3 CIVIC PLAZA

Surrey | BC | Canada

3 Civic Plaza is an iconic 53-storey building comprising a mixed-use office and residential tower attached to a 20-storey hotel. Despite the entire structure consisting of concrete, a fresh look was achieved by dispensing and replacing the traditional concrete core with a shear wall ‘spine’ in the long direction of the buildings, and ‘bookend’ shear walls in the short direction. The striking design is another step towards turning Central City Surrey into a vibrant gathering space.

Photo Credit: Ed White Photographics

INNOVATION

The iconic 3 Civic Plaza is a building comprising a 53-storey mixed-use office and residential tower attached to a 20-storey hotel situated over a 5-level underground parkade. The entire structure consists of concrete; however, the traditional concrete core was dispensed with and replaced with a shear wall 'spine' in the long direction of the buildings and 'bookend' shear walls in the short direction. This approach efficiently helped buttress the taller building with the shorter one, while also providing the architect with increased design flexibility to layout the residential and office spaces.

Fast + Epp's structural solution opened the gate for an iconic aesthetic expression through guitar pick-shaped window openings in the bookend shear walls – metaphorically referencing the developer's architectural vision for bubbles rising in a champagne bottle. Not only did the multitude of openings work in the shear walls, but also in the 'swiss cheese' like floor diaphragm which required extensive detailed analysis in order to achieve a satisfactory degree of both seismic and wind resistance.

Wind tunnel testing was carried out to more accurately determine wind action on the building and ensure that occupant comfort under building acceleration was not compromised. This is also the first time Fast + Epp has ever invited the reinforcing steel subtrade into their office to discuss rebar detailing during the design phase of a project. This was required to solve the complex rebar detailing requirements around the unusually shaped shear wall openings. A mock-up of the window openings was constructed to also test the concrete mix and flow around the openings.

Furthermore, pouring high strength/high flow concrete in the 1,400mm thick shear walls, particularly during the hot summer season, risked early age thermal cracking. The unusual step of installing temperature sensors in the shear walls was made to ensure that premature stripping of the formwork under these conditions would not unduly affect the quality of the exposed concrete shear walls. Large storey high transfer beams with guitar pick openings were also required in the fitness area above the long span hotel ballroom and required detailed analysis and posttensioning to make them work.

3 Civic Plaza is also the largest building in North America to date to incorporate thermal isolators at all exterior balconies – a German technology that Fast + Epp has helped introduce to the North American market on various projects.

Photo Credit: Fast + Epp

COMPLEXITY

Although the fundamental concept is simple, this project is much more complex than a standard developer high-rise building owing to its myriad of openings and unconventional lateral design approach.

Building right up against the Skytrain guideway with the strict intolerance for any guideway column movements resulted in considerable grief convincing the transit authority that what the team had planned would not cause problems. It was also a tricky challenge designing a canopy protection cover over the portion of guideway immediately adjacent to the building. Fast + Epp was only afforded a single row of columns between the guideway tracks and developed a torsionally stiff steel box girder spine with cantilevered steel purlins and wood decking to address the site constraint. The solution not only works but is also an elegant appurtenance to the base of the tall building.

The introduction of thermal isolators at balconies on such a large scale is new to Canada; however, with increasing emphasis on sustainable design, this will soon become par for the course.

The project overall required extensive patience as its unusual assembly of hotel, office, and residential spaces resulted in many design changes along the way. All the aforementioned work was also completed in-house, with the exception of the independent concept review which (in view of this being Fast + Epp's first tall building) was performed by the prominent high-rise engineering firm in Seattle, Magnusson Klemencic Associates.

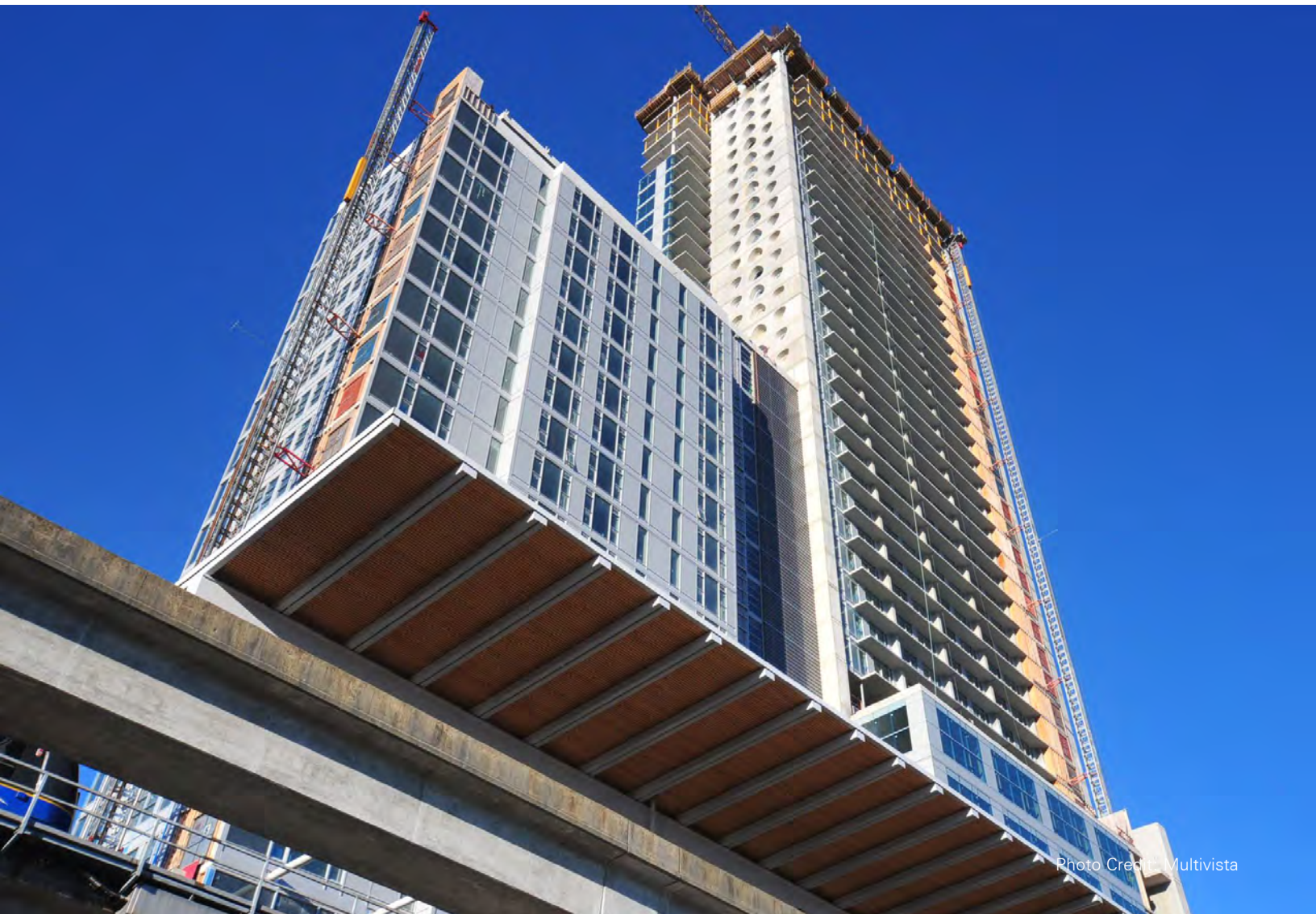


Photo Credit: Multivista

SOCIAL + ECONOMIC BENEFITS

The striking iconic design is another step towards turning central Surrey into a vibrant gathering space. With its uniquely shaped window openings 'bubbling' up the building, it is a beacon on the Central City skyline. All units have been sold, and Kwantlen Polytechnic University has established itself in all five office floors of the tower. Residents can peer through the guitar pick-shaped window wells for spectacular views of the surrounding landscape. The boutique hotel operates under the Marriott Autograph Collection label, most certainly at least in part a tribute to its iconic design. And the tower appropriately complements the striking designs of the new Surrey City Hall and the Central Library around the city's newest plaza.

Fast + Epp has also made positive contributions to the AEC industry by exploring and sharing the unique approaches utilized in this project. A paper outlining the installation of temperature sensors in shear walls was written and presented at the CONCRACK International Conference in Japan, while a paper outlining the wind tunnel testing approach was published in the Structural Engineering International journal.

Furthermore, 3 Civic Plaza certainly demonstrates how engineers can have a major influence on the architectural design and artistry of a building, as well as solidifies the City of Surrey's status as a pioneer of dynamic architecture that is driven by the needs of the end user.

ENVIRONMENTAL BENEFITS

While it would have been great if Fast + Epp's proposal for a novel hybrid timber-concrete tower had been accepted, this project has, in part, served as a steppingstone for another tall tower project that will feature hybrid timber-steel construction. However, the thermal isolators at the balconies do promote a sustainable approach.

Photo Credit: Multivista

MEETING THE CLIENT'S NEEDS

Through Fast + Epp's "fresh thinking" and collaborative approach, the design team exceeded the client's budget expectations. The contractor stated that the cost of structural work was 3-5% less than a traditional core design approach.

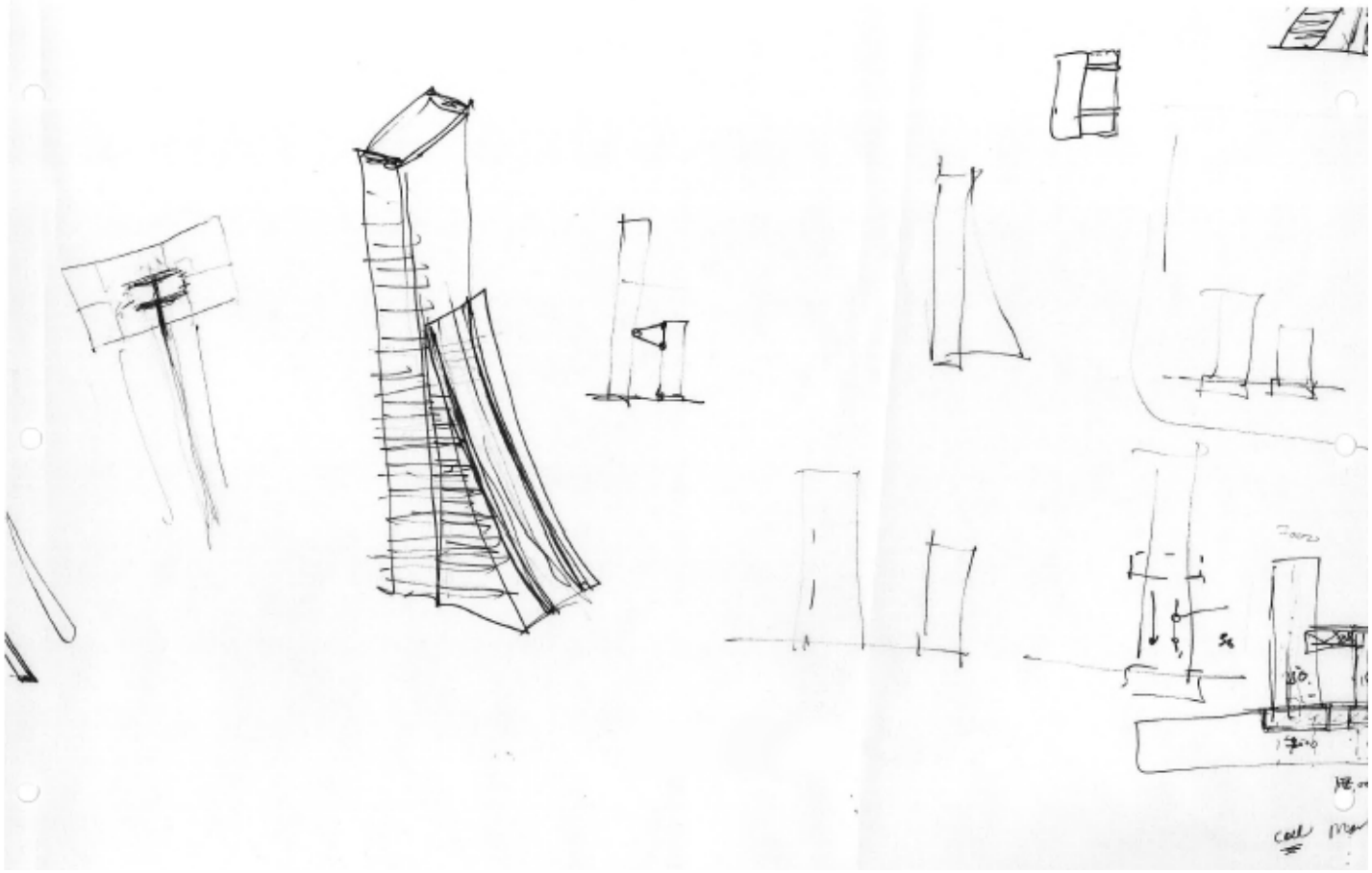
Additionally, the project goals included:

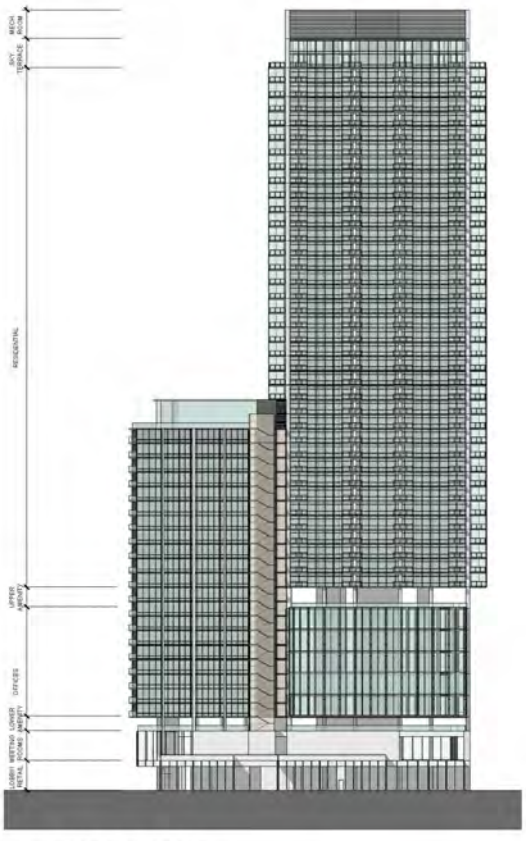
- taking a fresh look at high rise design while aiming for construction efficiency and iconic aesthetic expression
- providing the developer and architect with design flexibility to layout functional office and residential spaces
- complementing existing architecture to redefine the Central City Surrey area.

The City of Surrey has been working to redefine its downtown core as a destination for culture and commerce. The design team intentionally deviated from the traditional "tower with a concrete core", the norm for high-rise construction. Instead, the building features an external concrete shear wall structure, which proved a more economical than a traditional concrete core method and increased the design freedom for interior layouts. This unconventional approach also allowed for dramatic architectural expression on the building's exterior, as evidenced by the perforated, organically shaped "guitar pick" window openings.

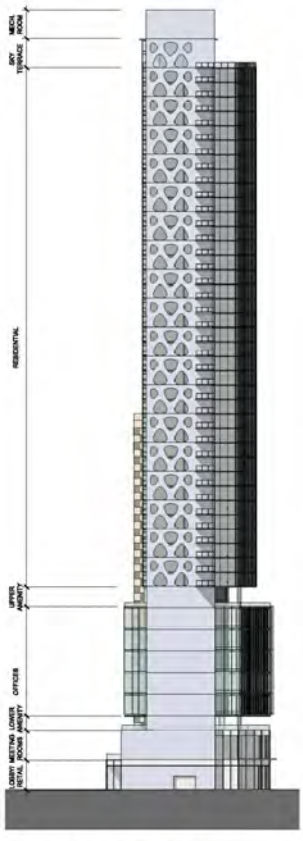
The final result is a building that was just as economical to construct as a traditional core building, enjoys efficient functional layouts, and has striking aesthetic appeal.

Photo Credit: Fast + Epp





1 EAST ELEVATION
1/32"=1'-0"



2 NORTH ELEVATION
1/32"=1'-0"