Though much unloved, concrete has changed the cities of the world, even made them possible. Sadly, architects have not always taken full advantage of its expressive properties, but Viljo Revell was different. The Finnish practitioner, chosen in 1958 through an international competition to design Toronto City Hall, fully understood the sculptural potential of this ancient medium. More than four decades after his masterpiece was completed, it still stands among the supreme examples of architectural concrete in the world.

True, people complain that Toronto City Hall lacks colour, but that’s more than adequately compensated for by the spectacular forms of the complex. The two curved towers, 27 and 20 storeys, embrace the ‘flying saucer’ that contains the council chamber. Revell’s concept, however abstract it may seem, expresses the civic ideal and the democratic spirit that lie at the heart of the modern city.

It was concrete that enabled Revell to achieve the organic, curvilinear qualities so essential to his vision. Though inspired by classical notions of civic architecture, his interest was not formal. Unlike, say, Ludwig Mies van der Rohe, who sought to mesh the rationality of classical models with 20th-century technology, Revell took a more humanist stance. The rigid geometry of the Miesians held little appeal for Revell; he opted for a kinder, gentler architecture ideally suited to the plasticity of concrete.

Thus, City Hall is defined by its flow, soft edges, curves and circularity; it is a complex where every element connects seamlessly with the next. The ribbed tower walls, for example, are informed by Revell’s concerns for shape and texture. They feel more gestural than structural, more handmade than constructed. There is a fluidity here rarely found in architecture, especially in a building such as City Hall, which must bear the weight of municipal symbolism. In this case, it’s concrete that made such expressiveness possible.

Best of all, Revell does not seem to have approached concrete as a substitute for some other material. One doesn’t look at City Hall and wish it were clad in marble or limestone – that wouldn’t be appropriate. His building makes a virtue of the specific characteristics of concrete, its ability to take any shape, its almost liquid quality. Unlike some Brutalist building, with its fixation on surface and texture, Revell’s structure concentrates on forms and shapes.

Interesting, too, that even the now-legendary City Hall competition also helped set the stage for the acceptance of concrete as a material for use in a civic icon. Among the architects the contest drew to Toronto was John Andrews, whose submission was one of seven chosen from 510 entries sent from 42 countries. Though he eventually lost to Revell, Andrews went on to design several local landmarks, including the CN Tower and Scarborough College, both remarkable examples of sculptural concrete.

It is a testament to Revell’s genius and the power of concrete that City Hall ranks among the most beloved buildings in Toronto.
Fig. 3. Viljo Revell’s winning competition model superimposed onto site.
Fig. 4. The ‘Ward,’ site of New City Hall before clearance

Fig. 5. Site cleared, in use as parking prior to construction of New City Hall

Fig. 6. Photo montage of Revell’s winning design
Fig. 7. New City Hall, giving Toronto an icon and vaulting it into the modern era.
Figs. 8, 11. Nathan Phillips Square, Toronto’s first large public space, with Henry Moore’s Archer

Fig. 9, 10. Sculptural towers of the east and west office blocks are clad in precast concrete panels with marble inserts.
Design in Concrete and Architectonic Form in Viljo Revell’s Toronto City Hall

Ronald Mar
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As pure, mannered sculptural form, Viljo Revell’s City Hall, with its iconic boomerang-shaped towers poised above the largest public square in the metropolis, has, since its inception, occupied a place in the collective imagination of the City of Toronto. With a futuristic architectural concept translated largely intact from the original 1958 competition-winning scheme to the built project that officially opened in September 1965, the project embodied the post-World War II spirit of optimism, looking forward to the new modern era in the second half of the century.

While the architectural form and design image of City Hall is the subject of other articles in this publication, Revell’s project was also firmly rooted in the spirit of technological and structural innovation, especially in terms of design in concrete. The formal expression of concrete was most apparent in the fluid structural shapes of the civic square and podium elements, but also in the overall building language of the two office towers’ concrete-shelled arcs and the spaceship form of the Council Chamber.

The structure is essentially a composition of three components—the towers, the Council Chamber core and the podium/base with civic plaza – with each component placing a great emphasis on concrete as a visible structural system that:

• creates an enclosing shell, keeping the elements at bay (commodity)
• resolves the forces of gravity and wind (firmness)
• forms a series of exterior and interior spaces for public and private interaction in activities that range from the mundane payment of one’s city reality tax bill to the esoteric pleasure of ice-skating outdoors (delight)

Structural Design: Towers
Each of the two office towers (20 and 27 floors) was conceived as a sliver-like convex curved vertical shell with a hard blank outer skin that opened up to reveal a glazed transparent inner skin.

The plan form of each tower is similar but different in size (with long arc dimensions of approximately 255 feet and 325 feet), being more boomerang in form than pure arc as they bulged out at the midpoint to house vertical circulation cores. The constructed structural design of these vertical shells was based on a massive 18-inch-thick reinforced concrete bearing wall along the outer convex line, commonly referred to as the ‘back wall,’ and a single interior line of column elements. The back-wall element is pinned from ground to roof at the midpoint of the arc by the elevator-services core and at the ends of the arc by stair and washroom/service cores. Along the centre of each typical tower floor, the line of 24-inch-by-78-inch columns acts as a buttress element, carrying radial reinforced concrete beams, which in turn support the cantilevered one-way reinforced concrete slabs that form the rigid horizontal diaphragms bracing the vertical shell at each floor. The 24-inch-wide concrete beams span from the back wall, over the columns, cantilevering nearly 16 feet beyond the interior face of the columns to the glass curtain wall that forms the convex inner facade of the towers. These massive beams create concrete ‘prop’ elements when combined with the pier-like columns. The beams start at a 3.6-inch depth from back wall to column and taper to a nine-inch depth at the end of the cantilever.

By virtue of the cantilevered floor slab design, the inner face of the envelope was then open and transparent, freed of obvious structural elements, with continuous glazing giving generous light and views from the adjacent open-office floor space. On the outer convex face, the structural capacity of the back wall was manifest in the carapace-like windowless cladding consisting of precast concrete ribbed panels, beautifully faced in strips of Botticino marble.

The heights of 20 and 27 floors (260.5 feet and 326.5 feet), and the unusual plan shape and different size floor plans for each office tower, made mathematical predictions of the wind loads on the structures an onerous task. Instead, scale models (1 inch = 23 feet) were constructed out of solid mahogany, and wind-tunnel tests were conducted at the University of Toronto’s Institute of Aerophysics. The structural design was tested for wind speeds varying from 110 mph at the top to 60 mph at the bottom. The original competition and early design development scheme had intended for the two towers’ structural systems to resolve independently to the foundation, but the wind-tunnel
Fig. 12. New City Hall office towers
testing confirmed excessive horizontal deflection at the top of the towers, which were then modified to be connected at the podium roof or third-floor slab level, thereby reducing the effective unsupported length of each vertical shell.2

**Structural Design: Council Chamber**

The Council Chamber was where the elected civic governing council would officially sit in a central circular assembly space surrounded by a semicircular public viewing gallery. According to the competition brief, it was meant to be the ‘centre of interest, easy of access by the public and easily seen from the public areas.’3

The formal image is of an inverted cone with a domed roof, a precious object atop the two-storey podium, cupped between the protective hands of the two office towers. The Council Chamber then formed a stylized bolt element, which holds everything together as the central focal point of the building composition.4

**Competition Winner to Built Form**

Revell’s competition-winning scheme in 1958 was an exciting, dynamic design, as yet untested by economic constraints and structural realities. The inevitable change wrought upon the original scheme in developing the design for construction was surprisingly minor in terms of the formal elements of the City Hall. The primary visible formal differences between the competition design and built project are in the structural design for the tower, details of the tower plan outline and the structural concept for the Council Chamber volume.

The tower plans from the competition showed a dynamic parabolic arc shape, with narrow blade-like projections at the arc ends formed by the interior shell slipping past the exterior shell at the stairs. The structural concept of the massive back wall in the exterior arc was carried by a series of diminishing structural cells along the exterior, with a simple internal row of point columns. The built project’s tower plans reveal how the wind-testing brought about changes to the structural design not just of each typical floor, with the back-wall/cantilever-beam/prop-column concept, but at the podium level, where the two towers were jointly stabilized. The knife-edge form of the competition scheme’s towers, with its slightly disengaged exterior and interior shells, gave way to a more rounded finish to each tower arc, with an enclosing wrap of the precast exterior shell at the exit stairs.

Revell’s original design for the Council Chamber did not have the concept of a main structural cylinder column. The Council Chamber was rather a true saucer shape in section that seemed to hover on more of a framework of struts; the main Council Chamber form, an inverted cone with sides inclined at 30 degrees from horizontal and braced with two pre-stressed ring beams at the top and midpoint of the cone; and the cylindrical reinforced concrete shaft supporting the dome and cone (20 feet in diameter and 27 inches thick), carrying the loads down through the podium to the foundation set on local shale some 74 feet below the base of the cone.5

The structural design of the Council Chamber comprised three parts: the roof is a reinforced concrete dome constrained by a pre-stressed ring beam and supported by a web of inclined V-shaped precast concrete beams; the main Council Chamber form, an inverted cone with sides inclined at 30 degrees from horizontal and braced with two pre-stressed ring beams at the top and midpoint of the cone; and the cylindrical reinforced concrete shaft supporting the dome and cone (20 feet in diameter and 27 inches thick), carrying the loads down through the podium to the foundation set on local shale some 74 feet below the base of the cone.5

**TECHNICS**

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support than the massive singular element that evolved in the built project as a result of structural design testing.7

Summary
While the structural design and architectural use of concrete in the City Hall’s sculptural office towers is undoubtedly less expressive and visible in the resultant built forms, the project remains 40 years later perhaps the city’s most notable example of concrete in architecture, from the exposed structural systems to the rich precast tower cladding. At the core of the project is the concrete design in the Council Chamber element, which can hardly be more obvious and celebratory. From outside in the civic square, within the podium entry lobby space and inside the Council Chamber interior itself, the formal volumes and heroic yet simple structural design is on display.

With a fluid formalism, Viljo Revell’s competition scheme evolved with the help of John B. Parkin Associates into a built project that stands, decades later, as an expressive symbol of a city moving into the postwar modern era. A brave international design competition resulted in a timeless building, linked in spirit to works by Saarinen, Niemeyer and Le Corbusier, representing a new formal architecture that was expressed in concrete.

References

Fig. 13. New City Hall original Council Chamber
Fig. 14
Fig. 15. New City Hall original site plan
Toronto’s New City Hall is fortunate to retain a small collection of its original office furniture, providing an interesting glimpse into contemporary Canadian furniture design and Toronto’s exploration of modernism in the 1960s.

After citizens voted down a proposed City Hall building in classical style in the 1950s, Finnish architect Viljo Revell’s design was selected following the 1958 international City Hall competition. The cultural implications of this selection were significant, resulting in Toronto’s first modern concrete civic building (the seat of government, no less) prominently located in downtown’s Victorian context.

Revell subsequently proposed to design office furniture for the new building and called City Council’s decision to award the furniture contract by a second international competition (held in 1965) the biggest disappointment of his life. As Revell passed away before the final results of the competition, judges felt an added responsibility to award the contract to Knoll International, stating, ‘More than any other competitor, this firm’s designers seemed to have caught the spirit of the building and maintained it consistently in major as well as minor areas ... In addition, it was the opinion of the Committee that the Knoll International submission was one that would not have been displeasing to Viljo Revell himself.’

The late 1950s to ‘60s were a time of design innovation in the Canadian office-furniture sector, with the Robin Bush Prismasteel design and Jacques Guillon’s Alumna office desk – with patented slotted-leg extrusion – appearing in 1958 and 1961 respectively. During this time, European furniture masters like Klaus Nienkamper and Leif Jacobsen arrived and set up shop in Toronto, later to expand or be consolidated into larger companies (Jacobsen’s company was purchased by Teknion). The award of the City Hall commission to American-based Knoll, who collaborated with local Leif Jacobsen, had an effect on Toronto’s furniture-design scene similar to the effect the award of Massey College to Ron Thom’s office had on the history of the city’s architectural production.

While the Knoll competition entry was not alone in pursuing a contemporary design, it was unique in its use of concrete and its direct response to the building. Like its host, the furniture, ranging from clerks’ to Council Chamber accommodations, capitalizes on the colour, texture and sculptural possibilities of its materials. Desks and benches feature massive, precast concrete bases, oiled white oak casings with Arborite top surfaces. Furniture for the east tower, which caught the afternoon sun through its west-facing windows, was upholstered in cool shades of blue and green. The west tower’s upholstery was in warm shades of yellow, gold and orange.

Scandal immediately erupted over the new furniture. For reasons that remain unexplained today, the selection committee voted on the entries without opening the envelopes containing cost information until after the winner had been announced. Knoll’s bid was found to be over budget, and other competitors complained it was unfair to award the contract to a company that had not followed the requirements of the competition. Several months of wrangling between the selection committee, the Board of Control and City Council followed over what one newspaper called questions of ‘ethics and aesthetics.’

City Hall’s Concrete Furniture

Marsha Kelmans
Urban designer, City of Toronto Planning, Urban Design Section
Fig. 16. New City Hall, east tower, floor plan with furniture arrangement.
When the dust settled, Knoll had reduced the cost of its bid and was allowed to fulfill the contract. Mayor Philip Givens, who supported the Knoll entry, stated, ‘Design is the guts of the situation. Otherwise we could have ordered from a catalogue.’

The furniture’s building and completion were considered newsworthy, and once installed, the furniture’s use continued to be controversial. Newspaper headlines included ‘Drawerless Desk Fine with Him,’ ‘Furniture Row’s on Again’ (referring to the coincidence of desk transparency with new, shorter hemlines – ‘vanity panels’ were later installed), ‘Wobbly Desks at City Hall Spark New Furniture Controversy’ (stenographers complained that desks moved as a result of typing despite their enormously heavy concrete bases), ‘Furniture Fine in Pictures But … ’ and finally, ‘Bell Quits after Row over Desks.’ Given Toronto’s optimistic response to the design of New City Hall, it seems strange that such controversy could follow its office furniture. Perhaps the equally modern furniture design, with its mimetic use of concrete, served as an outlet for the undercurrent of anxiety about the insertion of a new form of expression into the city’s fabric (construction of New City Hall was completed in 1965, the same year as the furniture competition).

Since the 1960s, a large portion of the collection was lost through renovations, as the weight and character of the furniture was not popular in later decades. Recognizing its value, Marc Barnes, a former Director of Urban Design in the City Planning Division, began to collect the original furniture in the late 1980s. Today, the City Planning and Urban Design offices at City Hall continue to be a repository for the remaining original furniture, housing its largest collection, which includes chairs, desks, tables, bookshelves, credenzas and coffee tables. It remains in daily use and continues to be at risk of replacement. Original furniture (circular lounge chairs and coffee tables) can also be found in the Council Chamber members’ lounge.

Still in use over forty years later, City Hall’s tiny extant collection of original office furniture continues to be sturdy and beautiful, although in need of some restoration and not terribly convenient for movers. The 1960s controversy over its procurement, design and early use attests to the long-standing willingness of Torontonians to debate passionately the design of our city and to City Hall’s as a banner for design innovation. It is reminiscent of recent public debate over buildings whose architectural expression is unhabitual for Toronto, offering insight for the present and future. The loss of most of the original collection is a timely reminder that the fabric of our public realm, be it furniture or architecture, cannot be evaluated merely on the criteria of ‘new’ or ‘old,’ nor can we afford to privilege the iconic over the mundane.

The original version of this text, by Manda Vranic and Marsha Kelmans, appeared as part of the 40th anniversary celebration of New City Hall.
Figs. 17, 18. "It may be argued," read Knoll International’s Competition Entry Statement, "that the new City Hall has been the product of European regionalism combined with North American technology and is, by reason of its successful physical fact, a "Canadian Design."

Winning competition drawings by Clifford and Laurie Architects, Knoll International Canada
Fig. 19. Mayor’s Office, 1965. The original mayor’s desk weighed 800 pounds and took four people to move.