

**PROJECT CREDITS**Client:
East Coast (Cecil) Investment Pte Ltd

Main Contractor:

Lai Yew Seng Pte Ltd

Landscape Contractor:

Consis Engineering Pte Ltd

Photos:

Ben Kan, Fara Zakaria, Rayne Ang

CECIL STREET MAKEOVER

AgFd came up with a 'layered-glass' design that provided a naturally ventilated façade dotted with a lively hanging garden

158 Cecil Street is a 14-storey premium grade office tower located along the Cecil Street within the Singapore Central Business District. Revolving around a green concept, the façade treatment of the building atrium is contemporary, thanks to the rework done on the existing building by the famous Singapore-based architects AgFacadesign (AgFd).

Location

The location is well regarded as central, convenient and popular among secondary financial institutions as well as professional firms in the industry.

Amendment and Alterations (A&A)

The original building of 158 Cecil Street was built in 1984 and it was a ten storeys structure then, designed to be environmentally responsive.

Architects from AgFd were given the task of redoing the structure by the building owner who also wanted the façade to be replaced. AgFd came up with a 'Layered-glass' design that provided a naturally ventilated façade to the eight storeys high- partially enclosed 'atrium'.

With floors re-seeding inwards approximately 1.5 m at each floor, shading was naturally provided. External RC Planters spanning across 24 m width on levels 4 to 9 provided further shading to the building façade.

The latest A&A has maximised the allowable Gross Floor Areas (GFA) with additional 37,000 sq feet of floor spaces. These new floors on Levels 11 to 14 are supported by a 1.5-storey high transfer-floor structure spanning over 40 m across the building's floor plate. A new façade (on Cecil Street) was created within the boundary line forming a recessed but external 'atrium' juxtaposed neatly with the existing re-seeding floor plates.

The Façade

The primary objective of the design was to maintain 'atrium' as an 'external space' without the need for any fire fighting provisions like; sprinklers, smoke detectors or fans etc. To meet that requirement, the façade must allow sufficient ventilation and provide natural smoke disbursements in the event of fire. The existing 'mesh façade' can achieve these, but to do this with glass (ie non-porous) was the 'wrong' choice of material from the fire department's perspective.

With this limitation, the architect provided a creative design with alternating glass panels having wide gaps separating them. Smoke control studies by fire specialist IGnesis Consultants demonstrated that such layout would provide the required free area in the event of fire.



Architecture Planning:

Within the Atrium confined space, the aim was not to add elements that would cluster up and make the space appear smaller. All existing elements that were hard and uninviting were transformed into soft and attractive features such as:

- Uneven end-wall converted to seven storey feature Green-wall
- Obtrusive columns to pleasing green-columns
- RC planters reinstated to create Hanging-gardens
- RC fly-beam converted to walkway planters for maintenance to reinforce hanging-garden concept.
- Inclined green-wall (facing external elevation) introduced (replacing RC protruding wall) to conceal visible M&E services from street level

Space Planning Design

Juxtaposing a series of existing elements provides spatial connectivity to the seven storey atrium:

- Walkway planters extending out towards façade (on existing RC fly-beams) as sky-walk on alternate levels.
- Existing platforms extended with end-planter added for maintenance access - provides perspective views across atrium
- Glass floor on L3 terrace creating a visual connectivity to pavement and street level below

Designing the Layered Façade

The façade concept was conceived based on the need to provide open voids to achieve natural ventilation and for smoke discharge.

With strong knowledge in glass technology and façade design, the architects created a unique facade system where two glass panels are simply clipped onto a centre mullion. Like a pair of transparent wings each module is placed in in/out arrangement alternating each module to provide the 900 mm void between them.

Following elements form the Layered-Façade assembly:

- 150x150mm steel mullion fixed to edge of RC beams or welded onto RHS beams
- 16.52 laminated clear glass full height panels with steel angles edge protection to exposed edges,
- Structural sealant used where glass panels are concealed within the recessed space of mullion with s/steel channel bolted onto the steel I-mullion
- Dead load support is provided at the base of glass via a cantilever bracket with s/steel clamps and dead load ledge within steel mullion
- Live load is achieved from the s/steel clamp plates at top and bottom edges of glass panels.
- Movements in X, Y and Z directions have been designed into the system to ease installation.

With reflections the layered-façade appears as a semi-transparent/translucent screen but by night with lighting, its total transparency transforms the 7-storey atrium into a glowing lantern of hanging garden adorns with greenery in space.

Construction Methods and Planning

Working on a tight 4-month construction programme the following were adopted to meet project requirements;

- Demolition of 7-storey RC wall - power saw cut was used to minimise noise and dust as the building was tenanted within built-up downtown area.
- Pre-fabrication works used for steel members with minimal site welding for speed, QC and site constraint.
- Finishes to steel were sand blasted & pre-finished with epoxy paint to reduce site painting.
- Facade glasses were pre-assembled in factory for better QC control, delivered in batches and sequenced for immediate installation
- Glass facade brackets and framings were re-developed based on Architect's concept and pre-fabricated



Before renovation



Vertical Greening after renovation

Layered-façade was created where voids between staggered full height glass sheets (clipped onto sides of steel mullions) like 'transparent wings' provided the 'free area' needed. The gaps are left permanently open allowing air and light to penetrate deep into the atrium.

Atrium Space

Enclosed by the mesh-façade, the atrium, before the redo work is done, was looking like a 'cell' providing an unpleasant view. The architect's main task was to transform it into a lively and stimulating space. A 'hanging garden' concept was instantly thought of. The architects felt that the entire atrium space would be much more lively when incorporated with 'visually interactive' elements into the design by transforming all existing elements within the atrium and strategically adding new features with hanging garden taking the centre stage. A lively environment was created, which enabled refreshing views from every floor overlooking the atrium.

Existing RC Planters were re-instated with money-plant draping over the edges with plants drooping from newly created walkway-planters along either sides of existing RC fly-beams. Vertical greening to existing end-walls and columns in the form of green-walls and green-columns, respectively have been integrated into the design.

Reinforcing the concept of vertical greening, the green-columns planting were extended down into pavement walkway at level two with plants appearing to be penetrating through glass floor panels strategically placed on level 3.

Thus from 2nd storey to 9th storey on either sides of the building, and also the back of each existing structural

columns, are covered with green walls, transformed to become a vertical garden - a festoon of potted plants. The green walls combine landscape elements with building technology to create walls of strikingly bold architectural landscape, both during the day and night.

Integrating Hanging Gardens with Façade design

With no horizontal landscape area within the building but for the existing half-round planters stretching across within the eight storeys high atrium space, the architect conceived the idea of a hanging garden within the existing architectural void with the design of an open-glass façade.

The challenge was how to allow for the natural elements essential for plants' survival. The layered-façade was developed where open spaces are provided between the glass panels. These 900 mm wide glass-panels are clipped onto sides of the central mullion and also spaced 900 mm apart enabling ventilation and drizzles through. The same modules are extended to adjacent bays and every floor over the entire atrium facade.

Two green-walls from L3-L10 are located at ends of the atrium with two intermediate green-columns from L2-L10. Mounted on metal frames, a total of 13,000 pots of plants form the vertical greenery. Fed from water tanks at high level, auto-irrigation and drip-tubes to every pot is provided. Access for maintenance is provided via concealed platforms and ladder behind.

For the horizontal hanging gardens, plants along existing RC Planters and the new maintenance walkways (built over the RC flying-beams), access to all plants are

either through recessed walkways and hinged-grating covers, respectively.

The atrium space facing east, have limited sunlight. Artificial lighting was added to supplement and provide the growth lights strategically mounted to achieve optimum lighting to all plants. By night, architectural-accent lights are provided to transform the reflective glass (by day) into a glowing lantern of hanging-garden clearly visible through the layered-façade glass.

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KELVIN KAN

AgFacadesign, Principal

Kelvin is a Chartered Architect in the UK and Singapore with an MSc in Construction Management from Kingston University. With an architectural background, Kelvin ventured into structural glass design and the curtain wall industries successfully designed and completed various glass/facades projects around the region.

With a unique hybrid expertise in Architecture, glass (& green technologies), Façade and design capabilities, Kelvin formed AgFacadesign (AgFd) to provide total integration of these elements in a seamless manner. Kelvin has completed a wide range of façade works ranging from investigation of building diagnostics, the range of curtain walls to the unusual hybrid of structural glass walls/facades and "monocoque" (shell & skin) facades systems.