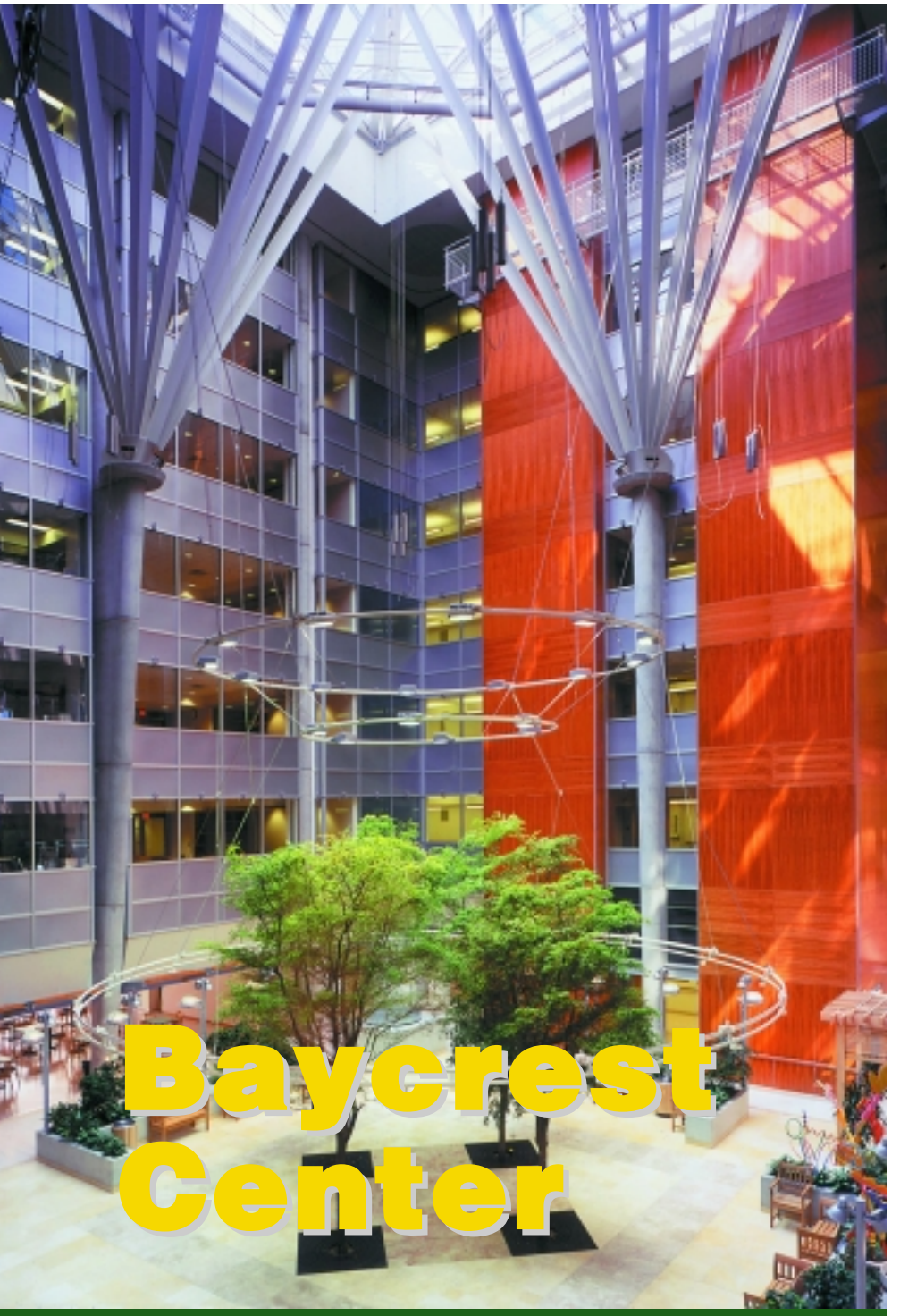


Baycrest Center

By Barry Charnish, P. Eng.

The newest facility at the Baycrest Center for Geriatric Care will accommodate 372 long-term care residents and 100 beds in the Center for Cognitive Disorders. The Center for Cognitive Disorders incorporates a short-term program for diagnosis and treatment and a long-term program for residents with vascular dementia. Access to both indoor and outdoor spaces is encouraged; and a Winter Garden and Atrium form the nucleus of the complex to provide an all weather gathering place. Architects A. J. Diamond, Donald Schmitt and Company in association with Boigon Petroff Shepherd Architects Inc. were the architects for the new Center.

The architects' goal was to offer an environment that provides accommodation to meet the needs of the elderly, provide an environment that will be attractive to the residents, their families and the staff that serve them and foster the excellence in geriatric care research and education. It was the intent of the architects that the atrium's structural design create an easily recognizable spatial configuration to residents with cognitive disorders. The architects also intended to provide an immediate and dramatic sense of presence to people below. The overall visual appearance would be quite textural in nature, working to draw the eye of the viewer upward to the featured skylight.

By placing the support points part way up the atrium wall at the fifth floor level, a stronger spatial sense of a rounded volume is created. Such spacing provides visual interest to residents and visitors when travelling the upper floors and reduces the scale of the space in order to keep visitors from feeling overwhelmed.

The selected design uses a configuration of structural steel struts and ties that suggest a canopy of trees branching from the sides of the atrium. The use of steel was selected so that shadows would develop from the natural day and evening lights, locat-

ed on the sides, within and below the space. The varying widths of the plate struts respond to the slenderness requirements of the significant lengths of the strut members. As supported by comments from Jack Diamond, the design architect, structural steel was the material of choice for its ability to impart the overall visual aesthetic of the project. In addition, steel's high strength-to-mass ratio allowed for the use of many light, slender elements. By keeping the design elements "light", the engineers were able to create the required visual texture within the space. Other materials such as concrete or timber would have made such an expression quite difficult and would have proven prohibitively "heavy".

The atrium (winter garden) is 23 m (78') x 30 m (98') in plan area with the structure tapering to an opening at the roof of 18-m sq. (59'). The steel framing in the atrium consists of an octagonal shaped catwalk with cross bridges and an architectural structural steel support system supporting the entire skylight. The catwalk structure is hung and braced from the roof structure with moment connected brackets to the hangers and HSS 323 mm (12") diameter main supports. The double profile plates, which cantilever both sides of the main support, carry the small HSS and angle catwalk support system. There is a curved ridge that crosses at each direction intersecting at the center of the catwalk. The walkway and handrails consist of a heavy gauge mesh. Due to the size, mass and integrated support system of the structure and the complexity of the installation, the entire structure was assembled and completely finished at ground level and then hoisted into place by using two 80-ton cranes.

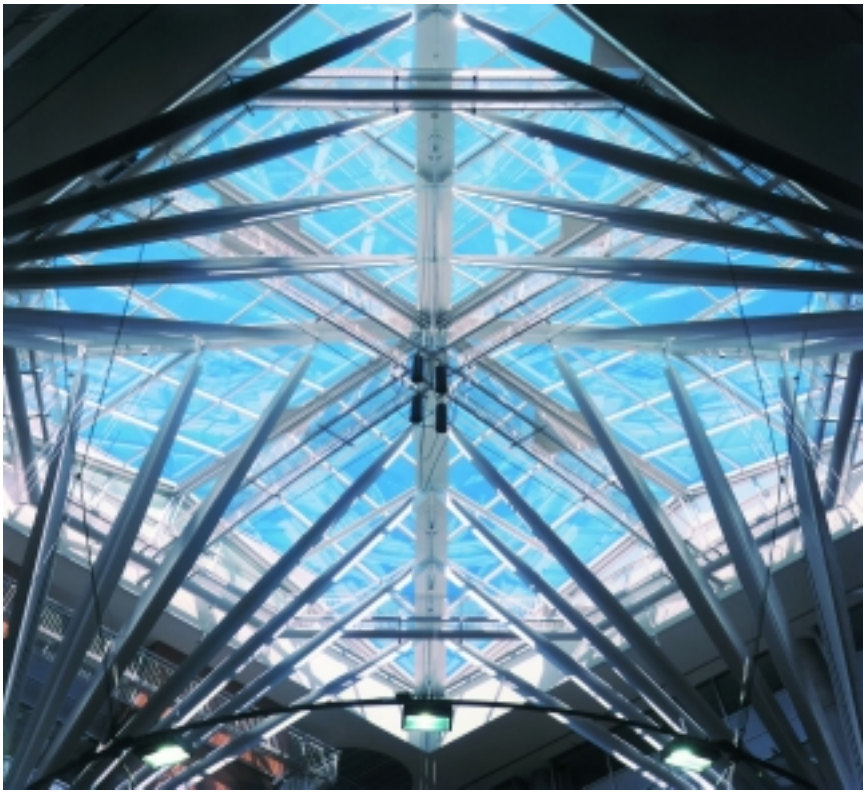
Support for the glazed skylight is provided by a complex geometrical architectural steel support system. The roof is supported at the exterior with wide flange and HSS framing. The interior framing consist of large to small fabricated tee sections which connect to a compression ring at the center point. The roof structure is supported on three sides by concrete pedestals at the fifth floor with two skewed angle disks and eight profiled fabricated tee sections at each location flaring up to the main valley support. The support on the fourth side consist of eight profile fabricated tee sections which intersect and cross at two fabricated steel disks and flare down and connect to a large HSS cross brace supported from an elevator shaft.

Yolles Partnership Inc. considered a number of alternates before deciding on a simple joist or truss scheme for a base line for costing. The simple truss scheme was developed into a series of variable width and depth hyperbolic paraboloid trusses to support smaller skylights. While texture in feel was limited to the thin layer at the roof and had limited presence when considered from the ground level below.

This second generation spawned a deep tension truss of rod and strut members reaching further down into the atrium space and an alternate that include a series of columns supported from the ground floor itself but developed into a tree and then the truss to support the roof. While providing a presence at the ground floor, the design team suggested that bulk of the columns resulting from the great unsupported lengths of the columns created too strong a planning and presence issue at the ground floor.

Since the selected design was developed from an analogy of a tree, and the need to reduce the unsupported lengths and design concept of making the structure interesting from the sides and levels of the atrium was a strong consideration. The corridors and rooms along the perimeter of the space created the opportunity for the residents and staff to view the atrium structure from another perspective.

Structural analysis of the roof structure and its supporting struts was



View looking up at the roof of the Winter Garden and Atrium. The tapering steel supports create dynamic patterns of light and shadow.

View of erected structural steel roof from a construction platform.

carried out by using ETABS software produced by Computers & Structures Inc. integrated with Autodesk AutoCAD drafting software by the use of a program developed by Yolles Partnership Inc. This software permitted the design team to satisfy itself in both the structural design characteristics of the structure and a three dimensional aesthetic of the proposed structures.

Due to the highly visible nature of the structure, the clarity of the details of the connections of the members and the support integration with the concrete structure supporting the building structure was a major effort of coordination between the design team and the steel fabricator. Adding to the difficulty of this coordination was a need to provide simplified details so that the structure could be erected in a safe rapid manner. Other facets such as the coating of the steel for the final appearance of the structure, coordination with lighting requirements and long term access to the roof space was integrated into the process of the connection design.

In the end, the 305 metric tonnes of structural steel complemented the efforts of the design team both in development of the roof structure and completion of the detail design; and the fabrication and erection successfully satisfies the architects' intent. But the ultimate test and proven success of the design goals comes from the people who enjoy the beauty of the cneter and it's winter garden day to day, rain or shine.

The Baycrest Center for Geriatric Care was the winner of the Canadian Steel Construction (Ontario) Award in the architectural category; the focus of the award was the exposed roof structure in the winter garden.

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Structural Engineers: Yolles Partnership

Architects: A. J. Diamond, Donald Schmitt and Company in association with Boigon Petroff Shepherd Architects Inc.

Software: ETABS; AutoCAD