VIRTUAL CONSERVATION: USING COMPUTER SIMULATION TO PROTECT OUR HERITAGE
by Robert Allsopp and John Danahy

Editor's Note: *Communities across Canada are facing development plans which include towers that threaten to overwhelm heritage buildings and districts. State-of-the-art computer visualization techniques, pioneered in Canada, were used to create height controls in Ottawa that strike a unique balance between allowing high-density downtown development and visually protecting Parliament Hill and other national symbols. That was a dozen years ago. Now, similar techniques are coming to laptops in your community.*

The view of Canada's Parliament Buildings is a national icon—for years it was the picture on our old one-dollar bills and it's often the backdrop on national television newscasts. That tall office towers have not visually overwhelmed Parliament Hill and other symbols of our national identity is no accident. Planning regulations have ensured that views of the copper-roofed and spired Nepean sandstone buildings remain as evocative as when the first neo-Gothic structures were erected on Barrack Hill in the 1860s.

Over time developers have challenged these regulations—in the 1960s one such challenge successfully forced a new approach to building height control in Ottawa's urban centre. Another challenge, in the 1990s, was rebuffed after the city of Ottawa and the National Capital Commission held open houses to inform the community about the impacts of a development proposal. Key in the public consultations was computer simulation that provided an accurate assessment of what the proposed building would look like in its city setting. These techniques became the principal working and communication tools in preparing a new set of height controls that now protect the visual integrity of our national symbols.

Height Controls for Protecting Views
Many cities in Canada and around the world have controls to visually protect their most important buildings or landmarks. Capital cities in particular have imposed building height limits in areas surrounding symbolic structures to ensure that they remain centre-stage in their cityscapes. In some capitals the controls involve a uniformly applied maximum height for all city buildings. Washington, D.C., for instance, has blanket height limits of 50 metres (160 feet) for buildings on Pennsylvania Avenue, 40 metres (130 feet) for buildings in surrounding commercial districts and 27 metres (90 feet) in residential areas (the building heights are measured from the ground up). These controls have acted as highly effective "height police" in the city's federal district—unlike any known Canadian example.

Ottawa had similar blanket height controls to ensure the pre-eminence of the Parliament Buildings. Introduced in 1910, they lasted for more than fifty years. At first, all buildings in the city were limited to 30 metres (100 feet). Later, downtown buildings were capped at 45 metres (150 feet). As long as development pressures and height limits were not in conflict, these limits were respected without the need for tough enforcement.

Ottawa in the 1960s
In the early 1960s Ottawa experienced a clash between expansionist economic development and heritage conservation. The broader debate about the relevance of the traditional city and the shape and form of the modern city evolved. Opposition to downtown building height controls intensified.
In 1966 a rezoning was successfully steered through the Ontario Municipal Board that resulted in a new free-standing, slab office tower known as Place de Ville. This decision resulted in the 45-metre height barrier being extended by a full 30 metres—rivalling the Peace Tower. This change would have seemed unimaginable a few years before.

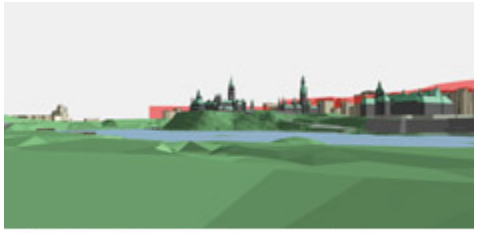
The enormous breach in the blanket controls led to a different strategy for limiting building heights. It was introduced in 1971 to "encourage large-scale investment of private capital in central Ottawa . . ." while at the same time ensuring that Parliament Hill would not be "jeopardized by the tide of urban development." Tailored to the specific site conditions and topography of central Ottawa, the new height control system involved a series of angular view planes designed to protect particular views of the Parliament Buildings. The variable height limits resulting from this innovative views protection approach generally exceeded the

previous 45-metre maximum. Ultimately, where the angular planes were capped, the limit was set at the height of the Peace Tower.

History Repeats in 1990
In 1990 downtown building heights were again in question. A proposed 40-storey office tower threatened to smash through the height ceiling, exceeding the Peace Tower by 30 metres. As a potentially precedent-setting development, it represented an overwhelming threat to the visual integrity of the capital's national symbols.

Developing New Height Controls Using Computer Simulation
A 1993 Ottawa Views study was commissioned by the city of Ottawa and the National Capital Commission to "investigate and recommend strategies that will ensure the protection and enhancement of the visual integrity and symbolic primacy of the Parliament Buildings and other national symbols….and [that] such mechanisms….shall include the development of objective, numeric and verifiable measurements which quantify the term 'visual integrity.'"

This study used computer visualization and simulation tools (prepared by du Toit Allsopp Hillier in collaboration with the Centre for Landscape Research at the University of Toronto) that provided the means to examine a far wider range of issues more comprehensively and with greater precision. The electronic tools allowed people to see the effect of different height control strategies from any number of different viewpoints.


The top of the red band represents the maximum height for all buildings seen behind the capital's national symbols.

The innovative computer program, developed by the Centre for Landscape Research, brought together real-time visual and development density factors. This combination of visual and economic simulations allowed the planning team to test the impact of hundreds of building heights from hundreds of different viewpoints to determine a balance between visually protecting the city's national symbols and increasing development density pressures.

The Ottawa Views study moved the question of sightlines off the two-dimensional drawing board into the simulated three- and four-dimensional world of computer-generated models. The new tools dramatically increased the ability to visualize (and accurately calculate) the impact of proposed new buildings on the city's skyline and to frame controls to keep their heights in check. People not skilled in reading paper plans and cross-sections could now participate by watching a simulated walk-about on the computer or in real time in the panoramic, three-screen projection facility—that takes into account peripheral vision—at the University of Toronto. For the first time, the twenty-year-old height control planes, which had previously existed only as two-dimensional planning diagrams, were represented three-dimensionally and checked against the moving eye experience of a pedestrian.
Instead of focusing solely on the Centre Block with its Peace Tower and Library of Parliament as the subject of views protection, the speed and flexibility of computer simulations allowed people to explore a more comprehensive view that included other national symbols. The East and West Blocks, the Supreme Court and other national institutions and their landscape settings on both sides of the Ottawa River—collectively referred to as the Central Capital Landscape—gained prominence.

The important sightlines were distilled into twenty-one key views showing clear silhouettes of our national symbols. Of the twenty-one, three were determined to be controlling views which then became the generating points for the angular height control planes that are extended over Ottawa's downtown, limiting any building from interfering with the silhouette. The foreground areas of the twenty-one key viewpoints are also protected.

The implications of a building heights policy could now be seen. It was possible, for instance, to virtually stand at one point and quickly assess whether a new tall building at another point would compromise the silhouetted profile of the spires of the Centre Block or the tower of the West Block.

More importantly, community groups, politicians, representatives of the development industry and others were able to see their ideas and suggestions tested in a three-dimensional real-time world. This proved to be essential in gaining the support of the development industry for new height controls during the final stages of the planning process.

The Ottawa Views process was initiated more than a dozen years ago and relied on expensive pioneering research equipment. Now, similar visualization techniques can run on a $1,000 laptop, making this software accessible to more city and town planning authorities who need to adopt it into their heritage planning process. Heritage interest groups can also acquire the software, allowing them to conduct their own simulations to debate their concerns and ideas with planners and developers on a more equal footing.

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