CENTRAL PARK One Central Park, Park Lane and The Mark

Technical Paper



2015 Australian Construction Achievement Award



ABSTRACT

Watpac Construction was contracted to design and build five residential towers across three complexes – One Central Park, Park Lane and The Mark – as part of the Central Park development in Sydney's CBD. The project consisted of two separate stages with the buildings offering mixed-use of residential, retail and commercial.

The project site covered 15 hectares and is located opposite the University of Technology on Broadway. The site is a redeveloped industrial site, with boundaries at O'Connor Street, Carlton Street, Broadway and Chippendale Way.

Watpac participated in the construction of two stages of the Central Park redevelopment. These two stages delivered 1,426 apartments and a total Gross Floor Area (GFA) of over 150,000 square metres.

KEY WORDS

Central Park, residential, apartments, Chippendale, Watpac, Watpac Construction, construction, The Mark, Park Lane, heliostat, green wall, Frasers Property, Sekisui House

INTRODUCTION

Central Park is the landmark \$2 billion development on the southern edge of the CBD. It is principally a residential development built on the former Carlton and United Breweries site in Chippendale.

Social and environmental initiatives underpin Central Park's unique architectural aspects and design. The precinct features a landscaped area of around 64,000m², including the spectacular vertical gardens. The vision for the project included creating a linkage from the southern end of the CBD and the adjacent residential areas, contributing positively to both sectors.

Construction on One Central Park commenced in December 2013 and Park Lane and The Mark in September 2011. One Central Park was completed in December 2013 and Park Lane and The Mark were completed in August 2014.

SCOPE OF WORK

The scope of works for the project consisted of:

- Stage 1: One Central Park East and West Towers. The East Tower is 33 storeys while the West Tower is 16 storeys. Together they deliver 623 residential units above a five-level retail and recreation podium.
- Five levels of basement car parking to cater for 1,200 vehicles. In addition, it provides a public amenity with parkland and landscaped area in the centre of the complex.
- Stage 2: Three residential buildings: Park Lane and The Mark. Park Lane has two buildings of 9 and 19 storeys delivering a total of 393 apartments; The Mark is a single 28-storey building of 413 apartments .
- 5 Star Green Star Design and As Built rating for the multi-residential and retail tools

FORM OF CONTRACT

One Central Park was completed under a Design and Construct contract model. Park Lane and the Mark were administered as variations to the original contract.

GENERAL

Client:	Frasers Property Australia and Sekisui House Australia
Value:	\$597 million
Stages:	Stage 1: One Central Park East and West Towers Stage 2: Park Lane and The Mark
Location:	Chippendale, NSW
Start:	Stage 1: December 2010 Stage 2: September 2011
Completed:	Stage 1: December 2012 Stage 2: August 2014
Site area:	15 hectares
Materials used:	57,716 m ³ concrete 7,887 tonnes of reinforcement 15,000m stainless steel wire cables 2,100 stainless steel springs for cable tensioning 534.5 tonnes of glass in One Central Park
Basement area:	55,000 m ²
Retail area:	12,000 m ²
GFA East Tower:	32,000 m ²
GFA West Tower:	14,000 m ²
GFA Park Lane 5A:	11,000 m ²
GFA Park Lane 5B:	17,000 m ²
GFA The Mark	24,000 m ²
Total apartments	1,426

SAFETY

Total man hours worked:	3,842,525
Total site inductions:	7,523
Lost Time Injury Frequency Rate	2.94
Medical Treatment Injury Frequency Rate:	7.03

DOCUMENTS

Correspondence issued to Watpac:	184,340
Documents uploaded to Aconex:	161,584
Consultant drawings:	60,701
Shop drawings:	95 <i>,</i> 138

PROJECT OUTCOMES

SAFETY

As a project, One Central Park presented Watpac with many opportunities. Watpac takes great pride in its safety record, and was particularly aware of the challenge that a project of this scale presented in terms of workplace health and safety. The three-year plus duration of the project allowed Watpac to explore, develop and trial a number of safety initiatives which allowed the site team the latitude to actively manage a large workforce.

For a construction project of this scale, overall the project performed exceptionally well. There were no major incidents or injuries on the project.

The project closed on a figure of 3,842,525 working hours logged. At its peak over 1,100 men were recorded working on site.

The project recorded a Lost Time Injury Frequency Rate of 2.94. The combined separable portions of One Central Park, Park Lane and The Mark recorded a Medical Treatment Injury Frequency Rate of 7.03.

Some of the safety initiatives and achievements for the One Central Park project were:

- Involving the WorkCover inspectorate on many occasions including a Safety in Design peer review prior to the lifting of the reflector frame to the top of the building forming the heliostat. In addition, a delegation of WorkCover and Korean workplace safety inspectors was invited to the project to review best practice construction methodologies in Australia.
- 2. The implementation of the Smartek access control system. This allowed the team to accurately monitor the number of construction workers on site on a daily basis. In addition to this, the automated system provided the ability to deny access to individuals and subcontractors if their insurances were not up-to-date or if competency certificates had lapsed.
- 3. Actively engaging with the CFMEU for consultation on safety matters.
- 4. Due to the large volume of up-to-date data captured on the project, we now have the ability to carry out extensive data mining and analysis of incidents and injury statistics. This will provide benefit not only to Watpac, but also the construction industry as a whole in Australia.

TIME

The project had ten separable portions:

Water Treatment Plant Stage 1 Level 6 West Marketing Floor Stage 2A Stage 2B Level 20 East Marketing Floor Stage 3 Block 5 Car Park **Retail Podium** Stage 4 One Central Park West Tower Stage 5 One Central Park East Tower to Level 28 Stage 6 One Central Park East Tower Level 29 to Level 34 Stage 7 Stage 8 Park Lane Building 5A Park Lane Building 5B Stage 9 Stage 10 The Mark Building 5C

Each stage was administered and reported according to the Contract. Where final completion dates were extended, these were generally the subject of Extensions of Time for client-instigated variations or inclement weather.

Programs were administered internally by a full time planner based on site. Peer review of the program was undertaken by external consultants engaged by both Watpac and the client.

Short term programming was the responsibility of Site Engineers. Overall coordination of these programs across the site, including prioritising areas, resource allocation, logistics, materials handling and safety considerations was the responsibility of the Project Manager – Operations.

Key factors regarding time management included:

- Accurate program reporting (no "rose coloured glasses").
- Clear communication of objectives to all operational stakeholders using multiple communication forums.
- Extended working hours procured through development consent amendments.
- Extensive tools to monitor progress and production rates.
- Splitting of trade packages to avoid overloading key subcontractors.
- Increased off-site fabrication to mitigate risks associated with on-site activities.
- · Clear demarcation of lines of responsibility.
- The ability to recognise and balance the need to spend money to save time and, ultimately, money.
- Awareness of the need to maintain safety at the highest levels, noting that an OHS incident would cause significant project disruption.
- Fatigue management for staff.

QUALITY

As Watpac had previously delivered projects for Frasers Property, the project team was familiar with the high level of quality that was required to be delivered. Additionally, the risk associated with constructing over 1,400 apartments and the statutory warranty provisions existing in NSW meant that considerable time and effort was devoted to developing systems to minimise defective work, particularly latent and repetitive defects.

These systems and tools included:

- High-risk trade design workshops.
- Prototyping of elements such as apartments, façade panels, planter boxes, heliostat and green walls.
- Elemental work sign-off sheets.
- Consultant peer review checks.
- Supplier spot checks and audits for items such as paint film thickness and brick mortar testing.

The project was administered with a formal Project Quality Plan which complied with AS/NZS ISO 9001:2000.

Significant time and energy was devoted to establishing a defect process that was efficient, timely and communicative between all the stakeholders. Aconex Field was the agreed platform.

The logistics of handing over residential towers with anywhere from 200 to over 400 apartments cannot be understated. At times, there were over 35 purchaser settlement inspections a day which required detailed coordination between Frasers sales staff, subcontractors and Watpac.

The level of quality consistently achieved over this volume of high density residential product set a new benchmark for the city.

ENVIRONMENT

Specific environmental aspects were identified as part of the start-up meeting. For the project, these included:

- Environmentally sensitive areas.
- Land contamination.
- Sedimentation run-off.
- Sullage pits for concrete and wet trade containment.
- Traffic management.
- Air quality.
- Noise.
- Storage and handling of hazardous materials.
- Preservation of identified and labelled trees infiltrating the construction site.
- Storage of materials.
- Neighbourhood communication.

Regular site inspections formed the basis for environmental monitoring. Watpac's Environmental Auditor was responsible for overseeing environmental conformance and presenting monthly reports to senior management. Weekly environmental inspections were also undertaken and logged. Each inspection included numerous pass/fail criteria.

SUSTAINABILITY

The Central Park project is one of Australia's greenest urban developments. It has achieved multiple 5 Star Green Star – Multi Unit Residential v1 Design Ratings and a 5 Star Green Star – Retail Centre v1 Design Rating, with the respective As Built ratings currently under assessment.

A minimum of 5 Star Green Star (in both Design and As Built under an applicable Green Star Rating Tool) is specified on every relevant building in the development. This requirement translated to the management of multiple simultaneous Green Star submissions by Watpac.

The enormity of this project and the multi-Green Star Rating Tool arrangement made it an extremely challenging undertaking for the project team. This was managed successfully through:

- Establishment of a dedicated sustainability team on the project.
- Engagement of reputable and experienced sustainability consultants.
- Subcontractor engagement and commitment.
- Detailed record keeping.
- Stringent monthly reporting.
- Ongoing site-wide audits.

Accordingly, sustainability formed an integral part of the project's design. Some of the key sustainability initiatives and achievements, which set it apart from many other green-building projects, include:

- An on-site trigeneration plant to reduce carbon emissions. The trigeneration plant supplies chilled and hot water plus green energy to all buildings. It has been quoted to achieve an 80% reduction in emissions when compared to electricity.
- A recycled water treatment plant (blackwater system), which minimises demand on mains water.

Water is collected from the following sources on site:

- Rainwater from roofs.
- Storm water from impermeable surfaces and planter box drainage.

- Groundwater from basement drainage systems.
- Sewage from an adjacent public sewer (sewer mining).
- Sewage from all buildings within the Central Park community.
- · Backwash from pools and spas in the development.
- Irrigation water from all green walls.

Recycled water is used for:

- All toilet flushing.
- Irrigation.
- All washing machines.
- Mechanical plant.

Extensive sub-metering and implementation of smart meter panels are provided in each apartment, allowing occupants to view their home's real life energy and water usage data at any given time.

Extensive use of environmentally friendly materials throughout the project included:

- Environmentally sustainable concrete.
- Low emitting paints, carpets, sealants, adhesives and wall and ceiling coverings.
- Sustainable plasterboard for the majority of wall linings.
- Sustainable timber.

Part of the construction works included the provision of appliances of the highest available water and energy ratings to every apartment. Appliances installed include dishwashers, washing machines, dryers and refrigerators. In addition, each apartment is provided with 7.5m of fixed and retractable clothes line, to allow natural drying of clothes.

Watpac's dedicated Environmental Sustainable Development (ESD) team developed and delivered a series of ESD training sessions to internal staff, the client and also the project's subcontractors. This process of stakeholder education and engagement ensured everyone had a greater understanding of the sustainability targets on the project and the role they individually played in its implementation and achievement.

HERITAGE

There were a number of heritage elements associated with the development.

Heritage consultants Godden Mackay Logan undertook a comprehensive site survey, analysis, archaeological investigation and documentation prior to demolition of non-heritage items at the old Carlton and United Breweries site.

Heritage architect Urbis managed the adaptive reuse of heritage structures in collaboration with the project architects. The projection of identified heritage aspects was a priority for the Watpac team throughout construction.

Thirty-three heritage items have been retained and will be restored or adaptively reused. These include the tiled arch at Kent Road, terraces and warehouses along Kensington Street, three hotels, the brewery yard buildings and brick stack and the administration building.

PROJECT DELIVERY CHALLENGES & COMPLEXITY

The overall project had a very high level of difficulty. Constructing multiple residential high-rise towers on top of a retail podium over a combined multi-building basement concurrently represented numerous construction challenges, requiring meticulous planning and logistical management. Several factors contributed to the difficult nature of this project.

Fast-Tracked Start

The excavation was carried out by the client prior to Watpac commencing on site, which required a fast-tracked start. This required Watpac to let early works contracts to a number of trades due to only the design of the basement works being sufficiently complete at that time.

This placed a high level of pressure on the Design Manager and the Contracts Administrators who had to design and procure multiple packages.

Changes

The client issued over 360 major changes in the form of variations and directions. These were mostly issued while undertaking the design element of the building.

This required the design team to understand the instruction and complete the redesign, to allow for the administration team to procure in time for construction. This resulted in a great deal of administration of both the head contract and subcontracts, and effective communication between various teams to mitigate potential delays.

Resources

Due to the size of the project, significant subcontractor participation was required. Careful consideration was given when procuring key trades such as structure, services and finishing subcontractors to ensure the right people were chosen for the project.

Façade

The concept for One Central Park was for the building to feature a living, organic façade on a scale never undertaken before.

This included green walls and bolt-on and sit-on planter boxes that contained over 350 species of plants. The key challenge with the design of this feature was how these would be manufactured and constructed. This included making the tasks safer, simpler and cost effective.

Input from Design Managers and Engineers was essential in managing the design; Contracts Administrators guided cost parameters and the Site Manager and General Foreman directed construction methodologies and program. Numerous innovations were undertaken to achieve the construction of the façade.

Green Walls

The use of the green walls as part of the façade required Watpac to design this feature as curtain wall panels to allow them to be installed progressively as the building was constructed. This method had never been undertaken before as the project was the first to use green walls in a high-rise application. The methodologies undertaken ensured a watertight façade earlier than planned and only required planting to take place later off swing stages.

Planter Boxes

These were originally designed as glass reinforced concrete. This would have made the planter boxes unacceptably heavy and susceptible to damage during construction. The material was changed to rotor-moulded polyethylene which provided watertight, indestructible, lightweight planter boxes that were easily installed with a small floor jib crane.



One of the planter box moulds

Vine Cables

Because vine cables had never been installed in a high-rise application such as this, a prototype was constructed for analysis. As load data was not available, wind tunnel testing was conducted to determine actual load factors. The knowledge gained by this analysis led to the design of a spring-type connection that reduced the loads imposed on the building and reduced reinforcement requirements and bracket sizes.



The green wall facade on the One Central Park East and West Towers

LOGISTICS

Given the location of the project, logistical management was a major component of the day-to-day coordination of teams and equipment on site.

There were several challenging constraints that the project team were required to overcome to ensure construction occurred safely and efficiently.

Location

The Central Park project site was essentially operating within an established living community given its location opposite the University of Technology. This meant that construction was carried out next to a six lane major arterial road and at times towered above public walkways.

To achieve project completion with minimal disruption and no safety incidents, Watpac actively engaged with key stakeholders, neighbouring properties and Sydney City Council.

Traffic Management

In a live CBD environment, traffic management is an important aspect of project logistics. Kent Road was used as the primary access point for deliveries and materials handling. Construction vehicles entered the development site using Kent Road and O'Connor Street.

Traffic control points were located at the intersections of:

- 1. Kent Road and Park Lane.
- 2. O'Connor Street and Park Lane.

These traffic controls ensured that construction traffic was managed appropriately and safely where it interfaced with the general public.

MULTIPLE WORKFACES

When the second stage of the project commenced, Watpac was carrying out construction on three separate workfaces and five buildings concurrently. While the workload was within our capacity, it presented particular challenges to the project team. The most significant was in terms of materials handling and logistics. It was a constant challenge for each workface to secure enough hook time on the cranes. A dedicated Project Engineer and Crane Coordinator were assigned to allocate crane time to each workface.

EQUIPMENT ON SITE

During the early site establishment phase, two tower cranes were utilised, each with a radius of 62 metres. The cranes were positioned to serve both the East and the West Tower. Each of the cranes was also capable of reaching the central podium area between the towers, which was a key materials storage and construction staging area.

A third crane was positioned in the Block 5A – 5B car park structure to facilitate the building of the car park. On each tower, a twin high-speed man/materials hoist was used. The hoists were established external to the tower footprints and penetrated the podium and basement levels, thereby servicing all floors of the project.

A materials hoist was also established in the goods lift core on the East Tower and was removed in sufficient time to allow installation of the goods lift prior to completion of the tower.

At the peak of construction, a third hoist car was added to the East Tower to provide efficient materials handling. This car was located on the eastern elevation of the tower. In general, separate work crews were dedicated to each main portion of the project – the East Tower, West Tower, the podium and the car parks. This helped minimise program interdependencies between these workfaces and reduced the risk of problems in one area of the project affecting other areas.



Crane erection on site - February 2011

CONSTRAINTS AND THE COMMUNITY

Community engagement was a key factor in the success of the project and represents one of its most important achievements.

Communication tools included a project hotline, newsletters, information sessions, a complaints register, regular reporting on complaints at executive level and building personal relationships.

This task was particularly challenging as throughout the project, there was significant peripheral infrastructure upgrade works being undertaken by separate contractors and authorities.

UNIQUE RISKS

There is no question that many elements of the project were unique and innovative, requiring bespoke design, engineering and methodology solutions.

On a project of this scale, many of what might be considered the normal risks associated with construction such as working from heights, live environments and environmental impacts, are magnified, however the project faced its own set of unique risks that required meticulous planning and preparation.

Design and construction of the Sky Garden and cantilevered heliostat frame

At tender, there was an architectural intent and design with some conceptual engineering solutions. As such, Watpac spent the next two years developing an engineering solution to turn this vision into a reality. The construction criteria essentially had to address:

- Program.
- Budget.
- Buildability.
- Safe installation and ongoing maintenance.
- Engineering parameters.
- Longevity.
- Architectural intent.
- Sustainability objectives.
- Subcontractor and supplier capability.

From what was a design vision, the resulting piece of infrastructure was a Sky Garden suspended approximately 100m above the ground and cantilevering out 20m from the west façade of the East Tower.



The Sky Garden on Level 29

Design and construction of the heliostat and mirrors

The challenge was to reflect sunlight from a 520m² horizontal mirrored surface suspended from a structural steel frame, cantilevered 40m from the edge of the building. The light is reflected 120m down through a permanently submerged glazed roof to a five-level retail precinct, eventually providing sunlight to a series of planted garden beds, allowing the plants to prosper through photosynthesis. In addition, the solution included over 2,800 LED lights fitted within the reflector mirrors, programmed to produce an artistic light show at night on the 520m² screen.

There were many risks associated with this element of the project which included:

- Stray sunlight being reflected upwards creating the potential to disrupt aviation traffic and even satellites.
- A very limited field of qualified suppliers and subcontractors of components the key subcontractors had very high-risk balance sheets.
- Engineering parameters including structural, wind, acoustics and heat.
- Reflected sunlight, refracted through glass and water may not facilitate photosynthesis.
- Programming of the moveable heliostat to track the sun throughout the year.
- Maintenance of the reflectors and LED lights.
- Managing the performance expectations of the reflected sunlight including:
 - Capturing the desired footprint of the sunlight.
 - Any requirement for the footprint to move with the time of day to simulate shadow.
 - Preventing stray light onto adjoining properties.
 - Heat from the reflected sunlight. Experience from other buildings 20 Fenchurch Street in London and the Vdara Hotel in Las Vegas made us aware of the dangers of reflected heat and sunlight. On these buildings, the heat from reflected sunlight was sufficiently intense as to cause damage to property and potential injury to people.



The heliostat is the crowning technical feature of One Central Park

Design and construction of the vertical gardens

Given the client's vision of a living, breathing building concept, Watpac was required to address a number of firsts associated with the design and construction of vertical gardens of this size. These challenges included:

- Selection of plant species capable of withstanding an urban environment in high wind conditions but consistent with Patrick Blanc's creative concept of a living building.
- Providing an irrigation solution that was foolproof. Gravity dictated that plants would die without water within three days.
- The program constraints and logistics of planting 85,000 façade plants on a construction site with limited access solutions, while maintaining established plants simultaneously with achieving production rates of new plantings.
- Planting and maintenance activities taking place above working areas below.
- Logistics of materials handling planter mix, plants etc.
- The design of the vertical garden that satisfied the structural, aesthetic and botanical requirements for the gardens.

INNOVATIONS

Central Park represents a landmark milestone, not just for the standard of residential apartment development in Australia, but also for Watpac as a construction company. The project included some truly innovative elements that needed ground-up thinking from the project team.

Sky Garden

The Sky Garden on level 29 is an extraordinary object in itself. It is a cantilevered structure that extends 20 metres beyond the main building. It uses bridge technology with embedded steel trusses. The construction technology is conventional – except for the fact that it is suspended 100 metres above a residential development.

Heliostat

The most unusual and innovative feature of the One Central Park project is the spectacular 29th level heliostat. A requirement of the master plan was to prevent a building on the north side of the site blocking sunlight from the parkland area. The 110 tonne heliostat reflects light from the roof of the West Tower and directs it down through the atrium and into some of the more shaded areas of the retail podium.

Innovations included the use of a gantry building maintenance unit for reflector panel installation which negated the need for more temporary access solutions.

Sustainability

The project has a contractual requirement to achieve a 5 Star Green Star Design and As Built rating for the multi residential and retail tools. We deployed an on-site sustainability team who provided leadership and tracking of our performance to ensure that we achieved the 5 Star rating for each tool.

The enormity of this project and the multi tool Green Star philosophy made this an extremely difficult task. Watpac managed this by detailed record keeping, stringent monthly reporting and site-wide audits.

The development uses on-site trigeneration power, a water recycling and blackwater treatment plant as well as its passive solar design to ensure the precinct achieves exceptional ESD standards.

Materials handling

While materials handling is not an area of construction normally associated with innovation, the use of the Favco M2480D crane certainly was an innovation in Australian construction industry practice.

The Favco M2480D – nicknamed *Tinkerbell* by the project team – had never been used on a building site and was procured from a mining site in the Pilbara.

The logistical challenges faced by the project team in the craning and positioning of the reflector frame and truss boxes required an innovative solution. The completion of the heliostat frame lift in February 2013 represented a major project milestone and was the culmination of three years of planning.

DESIGN PROCESS

The design process for all Watpac projects including One Central Park, is governed by a project-specific Design Management Plan which:

- · Defines procedures for management of the design and documentation process.
- · Outlines the responsibilities of design team members.
- · Defines the minimum requirements to ensure quality control of the documentation.
- Ensures that the design is sufficiently documented so that procurement, construction, inspection, testing, and maintenance are technically and economically feasible.

• Ensures the design is safe to construct, and results in facilities that are safe to operate and use. The Design Team consisted of the Watpac Design Managers and consultants.

The tasks in the design process included:

- Detailed design production.
- Subcontract tender and procurement.
- Construction documentation.
- Construction.
- Commissioning.
- · Defects liability obligations.
- Production of operations and maintenance manuals (including as built manuals).



OVERVIEW OF THE DESIGN PROCESS

Façade

Throughout the design development process, the need to maintain the architectural intent was of paramount importance, while also developing a solution which was buildable and cost-effective. Watpac programmed the tower façade to take place on a 12-day floor-to-floor cycle, commencing at Level 5 when the leading structure deck is at Level 13.

This placed the façade sequence on the critical path for both towers which, given the complex nature of the façade and vertical garden elements, was the case on site. During this design development process, an access system for construction of the façade exterior was also developed.

USE OF NEW TECHNOLOGIES

Heliostat

While many modern buildings incorporate heliostats into their design, the heliostat on One Central Park was not only unique in its physical presence but also in its execution.

The sophisticated light-reflecting feature is Australia's first heliostat to be incorporated into the architectural design of a high-rise residential tower. More than simply an architectural feature, the heliostat is a piece of public art.

Each mirror on the heliostat is fitted with nine coloured LEDs. At night, the heliostat's 2,880 LEDs theatrically and colourfully illuminates the towers. The lighting installation is one of the large-scale permanent artworks that comprise Central Park's \$8 million public art collection.

Light effect testing

Each of the mirrors on the reflector frame is slightly angled away from the others so no more than three mirrors reflect light onto one place at any one time. Sophisticated light modelling by Device Logic tracked the paths of sunlight reflecting off the heliostat and reflector mirrors at all times of the day and year, tracking the summer solstice to ensure the light is always dispersed safely.

Resolving the issue of focussing too much light on an area, also meant addressing the possibility of dispersing light too much and causing stray light to enter apartments or onto Broadway affecting residents or the general public. More light modelling scenarios were run to monitor and control stray light.

Further testing was performed to examine the effect of light swinging and swaying as the reflector frame moved in the wind. The concern was that this could cause a strobe effect, possibly affecting sufferers of photosensitive epilepsy.

With advice from Epilepsy Australia, who also put us in touch with the University of Wisconsin's Epilepsy Clinic, it was determined that the critical range of flickering is between 8–30Hz, with most people being sensitive to flickering between 15–20Hz.

As a result, tests were conducted that demonstrated a 13–14Hz frequency of light swinging across the ground, just under the sensitive zone.

Green walls

The façade concept for One Central Park was to feature a wall of gardens on an unprecedented scale. This included green walls and bolt-on and sit-on planter boxes that contained hundreds of species of plants. The Watpac team had to design these aspects in order to construct the façade with safety, simplicity and value engineering in mind.

A key constraint was the plants themselves, with 350 different species of plants in the green walls alone. Consideration was required to address the issue of construction dust and low light with large numbers of plants stored off site, given they need access to water and natural light. In total the façade features more than 85,000 plants.

Planter Boxes

The material used for the planter boxes was rotor-moulded polyethylene. This provided a watertight, indestructible, lightweight, easy-to-install alternative and addressed the issue of weight given the boxes were suspended from the buildings.

Because the planter boxes are supported by the slab edges, an integrated curtain wall system had to be ruled out. Instead, the One Central Park facade comprises a glazed head and sill track-framed stick system – the opposite of a curtain wall – and each glazing panel abuts the concrete slab and soffit.

Overall, the East and West Towers feature 5,500 planter boxes in the buildings with no two being the same.

TRAINING AND DEVELOPMENT INITIATIVES

Training on the project was conducted in accordance with the company's Enterprise Training Plan. In addition to standard inductions, training was provided on industry and project-specific areas such as:

- Appropriate Workplace Behaviour.
- SuperSafe risk training for supervisors.
- Manual handling.
- Working at heights.
- Performance appraisal training.
- Aconex training.
- First Aid.
- Hoist operation.

Cadets

As part of Watpac's Cadet Program, more than 20 engineering cadets were employed on the project. Many of these cadets are continuing their careers with Watpac as qualified engineers, following their first-hand on-the-job experience with this landmark project. This valuable knowledge will influence Watpac projects well into the future.

CONSTRUCTION PROGRESS



Site progress – January 2011



One Central Park East Tower jumpform - March 2011



One Central Park West Tower jumpform - March 2011



Building 5B Park Lane Ground Floor formed – June 2011



Building 5C The Mark jumpform - November 2011



Public domain concrete pours – February 2012



Green wall prototype - 2012



Micro piling – July 2012



Atrium progress – July 2012



Level 4 glazing – July 2012



One Central Park West Tower Level 15 services installation - mid 2012



Basement level 1 pour - December 2012



Planter box production – December 2012



Green wall panel production - December 2012



Craning the heliostat frame into position - February 2013



Heliostat mounted on its frame



Building 5A Park Lane – April 2013



Building 5C Park Lane – early 2013



One Central Park East Tower - April 2013



One Central Park complete – December 2013



Park Lane complete – August 2014



