



# 400 UNIVERSITY



## INNOVATIVE

## COLLABORATIVE

## SOLUTIONS

C3 Specialty Glazing Solutions would like to thank Crown Property Management Inc. for the opportunity to be part of the team selected to implement the curtain wall retrofit at 400 University Avenue. The project team has worked to design an innovative, fully custom system, to achieve substantial energy savings and an updated aesthetic for both the interior & exterior. The new system is being installed while the existing remains in place, thereby significantly reducing disruption to tenants.

## RE-DEFINING PROJECT DELIVERY

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SPECIALTY GLAZING SOLUTIONS



**400 University Avenue**, Toronto, a twenty-five storey tower, was constructed in 1969. It houses over 380,000 square feet of total office area. Despite a prime, downtown location, the appearance and performance of the building's façade were limiting its desirability to tenants. The original façade had many limitations. Single glazing had been utilized throughout the tower, and poor detailing in the spandrel areas and the 2nd floor soffits had resulted in significant air movement and water infiltration. While attempts had been made to repair the facade, their success was limited by inherent design flaws in the façade.

The façade retrofit at 400 University had three primary objectives:

1. Solve the ongoing issues with air and water leakage.
2. Significantly reduce the energy demand.
3. Modernize the appearance of the building from both the exterior and interior.

The project also had a number of challenging constraints:

1. Building must remain occupied throughout construction.
2. Minimize disruption to tenants.
3. Complete the project within a fixed budget.

At the early stages, three alternatives were considered.

1. Retrofit of existing system.
2. Remove existing system. Install new curtain wall.
3. Install a curtain wall over existing system.

Based on a review of the aforementioned options, option 3 was selected for implementation. Crown partnered with C3 Specialty Glazing Solutions (C3 SGS) to complete the engineering design, fabrication, and installation of the new system. C3 SGS completed a detailed engineering review of the building and conceptual sketches of the new system.

Using an iterative design process, the team developed a technically superior, cost effective solution with the following characteristics:

1. **Fully Custom Curtain Wall:** All components of the system have been designed to work within the constraints of the building at 400 University. Sixteen custom aluminum and rubber extrusions are incorporated in the system. The original system is used for the structural connection only.
2. **Technically Superior Solution:** The new curtain wall contains properly designed air seals, expansion joints, and insulation. This significantly improves the performance of the system relative to the original concept, as the concept relied on repairing and relying on the existing air seal in the spandrel areas.
3. **No Interior Disruption:** The new curtain wall has been designed so that it can be completely installed from the exterior, prior to removal of the old vision glass. Frames, insulation, vision and spandrel glass, and pressure plates and caps are fully installed prior to removal of the old vision glass. As all of the new air seals are complete prior to any removals, the interior is never exposed to the exterior elements during construction. The interior work is limited to removal of the old glass and cladding of the frames. This is easily scheduled outside of regular business hours, minimizing disruption to the tenants.
4. **Architectural Flexibility:** Because the system is fully custom, the team at Quadrangle had significant flexibility to achieve their architectural vision. The team constructed mockup panels that

were used to review various design alternatives. A full scale mockup was also installed on the building to provide an opportunity for the team to review both the architectural and technical details prior to full production.

5. **Interior Upgrade:** Although the old frames remain in place, and the only component of the existing system removed is the vision glass, it is not possible for anyone on either the interior or exterior to tell that it is not a completely new system. The custom cladding designed for the interior fully covers the old frames.

6. **Capital Budget Savings:** Crown and C3 SGS worked together to identify areas where budgetary savings could be achieved without compromising any of the project goals.

7. **Rapid Installation:** The design of the new system allows a large portion of the work to be completed off site. This improves quality, as important seals are completed in a controlled environment, and reduces the amount of time required on site, as there is no detailing work required on the existing system.

The following benefits resulted from the retrofit:

**Energy Savings:** Annual Energy savings of approximately 200,000 kWh are projected by Crown's energy consultants, Doherty Engineering Limited. Building operations have already begun making adjustments to the HVAC systems to respond to the improved thermal performance of the system that has resulted from the installation of the new system on less than 25% of the building.

**Building Repositioning:** The aesthetic upgrades are being leveraged to attract and retain tenants. Crown has successfully leased 24,000 square feet to new tenants that relocated from Class A buildings.

**Improved Tenant Comfort:** The new curtain wall system is making it easier for building operators to regulate the interior environment. On a cold day, the interior of the new vision glass is approximately 10 degrees Celsius warmer than the old glass.

The project team used a collaborative approach throughout the design phase of the project. Knowing that there was a fixed project budget, C3 SGS proposed engineering alternatives to provide cost savings. Crown was provided with a synopsis of the various alternatives that provided them the information they required to make informed, long term decisions.

Tenants at 400 University have been kept up-to-date on the status of the project through project displays in the lobby, a tenant orientation session, and regular updates. Further, a significant design parameter used by the project team was the minimization of disruption to tenants. No tenants are required to vacate their space during the construction activities.

The engineering, fabrication, and installation teams at C3 SGS meet regularly to review the progress and to exchange information and ideas on the best practices. Team leaders are provided with the responsibility to bring forth ideas on design or process changes to improve the installation of the new system. They have the autonomy to suggest changes to the project engineer for review and approval.

### Interested in learning more?

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