RONSTAN

TENSILE ARCHITECTURE

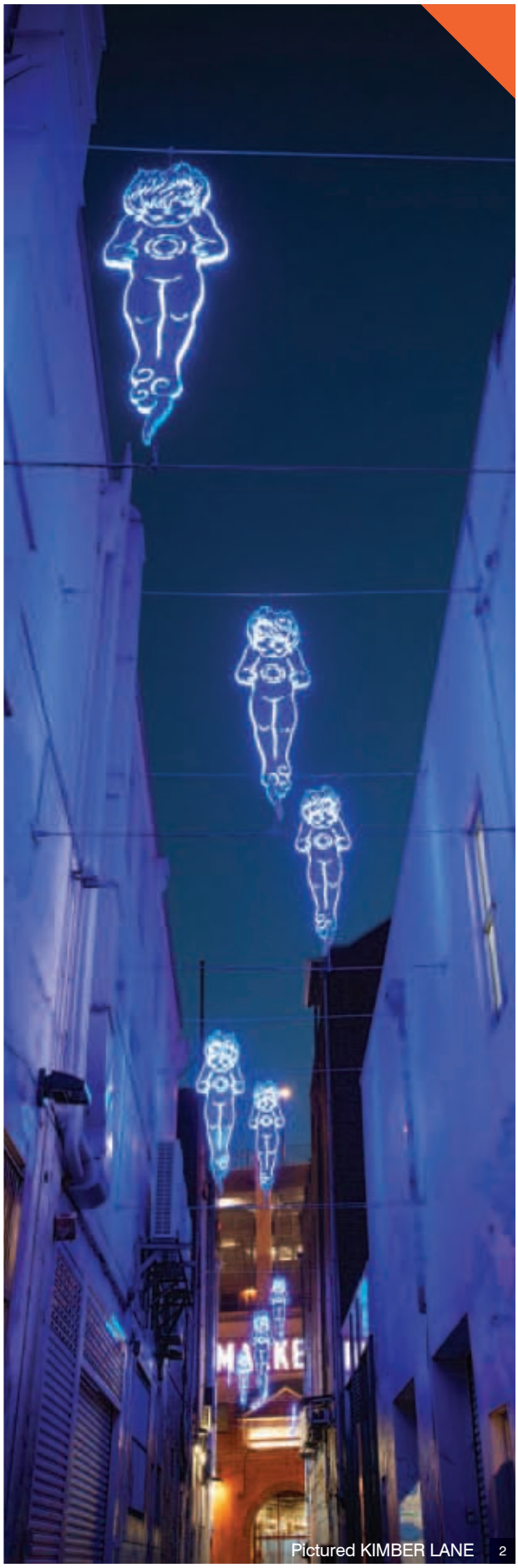
Catenary Lighting

AND STRUCTURES FOR THE PUBLIC REALM

Hargreaves Mall

Bendigo, Australia

Landscape Architect **RUSH WRIGHT ASSOCIATES**
Lighting Design **ELECTROLIGHT**
Supply & Installation **RONSTAN TENSILE ARCHITECTURE**
Client/Owner **CITY OF GREATER BENDIGO**


Pictured KIMBER LANE 2

CATENARY LIGHTING &
STRUCTURES FOR THE PUBLIC REALM

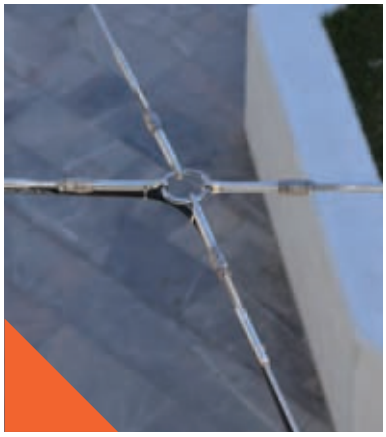
Contents

Introduction

The presence of light can critically define space. The flexibility available with catenary lighting suspended from Ronstan Tensile Architecture structural cables enables purposeful illumination with pin point accuracy. For large open public spaces, lighting from catenary systems creates a peaceful transition between environments instead of stark separation. Whether installing directional lighting, artwork sculptures or feature light sculptures, the use of suspended catenary systems creates a unique ambience for that space, and maximises the usable footprint of the public area by limiting light poles, masts or intrusive support structures.

Catenary Lighting is based on the ‘less-is-more’ ideology that sometimes brighter light is needed, but often it is not. Suspending luminaires from cables allows light to be focused in areas that need it, leaving other places in darkness. Pedestrians can be guided to safer areas, with light spill reduced to minimise light pollution and energy consumption, something conventional public lighting cannot achieve.

Ronstan Tensile Architecture understands these requirements along with the structural design of the buildings to which catenary cables connect. Our design team uses 3D analysis and structural computer modelling to ensure the most efficient cable and connection design, and makes performance checks to ensure luminaires maintain their position and protect the overall integrity of the lighting concept. Ronstan provides this complete concept, installation and certification solution, which allows us to tailor a project scope that brings to life your most exuberant lighting or artwork design intent.



Ronstan Tensile Architecture services

At Ronstan Tensile Architecture we pride ourselves on service. Whether our scope involves the simple supply of cables or components, or we are assisting you with full design and construction, our staff will deliver our support with equal passion; founded deep within the excitement and challenge of leading our industry, our long history of success and our simple love of cables and what cables can do. Let us help you bring your most exuberant catenary lighting or artwork concepts to life.

Design Support

Ronstan's design support services draw on sixty years of experience in cable innovation. Our team utilise the latest technology, matched only by it's enthusiasm and creative approach.

Structural Analysis and Engineering Certification

The Ronstan team can provide detailed analysis and modelling of system behaviours and interactions within any tensile architecture installation. We don't need to apply these skills to all projects, but you can be assured we have the in house skills at the ready to help you when needed.

Cost Estimation, Planning and Scheduling

Ronstan provides accurate quotations for catenary projects, as well as detailed estimates for cost planning requirements. We pride ourselves on transparency and open dialogue.

Supply of Materials

Ronstan manufactures product to exacting standards from manufacturing facilities in Australia, Indonesia and Denmark. Our market leadership demands continuous improvement and we are accredited to ISO 9001.

Custom Fabrication

If our wide range of standard hardware is not enough, Ronstan can custom design and fabricate the ideal hardware solution for any job. The bigger the challenge the better!

Method Statements

It's one thing to design structures that push boundaries, but to execute them safely and efficiently is something born from experience. Ronstan can develop accurate method statements for most designs. We thrive on the challenge of realising the most efficient, safe and timely installations possible.

Management and Coordination

Ronstan manages and oversees the construction of our catenary lighting and public realm structures on site and consolidates components from different suppliers for a seamless installation.

Installation

Ronstan's team of specialist installers prides itself on doing things once and getting the job done right and to international standards. Quality and finish are outcomes of this passion.

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Benefits of catenary installations

With the pressures of ever increasing urban density and the need to make best use of all public spaces and assets, catenary lighting solutions allow the non-obtrusive adaptation of public spaces. The benefits of these installations are many and varied:

Lighting

Catenary lighting allows us to position luminaires exactly where the light is required creating directional light focus as well as artistic shadow. Often the shadow is as evocative as the light itself, the two working symbiotically to develop an inviting and warm environment in stark contrast to flood lit areas, which can be cold and sterile. The accuracy of catenary lighting allows a reduction in light intensity to illuminate a given space. It significantly improves light spill, minimising light pollution and energy consumption.

Spatial Definition

An overhead catenary net informally defines a public space by creating a transparent roof filigree of small diameter cables. Installing these 'ceiling' cables provides uncompromised flexibility allowing the ceiling integration of artwork and sculptures which may become key features of the space. Purposeful light and shadow allows designers to interpret spaces with mood and spatial movement, creating interest and inviting people into previously under-utilised areas.

Increased Public Use

Lighting areas from overhead cables increases the usability of the public footprint as a greater area is gained, free of obstructive poles and structural supports. The illumination of common areas not previously lit, or flood lit, with suspended catenary systems creates a welcoming atmosphere for public spaces at night, increasing night-time use and maximising the capital return of the community asset.

Improved Security

Encouraging night-time use with improved lighting and atmosphere creates a safer environment. The combination promotes security, as more people use the space and gravitate towards well-lit spaces Illuminated accurately from above.

Social & Economic Impacts

The introduction of catenary lighting or a new installation of public art helps rejuvenate public spaces, encouraging people back into the area and increasing general patronage. Providing an inviting and interesting breakout space in dense urban areas promotes the overall health and wellbeing of a city's occupants.

Design guidelines

Defining the purpose

Designing the most appropriate catenary lighting system or artwork installation starts with proper planning. It is best to first define the function and purpose of the intended system. Is it decorative, an artistic installation or meant to perform another specific function? Is the system passive or active; meaning is it the centre piece of the installation or just another non-obtrusive inclusion? Would the installation benefit from having dual purpose by adding additional features? It is good to have a clear and realistic expenditure budget so that an appropriate solution can be developed.

Light Requirements

If lighting is the main requirement of the catenary system, it is important to define the lighting intent. Where does the light need to fall? Are there specific areas to be highlighted and illuminated or just as importantly, where shadow can be used to evoke a desired mood or atmosphere? Are there areas where light can be used to encourage pedestrian traffic, perhaps into places previously under-utilised due to an inability to light sufficiently? Is there a need for colour, vibrancy or animation? Armed with answers to these questions, a designer can think about the types of luminaires that would suit the application and what style of catenary cable net arrangement will provide the ideal structure to suspend luminaires exactly above the desired locations. This is the perfect point to seek Ronstan guidance. For further information on luminaire types, see the electrical and luminaire information in the Catenary Details section of the catalogue (p54).

Catenary Cable Net Arrangement

With the lighting intent confirmed or the proposed suspended artwork position identified, the catenary cable net arrangement can be determined. The layout and catenary cable net geometry can be designed to position luminaire suspension points exactly above where light is required, taking into consideration the existence and suitability of existing mating structures that will act as connection points. In some instances additional poles may be required. The height of the cables and topography of the landscape are both significant inputs that will impact on the aesthetics and efficiency of the lighting at night, or the appearance and ability of the structure to either blend or disappear into the background of the space during the day.


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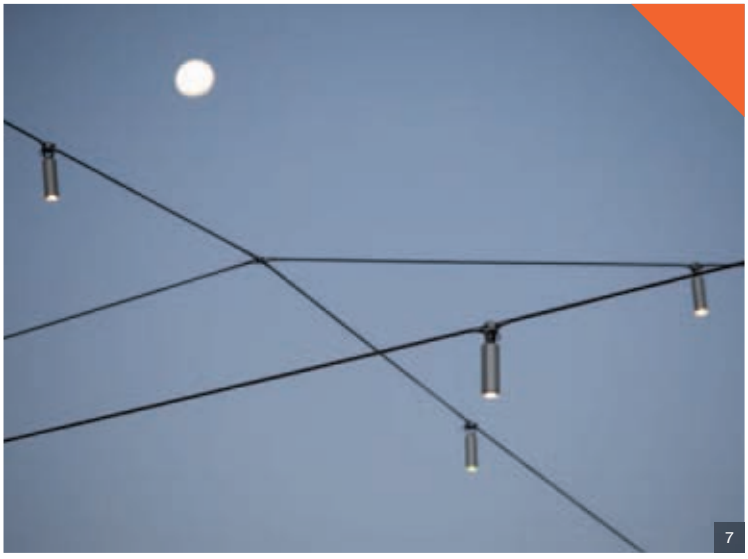
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Design guidelines

Site Conditions

As part of our scope Ronstan can perform independent structural checks on the cable net connections proposed to existing buildings to ensure the load path within the building can adequately deal with the catenary reaction loads. We have the required engineering experience to determine the suitability of these connections, and can also undertake remediation work to strengthen or hide the proposed connection points. Along with the overall buildability of the proposed net and connections, the availability and location of power sources is another important site condition for consideration at this stage.


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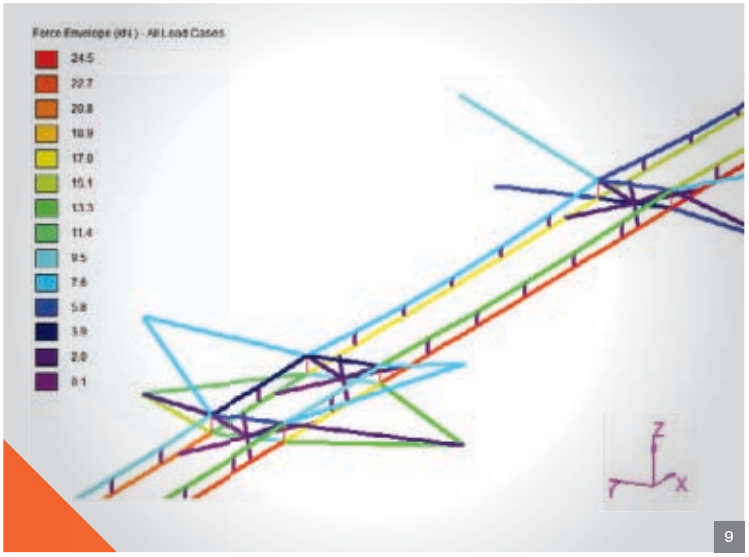
Engineering

With the quantity and location of lights sources decided, the weight of the luminaires and any other suspended elements can be calculated and a cable diameter selected. To determine the cable net specification required to meet the desired cable net geometry, and to identify loads or reactions that the cable net will impart at the mating structures, these loads are analysed taking into account the allowable cable sag and relevant wind considerations for the location. 3D computer modelling is used in this process to optimise the catenary system (including poles or connections), to determine the most economical structural sizing, to keep cable deflections within acceptable limits, and to ensure the reactions of any fixings to existing buildings are resolvable.



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Maintenance

For its lifetime, catenary systems should require very little upkeep to ensure the system remains functional and in working order. The design stages need to include careful consideration of future access for general maintenance, seasonal and themed decoration changes and the washing and replacement of light fixtures.


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Queensbridge Square

Melbourne, Australia

Architect STUDIO 505 / CITY OF MELBOURNE
Engineer VDM GROUP
Catenary Contractor RONSTAN TENSILE ARCHITECTURE
Client/Owner CITY OF MELBOURNE

RONSTAN
TENSILE ARCHITECTURE

Single Cable CATENARY

A simple, efficient and minimalist system for shorter spans

Benefits of a single cable catenary

Single Cable Catenaries are the simplest and most cost effective catenary suspension system. They are recommended for shorter distances such as narrow alley ways and can be used to suspend lighting elements between buildings or poles where a discrete lighting solution is required.


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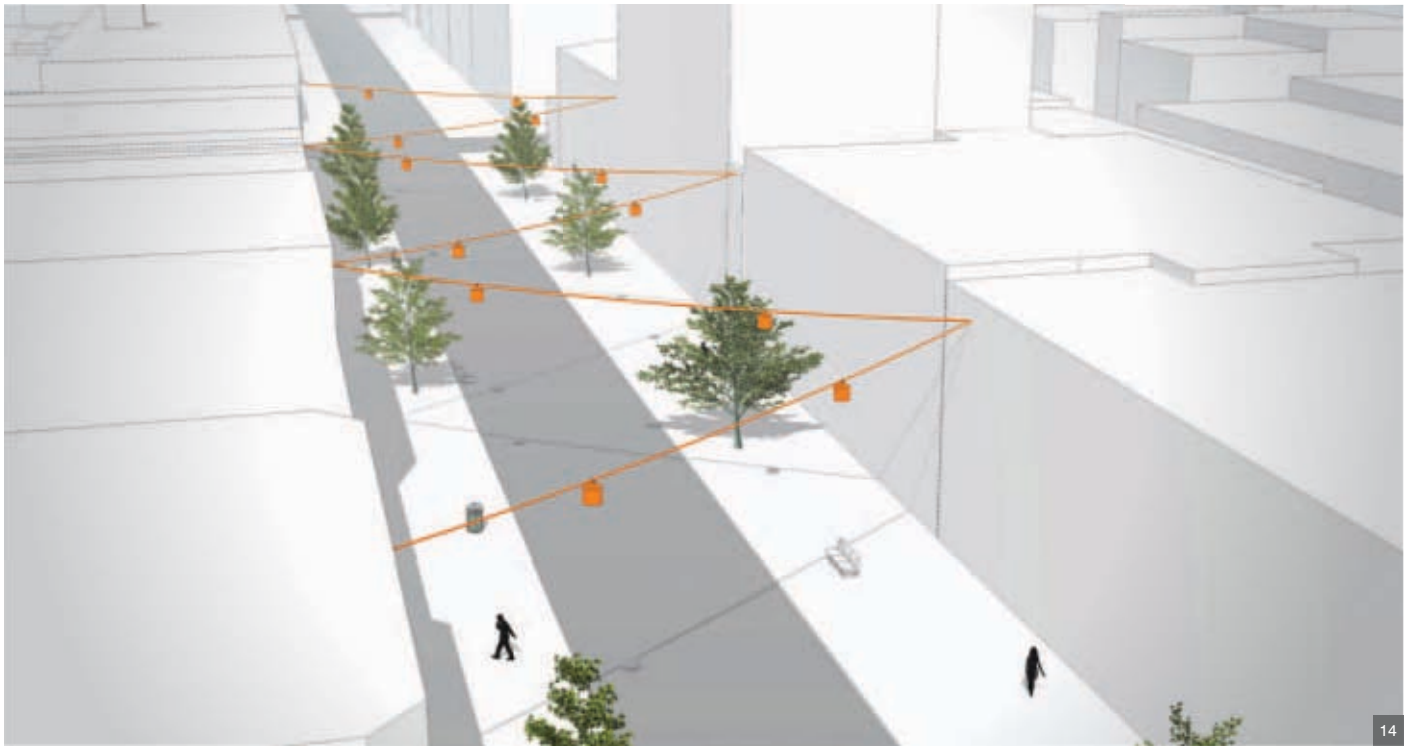
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Designer MARK HERRING LIGHTING
Contractor MARK HERRING LIGHTING
Client/Owner NEW PLYMOUTH DISTRICT COUNCIL

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New Plymouth

New Zealand

This single cable centenary system bridges Lower Brougham Street close to the waterfront of New Plymouth, NZ. The system was installed as part of a landscape upgrade and rejuvenation of the surrounding area to light the pedestrian crossing used by patrons of cafes and restaurants, and to significantly improve the atmosphere and light quality around a vibrant precinct of the city.

Auckland's MHL Lighting worked collaboratively with Ronstan through the design phase to develop a system that would deliver the required geometry in the context of the surrounding buildings. Standard Ronstan brackets were used and cables fabricated to defined lengths. Luminaires from We-Ef Lighting were clamped to the cables in specified locations with Ronstan cable clamps and Carl Stahl® stainless steel X-TEND® mesh was used to bind the structural and electrical cables together to create one homogeneous cable filament in each instance.

The result is a simple and efficient catenary, which serves its functional purpose and adds an element of interest to this community space.

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Designer URBIS
Lighting Structures WEBB AUSTRALIA
Client/Owner BRISBANE CITY COUNCIL

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Brisbane Chinatown

Brisbane, Australia

Key requirements of the Chinatown Mall catenary design were to reduce clutter on the ground plane of the mall, to improve sight lines, and most importantly, to significantly increase after hours pedestrian safety. The desired outcome called for a minimal number of light poles to achieve even and code compliant lighting levels site wide, as well as a dynamic ornamental coloured lighting display. A catenary system was seen as the best option to achieve this and Ronstan was engaged to design and deliver. Custom made light fittings were designed by a Brisbane based Chinese artist, Catherine Chui, to embrace and reflect elements of Chinese culture. The fittings combine both partially concealed down lights, providing code lighting and colour changing LED ornamental lighting that serves to enliven the entire space at night. Uneven numbers of fittings were required for each string of lights to ensure good feng shui was maintained.

Paul Hardyman, Urbis


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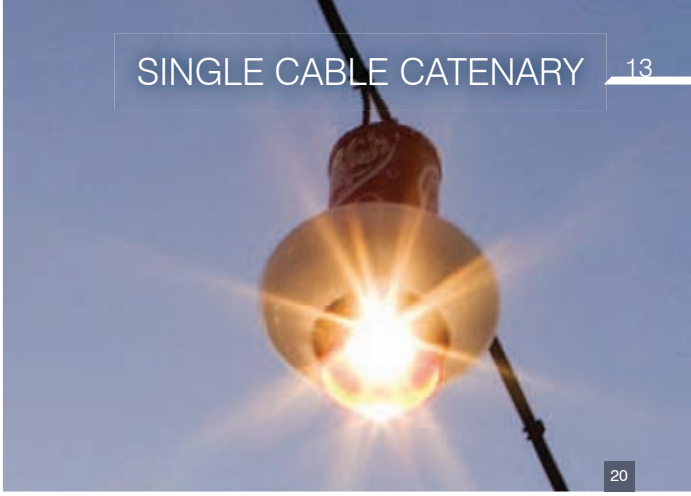
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Designer URBIS & BCC CITY DESIGN
Client/Owner BRISBANE CITY COUNCIL

Queen Street Mall Entry

Brisbane, Australia

The intent of this light installation was to spatially enclose the entrance to Queen Street Mall. The design solution utilised “sinews” of light to form a virtual “ceiling” and to define the entry space. The catenary system is comprised of individual cables each supporting strands of decorative luminaires, which together have become a key component of the character of the space at night and encourage pedestrians into the mall. The geometry or sag of the single cables is visually interesting and the cable system is strong yet unobtrusive, allowing the custom made LED light fittings to be the sole focus of attention.

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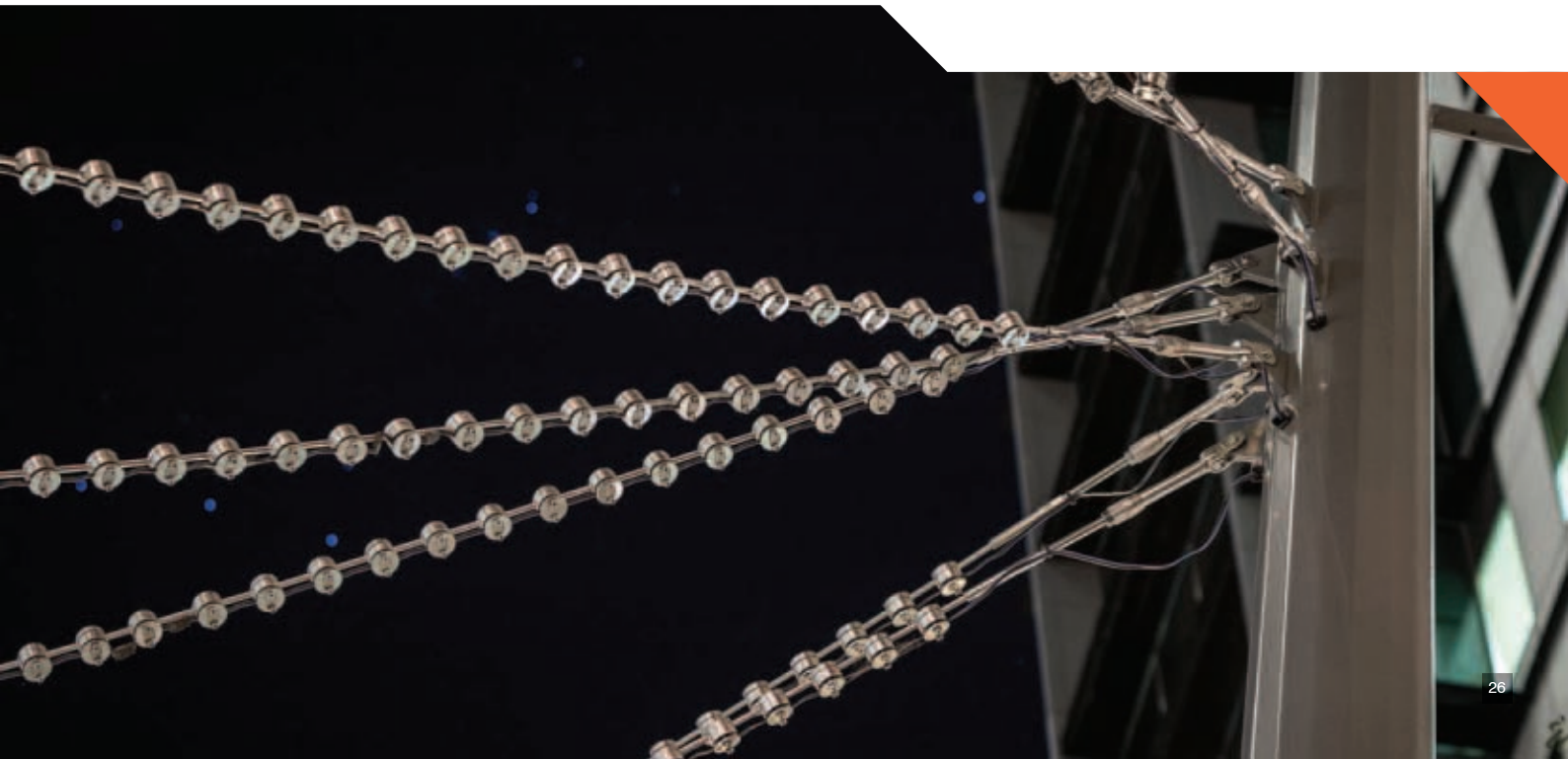

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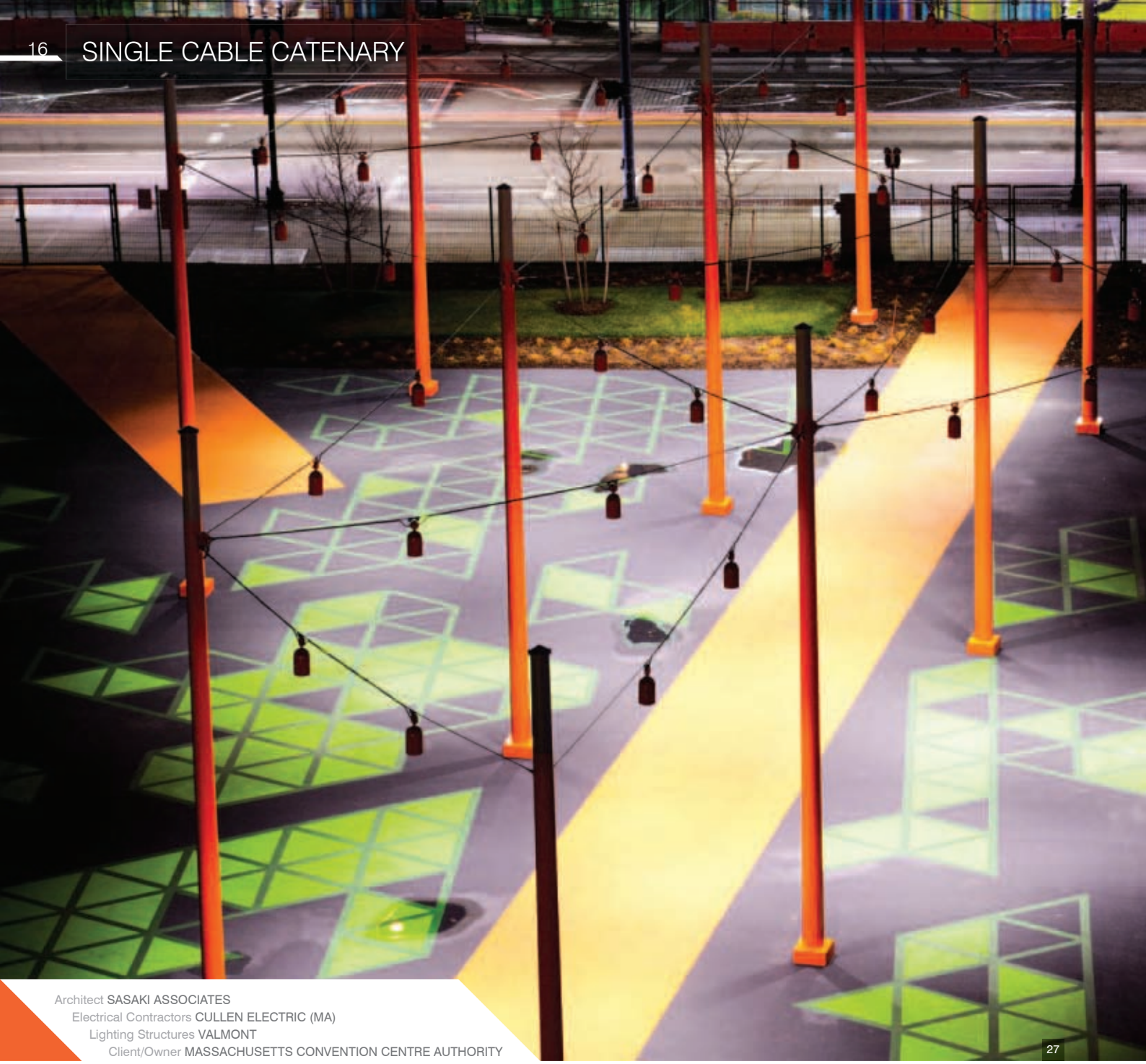

Architect SASAKI ASSOCIATES
Electrical Contractors CULLEN ELECTRIC (MA)
Lighting Structures VALMONT
Client/Owner MASSACHUSETTS CONVENTION CENTRE AUTHORITY

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Boston Convention Centre

Boston, USA

The Boston Convention and Exhibition Centre (BCEC) is the largest exhibition centre in the Northeast United States. A catenary lighting installation helped transform the area surrounding one of the main entrance corridors, the D Street Corridor, into an active, mixed use, urban centre with a safe and well lit environment. The installation draws attention to the pedestrian connection between the BCEC and the surrounding neighbourhood and businesses. The goal was to create a highly usable, open and inviting community space, to attract both residents and convention visitors. Ronstan worked closely with all stakeholders through the design and construction phases to ensure the integrity of the lighting brief was maintained through to commissioning.


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Designer/Architect LEND LEASE DESIGN WITH BUCHAN GROUP ARCHITECTS
Developer ING REAL ESTATE
Client/Owner LEND LEASE GROUP AUSTRALIA

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Lakeside Joondalup Shopping Centre

Perth, Australia

Lakeside Joondalup is the largest shopping centre in Western Australia and is located approximately 25km north of Perth CBD. The complex represents a central community meeting place with multiple retail and recreational precincts. A key feature of one of the entrances to the shopping centre is a new single cable catenary lighting system. The high level cables in the system stretch above the feature trees and provide adequate mood and directional lighting to create a visual jewel that welcomes visitors entering the centre and warms the immediate environment for diners in the adjoining open restaurants. The individual cables and luminaires were modelled and connections designed to ensure that the cable loads could be accommodated by the mating building structures, leaving a footprint completely free of poles and other support structures.

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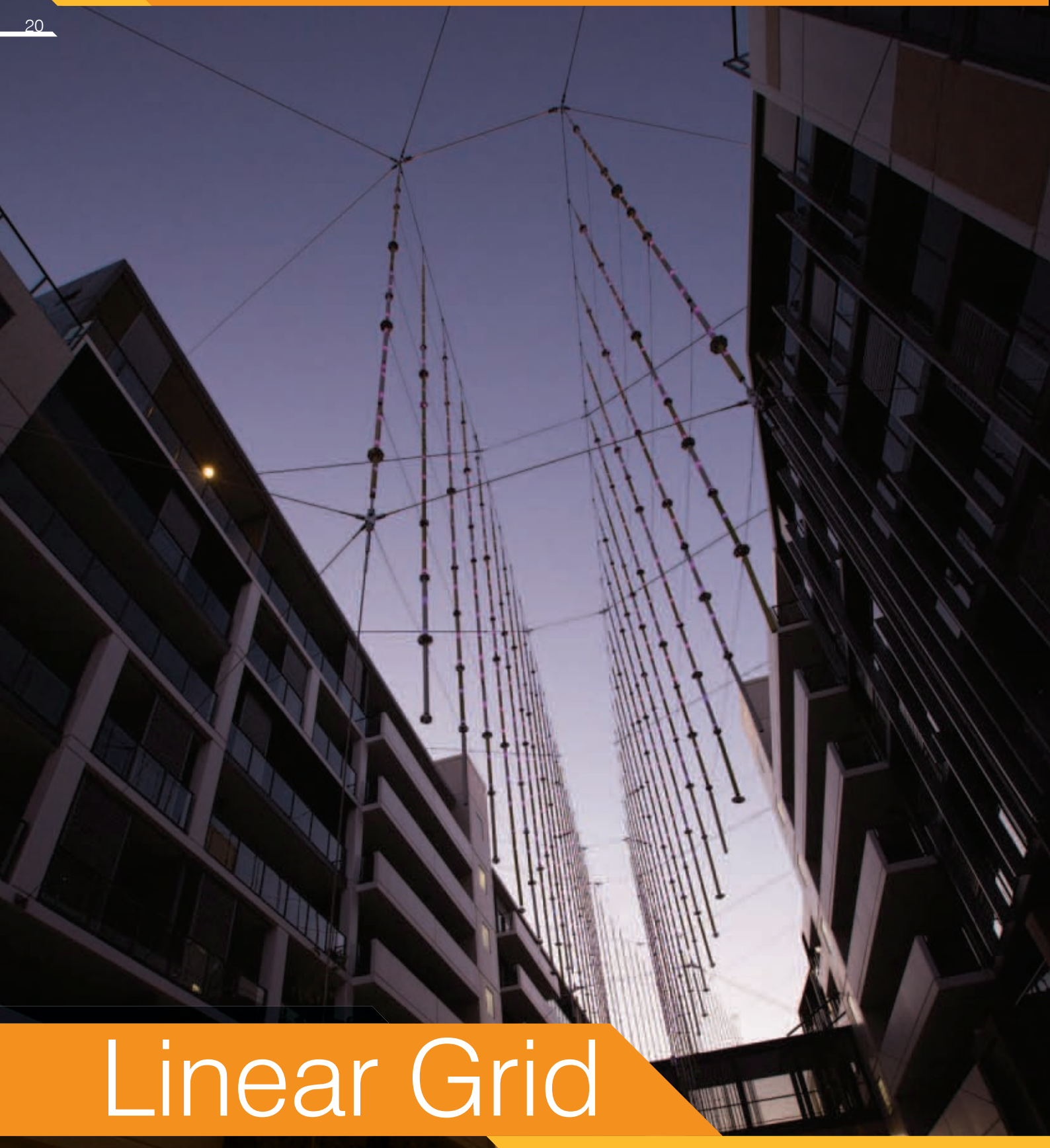

Linear Grid CATENARY

A grid style net providing maximum flexibility for feature integration

Benefits of a linear grid catenary

Linear Grid Catenary systems can be used for both small and large spaces. The net-like geometry and extensive attachment point options provide great flexibility and scope for the integration of temporary/seasonal banners and decorations. The Linear Grid Catenary system provides an ideal platform for suspending uniform and regular lighting designs and the structured form of the net creates a transparent “ceiling”, which informally defines spaces without physical boundaries. The interdependence of the cables within the net sees them work together to effectively resist wind loads, the linear grid providing a stable and functional lighting feature.


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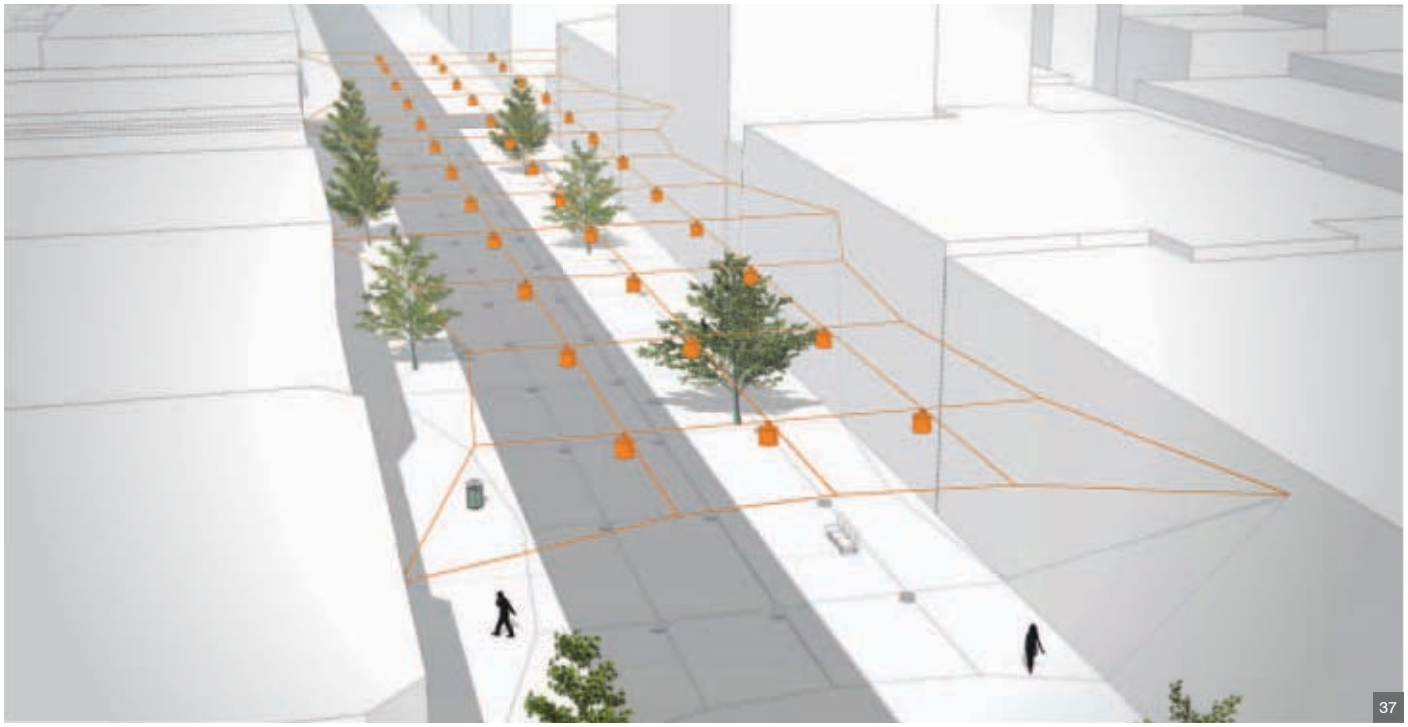
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Architect & Geometry STUDIO 505
Structural Engineer GHD
Contractor RONSTAN TENSILE ARCHITECTURE
Client/Owner CITY OF MELBOURNE

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Bourke Street Mall

Melbourne, Australia

Bourke Street Mall is the retail heart of Melbourne, housing the city's main department stores and flagship specialty retail outlets. Fully refurbished in 2006, Bourke Street Mall was transformed with the removal and replacement of cluttered street lighting with a catenary lighting system suspended from a tensile cable net, which also supports seasonal decorations.

Ronstan supplied all components and installed the cable net and building connections to exacting geometry set by GHD design at a height of 11m to 14m between buildings along the mall. The installation was particularly complex due to the overhead power lines associated with a tramway, which runs through the mall. The catenary provides functional and seasonal decorative lighting that now sees this urban space utilised well into the evenings.

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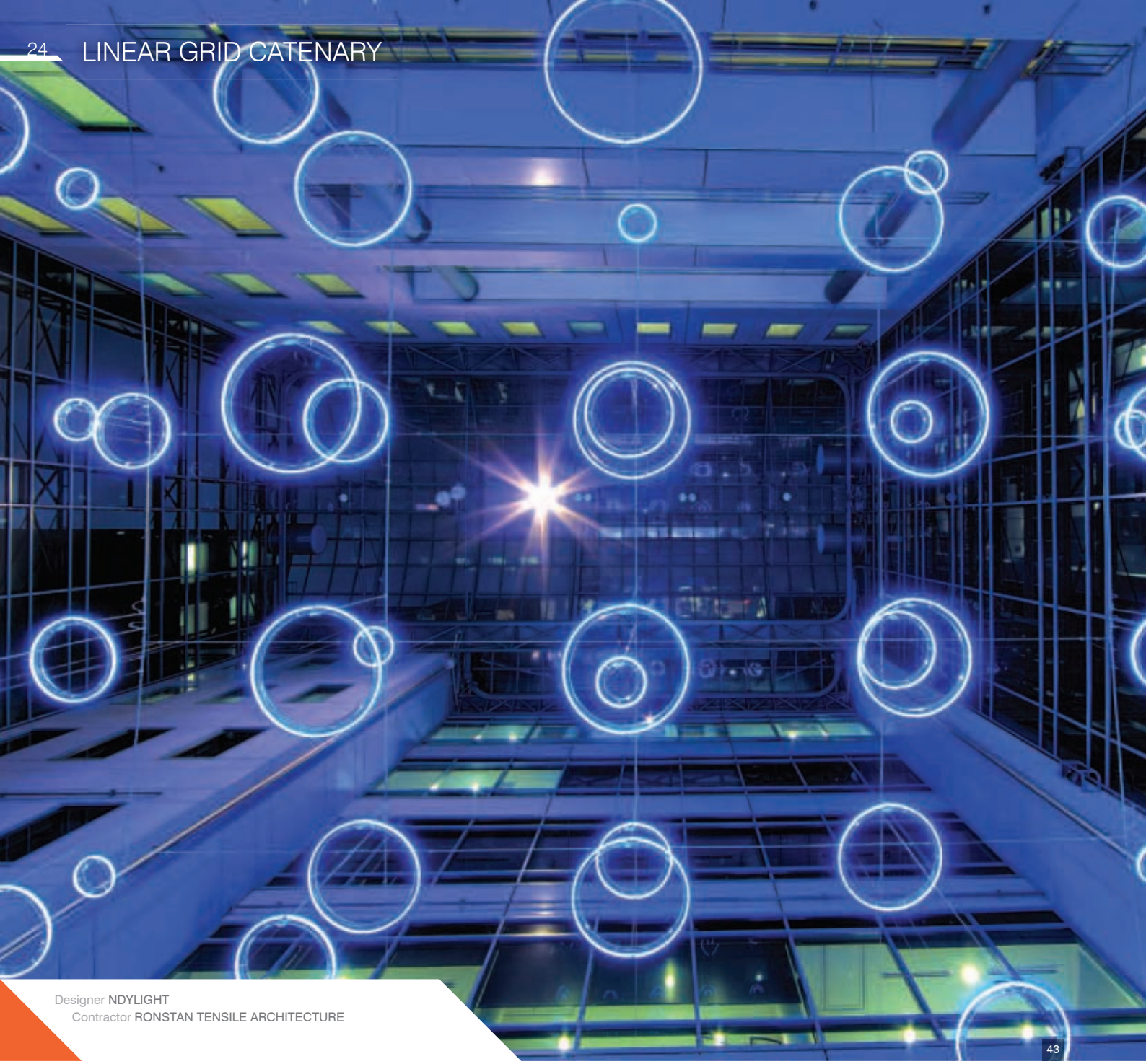

Designer NDYLIGHT
Contractor RONSTAN TENSILE ARCHITECTURE

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485 La Trobe Terrace

Melbourne, Australia

NDYLIGHT was appointed as the lead designer / artist for the sculptural light installation, “Downpour”, in the atrium at 485 La Trobe Street as part of a design competition. The space in which the installation was proposed had a range of challenges to overcome, principally the physical height of the space and the presence of beam smoke detection above a certain level.

To overcome this, NDYLIGHT looked at a layered installation of concentric blue neon rings mounted on a 5m x 4m grid within the space, with two variable sized rings in each location. Each ring is individually suspended to a different height to physically represent an abstraction of a raindrop falling in a puddle. To support the rings in each location a grid of catenary cables was selected as the best solution to address both the height and services limitations of the space.

The catenary grid spans the atrium at a level just below the lowest smoke detector and creates an almost invisible network of mounting points for the rings.

Nic Burnham, NDYLight

Designer CITY OF MELBOURNE
Structural Engineer GHD
Client/Owner CITY OF MELBOURNE

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Little Bourke Street

Melbourne, Australia

In the heart of Melbourne's CBD, Little Bourke Street is home to the city's Chinatown cultural precinct, which runs between Exhibition and Russell Streets. As part of a program to upgrade significant laneways with public art, new landscaping and improved lighting. Little Bourke Street was revitalised with the installation of a decorative and functional catenary lighting system. The system was designed to enhance the character of the precinct with unique Chinese lanterns, down lights and other iconography.

The Linear Grid Catenary suspended from buildings along the street utilises stainless steel rectangular frames spaced equidistantly to hold the grid form, while permitting the suspension cables to connect to buildings at different heights depending on the availability of structural connection points. The system enabled the de-clutter of the streetscape and provides a stable platform for the suspension of permanent lighting and seasonal festive decorations.


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Lighting Design STUART GREEN, BIG SPOON ART SERVICES
Catenary Design & Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner FINBAR GROUP

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Aurora at Subi Strand

Perth, Australia

Artist Stuart Green, in collaboration with Ronstan created the artwork “Aurora” - a catenary lighting curtain for the Finbar residential development Subi Strand. “Aurora” is primarily a lighting artwork with 2,340 individually addressable LED nodes set within a swaying cable curtain 60m long and 18m tall. The curtain acts as a permeable point of visual interest between the two residential buildings and through the lighting show, imparts a soft and enchanted atmosphere to the pedestrian mall below. Importantly the whole curtain is engineered to safely move within a strict range, with the wind giving movement to the work, and imparting a weightless quality that allows the strands and the lighting to sway and drift.

Stuart Green, Big Spoon Art Services


STRAND

Aurora at Subi Strand

Perth, Australia

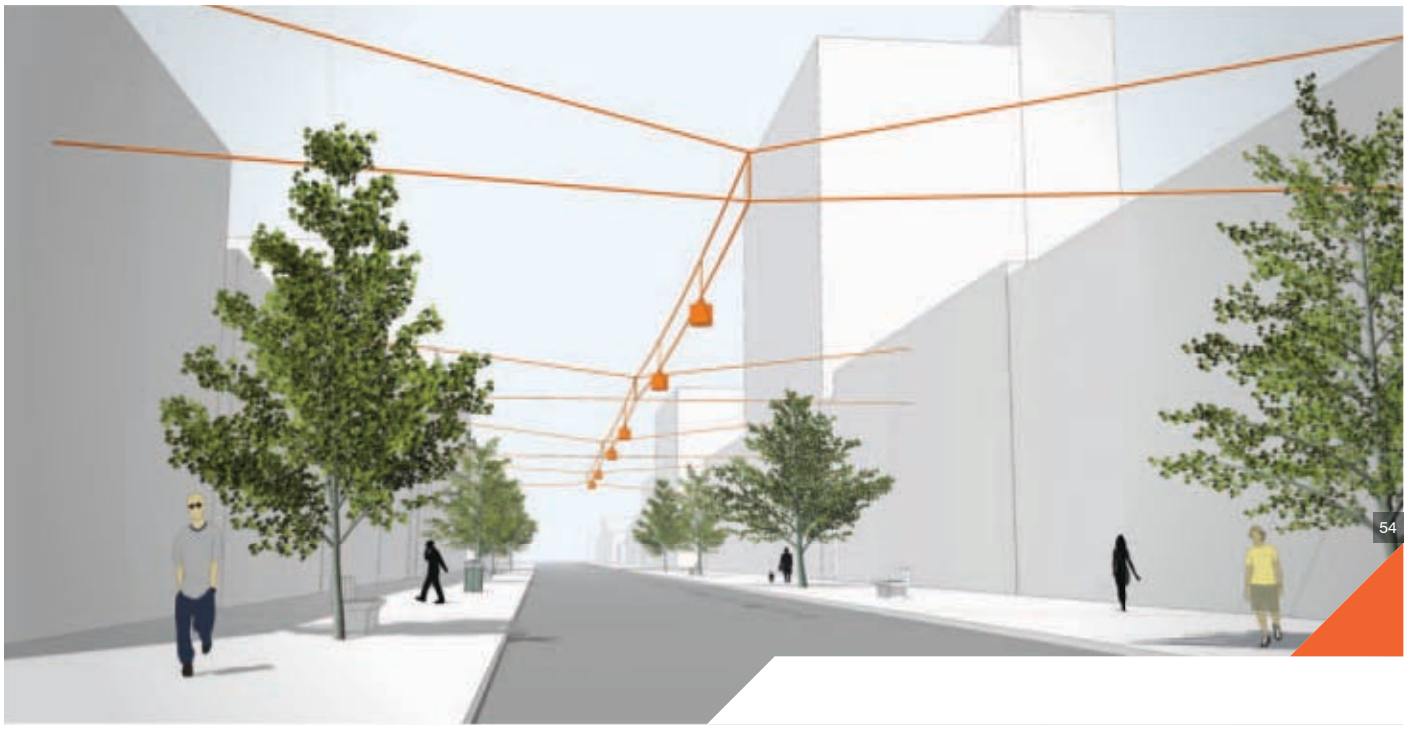
Lighting Design STUART GREEN, BIG SPOON ART SERVICES
Catenary Design & Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner FINBAR GROUP

Central Spine CATENARY

A structural backbone for artistic lighting features

Benefits of a central spine catenary

The common theme of the Central Spine Catenary system is the presence of one principal lighting or architectural element that forms an elegant and artistic sculptural form. Central Spine Catenaries are typically used in outdoor malls and dining strips. Their central chord or ribbon spans the full length of the street and is connected to surrounding structures at regular points along its length. Designed to be stable in wind, they hold the sculptural lighting elements precisely in space to meet all intents. Recent projects have made great use of new LED technologies to engage occupants of the space in a festival of animated light.



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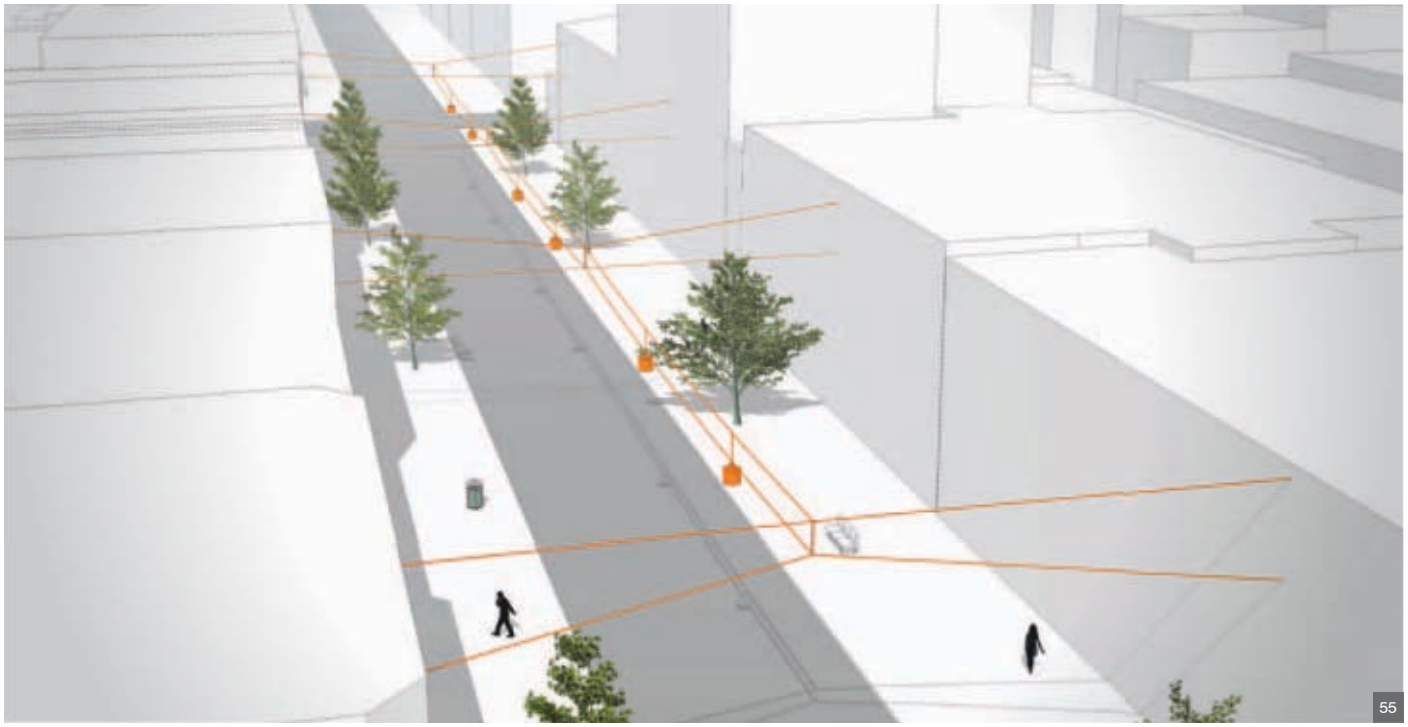

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Architect TONY CARO ARCHITECTURE
Engineer HYDER CONSULTING, ENSTRUCT
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner CITY OF SYDNEY

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Pitt Street Mall

Sydney, Australia

In celebration of its pre-eminent position as the retail heart of Sydney, Pitt Street Mall was given a unique central spine catenary lighting system to free the mall floor of clutter, to address public and ambient lighting requirements, and to create a distinctive image for the city's pre-eminent retail mall.

The central spine consists of a ribbon of tubular, custom LED luminaires that, when viewed in perspective, create a planar canvas of suspended light in the sky above the mall floor. The lights can be programmed for special events, seasonal displays and site-specific artworks and are supported by a series of bowstring cable trusses connected to the adjacent facades.

Bordered by heritage buildings and with strict geometric and sag limits set by the client and their design team, Ronstan played an integral role in the design and then installation process, particularly with regard to the mating structures and building connections, which were required to resist the substantial loads applied by the catenary along the full length of the mall. The simple form and transparency of the structure certainly hides the complexity.


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Designer CITY OF MELBOURNE WITH WEBB AUSTRALIA
Structural Engineer GHD
Client/Owner CITY OF MELBOURNE

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Lonsdale Gateway

Melbourne, Australia

"Lonsdale Gateway", the catenary lighting structure at the intersection of Lonsdale and Russell Streets in Melbourne, celebrates entry into the city's Greek precinct. Positioned above one of Melbourne's busiest intersections and tensioned between four structural spires, the structure utilises a cable net with two main spines, East-West and North-South, to suspend 144 Greek inspired programmable LED lights in a spectacular display of light.
With its net of 8mm stainless steel cables and specialist Ronstan rigging components, "Lonsdale Gateway" stands testament to what can be achieved with the combination of efficient structural cable solutions and the application of sound engineering principles.

Design ELECTROLIGHT
Structural Design GHD
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner THINC PROJECTS

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Watergardens Town Centre

Taylors Lakes, Australia

Electrolight was commissioned to design a vibrant lighting scheme in the dining precinct of the new Watergardens shopping complex. The design was inspired by wandering lines and the magnetic energy of iron filings. The design assists way-finding between the station precinct and the shopping centre and acts as a point of focus and interest, drawing visitors towards a centre of activity. One of the main aims of the design was to enhance the perception of safety and prestige. The lighting design acts like a magnet to encourage visitors to explore the facilities available beyond the immediate station area.

Utilising high efficiency, long life fluorescent fixtures, the lighting scheme achieves all of the projects objectives as well as meeting the requirements of the Australian Standards. A yellow hue was incorporated into the lighting design to reinforce the primary brand colour provided by the client. The right balance of yellow and white light was a crucial design consideration. Different length fluorescent tubes were utilised to accentuate a perception of movement and activity overhead.

It was a solution that sought to minimise the number of light poles along the footpaths of the shared use zone. The catenary design was original and challenging particularly in relation to the curvature of the lines and their integrated installation with the built form. Considerable collaboration was critical in the design process with Ronstan catenary fabricators and the structural engineer.

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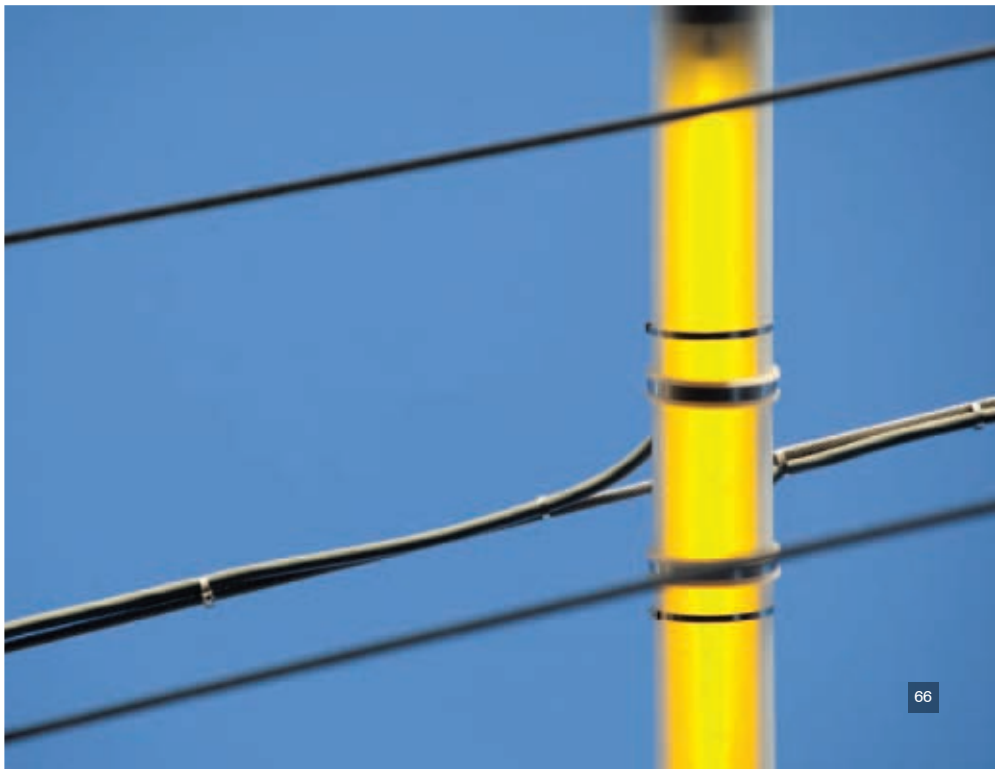

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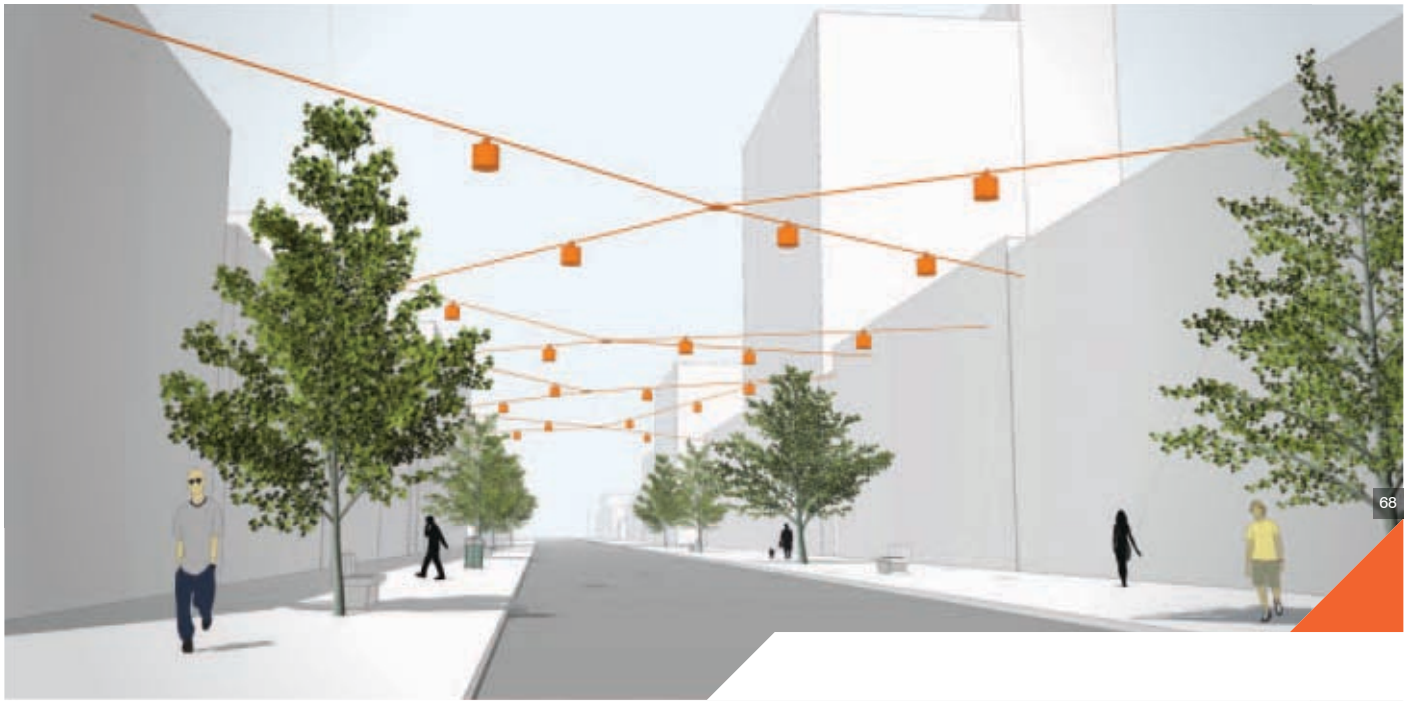
Random Central Ring CATENARY

A discrete cable system for the strategic positioning of light across large spaces

Benefits of a random central ring catenary

The Random Central Ring Catenary system is ideal for lighting large open areas where the availability of buildings for connections may be spaced irregularly around the perimeter. After consideration of where the light is required a cable net is designed to address cable sag and uplift from wind, which are common in large cable spans and wide open areas. The central junction rings that characterise this system usually connect 3 or 4 cables, configured to connect at different heights at the buildings. This creates a more stable net platform with very good resistance to wind uplift. In contrast to the linear grid system, random positioning of the luminaires allows them to better integrate with other elements within the space and to blend in more inconspicuously with the surrounds.



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Beresford Square

Woolwich, London UK

Designer LAP, LONDON
Architect GUSTAFSON PORTER
Lighting Design LAPD LIGHTING DESIGN
Catenary Engineering RONSTAN TENSILE ARCHITECTURE


ROYAL ARSENAL GATEHOUSE

Architect LAB ARCHITECTURE STUDIO + BATES SMART
Engineer ATELIER ONE
General Contractor MULTIPLEX
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner STATE OF VICTORIA

Federation Square

Melbourne, Australia

When Melbourne's new cultural centre was completed in 2003, stakeholders who had worked to design, engineer, detail, and execute the first cable supported lighting structure of this scale, came together and the term "catenary lighting" was born. Now Melbourne's civic and spatial heart, "Fed Square," with its open amphitheatre and surrounding urban and riverside landscapes, can accommodate up to 15,000 people in a space usable well into the evenings. The catenary lighting structure allowed the team to pin-point the many landscape features of the space in an interplay of light and shadow that creates a warm, safe and inviting ambience that is appreciated by the public. Expert in tensile cable nets, Ronstan was approached by Multiplex to detail, develop and execute the random cable net with ring cable connections that facilitated the suspension of luminaires exactly where the light was required. The cable net comprised multiple sets of four cables all designed to work together to provide a stable platform for the lighting elements that resisted deflection in wind. Varying the height of the cable connections created an anticlastic geometry that we still use today to ensure the integrity of these structures.


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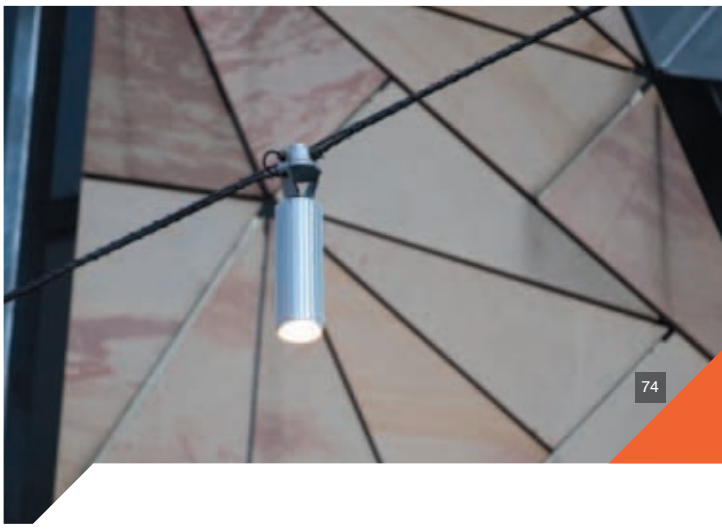
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Designer COX ARCHITECTURE
General Contractor LEND LEASE
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner UNIVERSITY OF QUEENSLAND

76

UQ Oral Health

Herston, Australia

The new Oral Health Centre at the University of Queensland is set to be Australia's largest and most advanced tertiary oral health facility. The architecture is designed specifically to allow professionals and students to interact and the large catenary lighting structure designed, supplied and installed by Ronstan helped fill the design brief to both activate the use of the existing park space, and to connect the medical school to the Hospital campus. With intentional light and shade to create mood, and functional and directional lighting to provide safety, the cable catenary net blends perfectly into the tree scape surrounds and helps add that finishing element to pull the overall design intent together.

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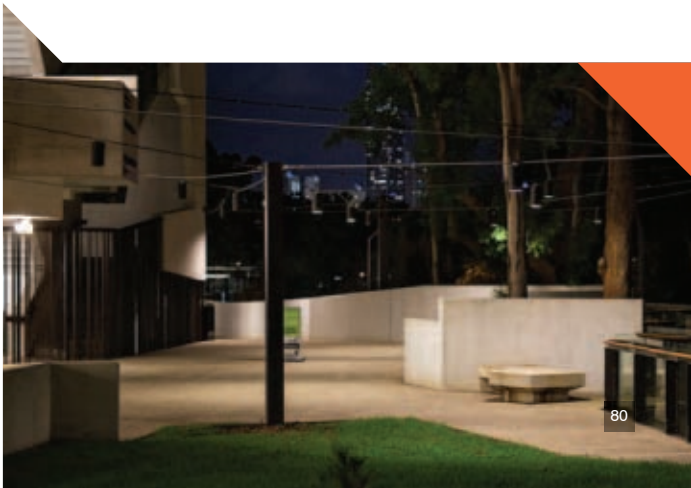

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Architect TAYLOR CULLITY LETHLEAN
Engineer GHD
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner CITY OF MANLY

81

Manly Corso

Sydney, Australia

For well over a century, Manly Corso has been the undisputed hub of Manly village life. Stretching from Manly Wharf to Main Beach Sydney, The Corso today remains the centre of commercial, social and cultural activity due in part to a major renovation of the mall in 2006/7. The project was designed to improve infrastructure, operational aspects of the mall and to reinvigorate the commercial and recreational use of this premier public space.

Central to the project was a catenary lighting system that would open the space and create a distinct, inviting and safe atmosphere that conventional lighting had failed to achieve. The Corso solution utilised a random central ring cable net to overcome a number of design challenges, not the least of which was the need for a design that transferred the high loads of the cable net to façades that in some cases date to the late 1800s. With the low net height governed by the mating buildings, the cable net also had to be engineered around existing trees and a substantial number of mature plantings. Ronstan's understanding of the elastic and inelastic performance of cables was paramount to the success of suspending a catenary cable net suitable to light this urban space of 7000m^2.

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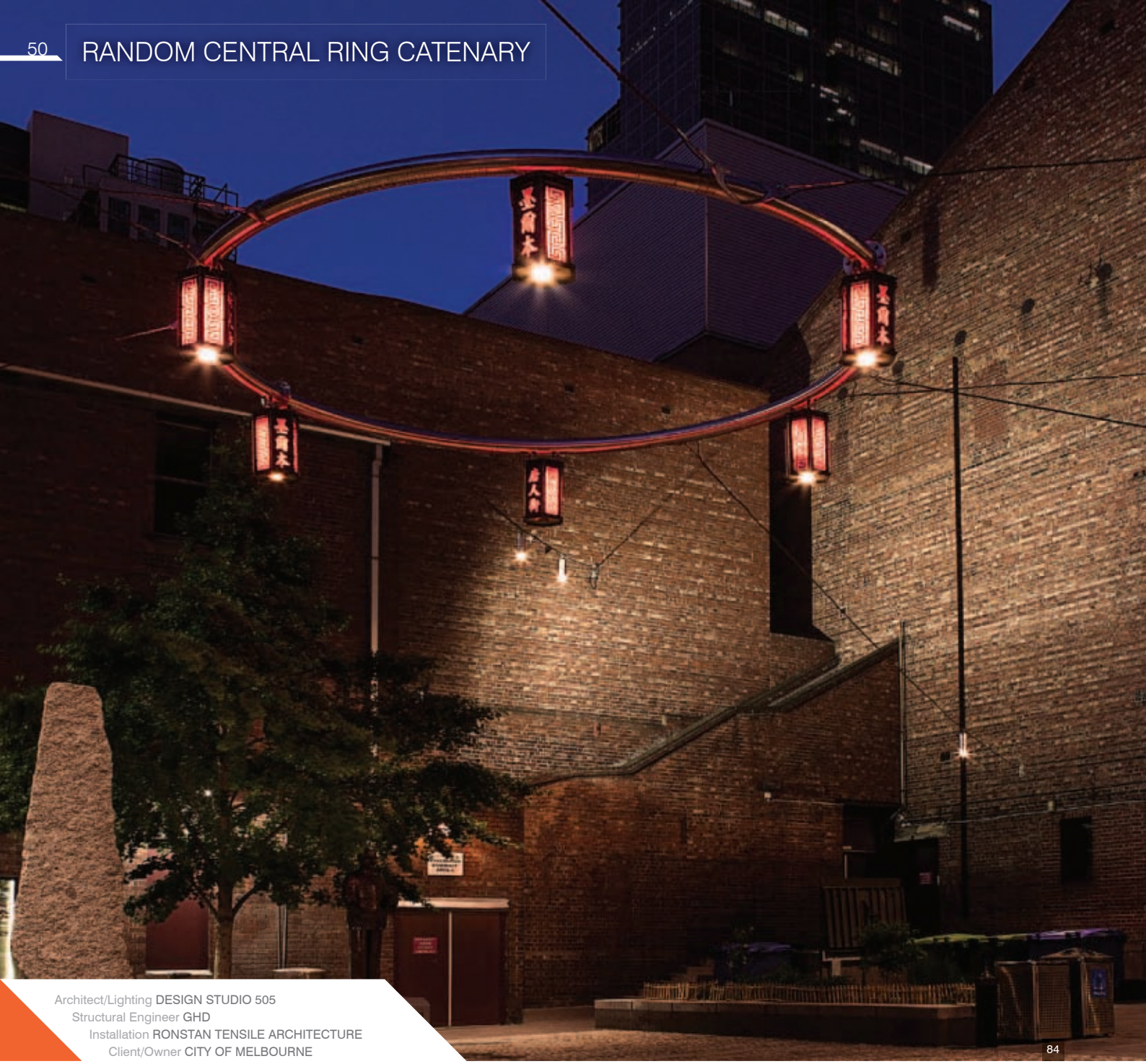

Architect/Lighting DESIGN STUDIO 505
Structural Engineer GHD
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner CITY OF MELBOURNE

84

Cohen Place, Chinatown

Melbourne, Australia

In the heart of Chinatown and adjacent to the Little Bourke Street catenary, the lighting design in Cohen Place responds to the smaller space of the square with a floating central ring catenary that acts as a giant public chandelier. The sculpture has some peripheral lights suspended from the supporting cables to illuminate the walled city square, and the central ring has been fitted with traditional Chinese lanterns. The result is a striking centrepiece that delivers light exactly where it is needed and creates a distinct and inviting ambience.

Catenary DETAILS

Standard and custom detail solutions to adapt any system to an existing or new space

CATENARY DETAILS

Standard connections

Like all tensile structures catenary lighting structures and cable nets resist deflection and hold to the required geometry; the result of careful analysis and consideration of loads and wind. In short, pre-stress or tension in the cable is required to minimise cable sag.

All components and links within the system must be designed to accommodate these loads, which ultimately must be transferred to the building face via a cleat or other connection, and resolved deep in the building structure.

Ronstan provides a wide range of standard and non-standard connections and brackets to adequately service these loads. All utilise corrosion resistant materials to ensure the long-term integrity of the structure. Careful consideration is given to galvanic corrosion, and isolation is used widely.

An important rule is that cleats and components need to be aligned or carry loads in the direct line of action of the cable. The cable geometry must define the cleat angles.


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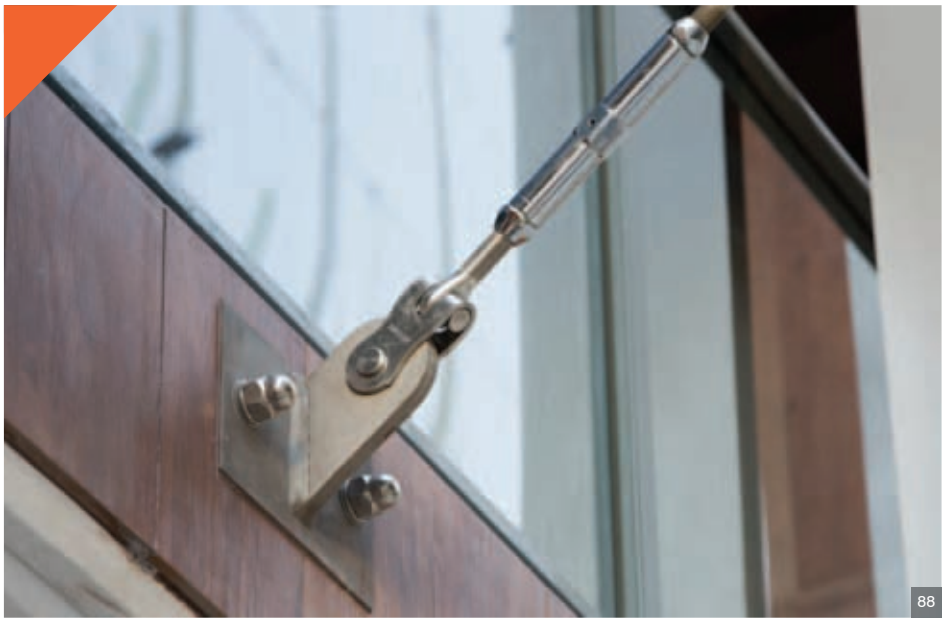
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CATENARY DETAILS

Pole connections

There are myriad pole types and styles available to the catenary designer, but the considerations are consistent to structural integrity, deflection and aesthetics.

The same load considerations mentioned in standard connections apply again with posts or poles, but deflection of the masts must also be understood. Deflection may de-tension the cable net resulting in an imbalance within the net and susceptibility to failure in certain circumstances.

It is important that the performance of the masts, poles or posts is carefully considered, preferably in the modelling and analysis of the net. This ensures deflections are identified and compensated for within the net design and footing design is resolved to support the overall net loads.

Of the different mast types deflection is less evident when tapered masts are used. Poles can also be pre-cambered to counteract expected deflections. Designers should be wary of the use of modular constructed poles with their limited loading capacity.


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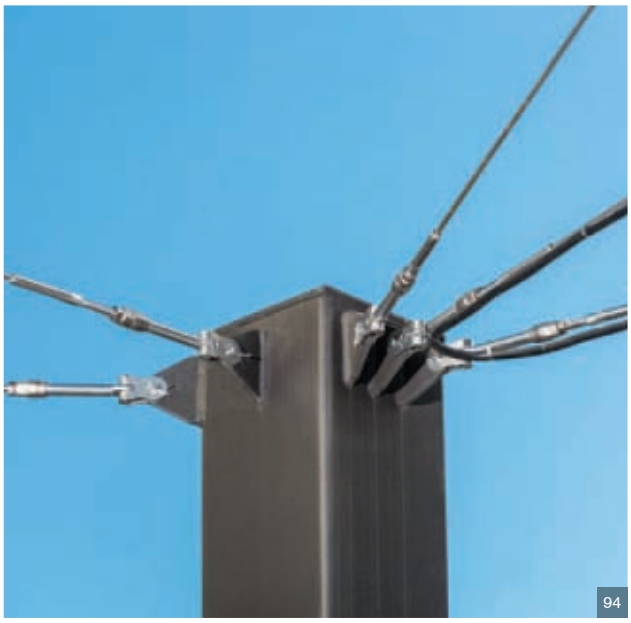
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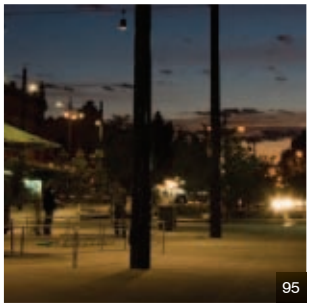
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CATENARY DETAILS

Electrical & Luminaires

Luminaires are many and varied and consideration for their selection must be driven by the functional requirements of the project.

Luminaires can be solely functional, or decorative such as Chinese lanterns, or a mix somewhere in between. With LED technologies a catenary system can be used to realise a passive or animated lighting outcome, where entertainment becomes a driving function of the electrical system.

Ronstan embraces varied and demanding electrical scopes and can offer a complete catenary package, working with your lighting designer to ensure the lighting outcomes reflect the desired brief.


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Public ARTWORK

Engineered suspension systems for urban art

Artist/Designer LIGHTWELL
Installation PACIFIC RIGGING
Client/Owner CITY OF SYDNEY

102

“Forgotten Songs” Angel Place

Sydney, Australia

“Forgotten Songs” commemorates the sounds of birds no longer found within the city. Some of the bird cages contain speakers and play back the sounds of song birds during the day with nocturnal birds taking over at dusk. The design intent for the installation was to create a calming space within this out of the way part of the city. The hand-made quality of some of the cages and the way the cages hang and move in the breeze gives a poignant feeling. Designed originally as temporary artwork, when it came time to de-install, feedback received by the City of Sydney encouraged them to make the artwork a permanent feature of the area. Ronstan structural cables allowed this to happen, with their proven high grade stainless steel and specific load rated turnbuckles and fittings.

Michael Thomas Hill, Lightwell

Artist JAMES TURRELL
Architect WILL BRUDER ARCHITECTS
Client/Owner ARIZONA STATE UNIVERSITY

104

Photographer MATT WINQUIST

Skyspace Air Apparent

Arizona, USA

Artist James Turrell is widely renowned for using photographic techniques in the physical world, to create works of art that make people change their perception of light and space. A “skyspace” is a chamber designed with an aperture in the ceiling where viewers can sit below and watch the changing colours of the sky, usually mixed with the influence of artificial light. The artful experience of the skyspace installation Turrell created at Arizona State University Tempe campus is known as “Air Apparent”. It is housed in a structure designed by architect William Bruder. The design is a contemporary interpretation of ancient Hohokam shade ramadas, pit houses and baskets redefined in a minimal sculptural formwork of 21st-century concrete and steel. Ronstan Tensile Architecture tensioned structural cables helped make this design possible, providing the high tensile strength required to support the overhead canopy.

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Artist PATRICK BLANC
Architect HERZOG & DE MEURON
Structural Engineer ARUP
Client/Owner PEREZ ART MUSEUM MIAMI (PAMM)

107

Perez Art Museum

Miami, USA

The hanging gardens at the famous Perez Art Museum Miami are a perfect example of a large greening system being incorporated into a stunning art exhibit. Ronstan worked with JTI and ARUP engineering to provide the support rods that are integral to this unique vertical garden located on Biscayne Bay in Miami, FL. The hanging gardens were designed by world renowned Artist Patrick Blanc – the creator of the “Living Wall” and famous for his vertical gardens.

The gardens are a series of 7 separate chambers of vertically supported 45cm diameter, fibreglass tubes that are up to 13.7m long. The tube structures serve as the growing surface for tropical plants, mimicking the famous Hanging Gardens of Babylon. The general public can walk freely through the chambers, experiencing the living sculpture that is a vivid part of the new Perez Art Museum Miami.

Ronstan provided technical support and approximately 200 structural tension rods and compression struts of up to 90mm diameter to support and hold the 67 greening tubes in the required position. They are designed to withstand up to 220kmh winds.

Artist ROBERT OWEN & JOANNA BUCKLEY, FINE ART STUDIOS
Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner STOCKLAND

109

“Under The Sun” - Point Cook

Melbourne, Australia

Under the Sun is a relief structure by artists Robert Owen & Joanna Buckley which embodies a symbol of the moon floating over the earth and casting filigreed shadows under the sun. The sculptural work is an expression of the relationship between these celestial bodies, opening a space for moments of perspective and wonder. The symbol of the moon draws a connection to the natural life and tides of the significant local Bellarine Peninsula Wetlands, and references the feminine in recognition of the important role of women in the Point Cook community.
Robert Owen & Joanna Buckley, Fine Art Studios


CHOCOLATE

Artist LAWRENCE ARGENT
Architect KREYSLER & ASSOCIATES
Engineer L.A. FUESS PARTNERS
General Constructor/Builder WALSH AUSTIN JOINT VENTURE
Client/Owner SACRAMENTO INTERNATIONAL AIRPORT

111

Sacramento International Airport

Sacramento, USA

A 17m long, aluminium framed, red rabbit is suspended from the atrium ceiling of Terminal B of the Sacramento Airport. Artist Lawrence Argent was commissioned to create a piece which would ignite the imagination of travellers and visitors alike. “Leap” as the piece is named, is intended to “bring the outside in” and looks as if a giant rabbit has plunged through the glass windows of the terminal and into an open suitcase on the floor of the baggage claim.

This suspended sculpture was installed as the centrepiece of several art exhibits commissioned by the Sacramento Metropolitan Arts Commission. Ronstan provided an array of stainless steel structural cables that bear the full weight of the suspended sculpture, yet appear nearly invisible in contrast to the bright red rabbit.

Play EQUIPMENT

Stainless mesh solutions for fall protection in play equipment

Architect HILL THALIS ARCHITECTURE + URBAN PROJECTS
Landscape Architect JANE IRWIN LANDSCAPE ARCHITECTURE
Tensile Mesh Installation RONSTAN TENSILE ARCHITECTURE
Play Equipment COROCORD
Client/Owner TARONGA ZOO (TARONGA CONSERVATION SOCIETY AUSTRALIA)

113

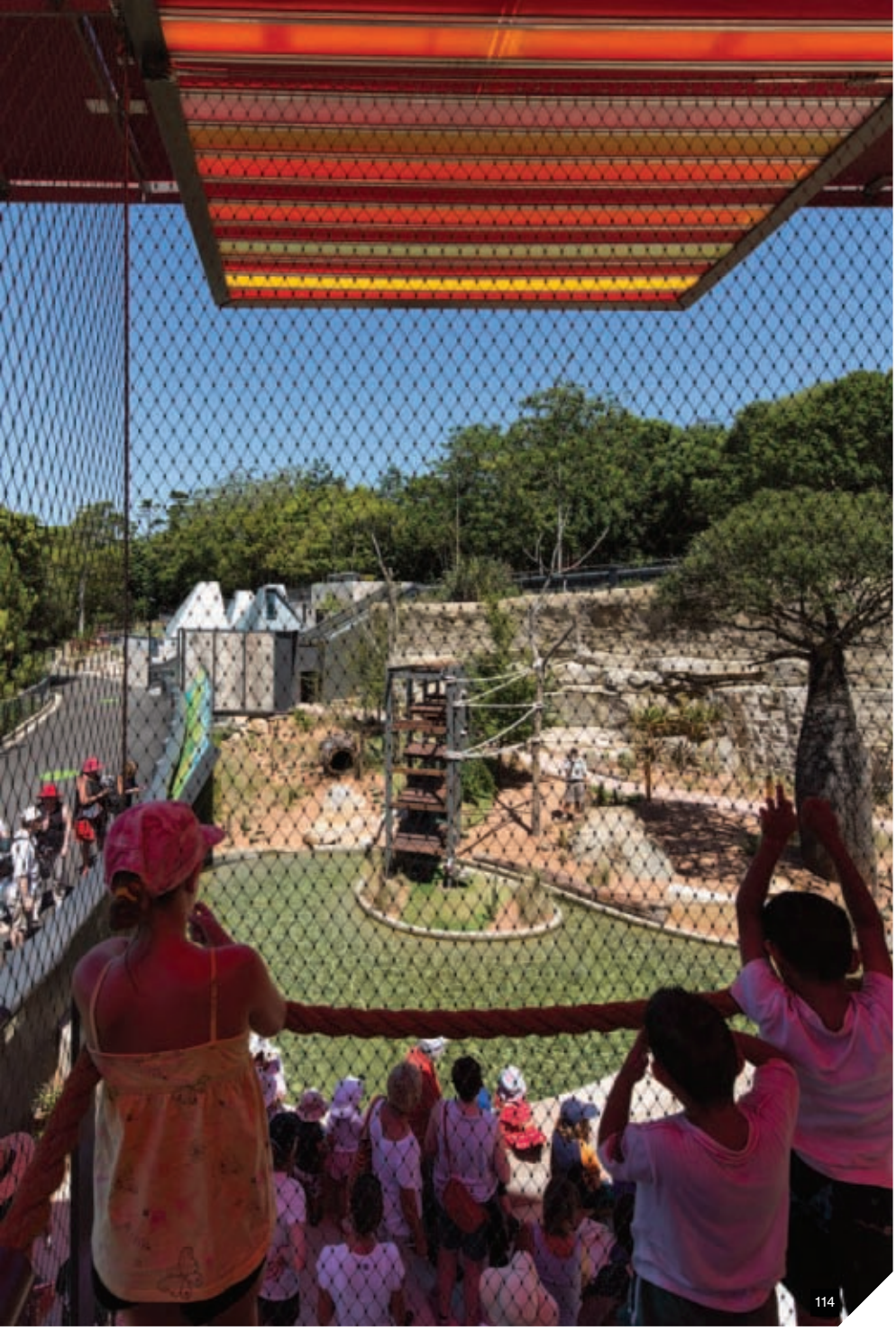
Taronga Zoo Lemur Enclosure

Sydney, Australia

Taronga Zoo's "Lemur Forest Adventure" is an experientially rich project which brings together play, education, interpretation and animal care. The project gives physical form to Taronga's interactive agendas and themes, including lemur welfare and conservation and interpretation of the beauty and wonder of forest environments contrasted against the threat from human actions.

A suite of materials and colours are purposely used throughout. The primary open air structures are light steel frames, overlaid with rope, metal and timber elements. Some are brightly coloured. The open enclosure fineness and the intrinsic material beauty of the woven stainless steel Carl Stahl® X-TEND® mesh supplied and installed by Ronstan, suits the forest structure's relationship to the drama and beauty of its setting, and other elements of Taronga Zoo's "Lemur Forest Adventure".

Hill Thalis Architecture



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Architect LANDLAB
Tensile Mesh Installation RONSTAN TENSILE ARCHITECTURE
Structure & Linear Park HAWKINS INFRASTRUCTURE
Client/Owner WATERFRONT AUCKLAND

117

Daldy Street Play Tank

Wynyard Quarter, Auckland, New Zealand

An existing maritime industrial area in the Wynyard Quarter, Auckland has been radically transformed into an exciting new precinct for locals and visitors to enjoy. Part of the rejuvenation included the creation of “Linear Park,” which has two significant play tank climbing structures reflective of the sites industrial heritage. An innovative and unique exterior cladding was sought to enclose the structure openings and provide absolute protection against falls with maximum visibility and minimal maintenance.

The answer was found in Ronstan’s vibrant new red coloured stainless steel X-TEND® Mesh from Carl Stahl®, which was fashioned and tensioned to the inside of the “Play Tank” to provide a distinctive and compliant barrier against falls, with no noticeable joins or seams. The stainless mesh has a durable and long lasting red polymer coating, which is temperature hardened. The result is striking and contrasts well with the feature timber panelling around the structure.

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Designer/Installer KOMPAN
Tensile Mesh Installation RONSTAN TENSILE ARCHITECTURE
Client/Owner BRISBANE CITY COUNCIL

121

Calamvale District Adventure Park

Brisbane, Australia

The Calamvale District Adventure Park is an exciting addition to the large range of play areas and parklands that stretch across South East Queensland. The structure of the park was designed and installed by Kompan which is the amongst the world's leading playground suppliers, offering unique and compellingly distinctive designs. Incorporating numerous rope ladders, bridges, and climbable spider webs, Carl Stahl® X-TEND® Mesh was supplied and installed by Ronstan to help house one section of playground and prevent children falling from height.


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Architects NEESON MURCUTT ARCHITECTS
Landscape Architect SUE BARNSLEY DESIGN
Contractor REGAL INNOVATIONS
Client/Owner CITY OF SYDNEY

125

Prince Alfred Park Playground

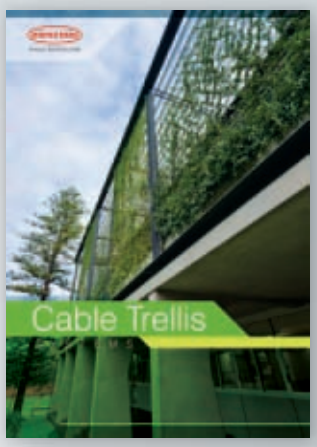
Sydney, Australia

Prince Alfred Park was originally laid out for the Inter-Colonial Exhibition, and the memory of this exhibition is recalled in a series of park elements that abstract the circus pens and animalia of the Agricultural Shows. The toddlers' playground is the most direct interpretation, evolving from two stories reported in the Sydney Morning Herald in 1870. The first was the sea voyage of Prince Alfred's vessel, the "Galatea", and of their pet elephant, which was given temporary residence in the park. The second was the story of an intrepid aeronaut infamous for launching hot-air balloons from the parklands. The playground conflates the stories of boats, elephants and hot-air balloons!
Within the park Ronstan-installed Carl Stahl® stainless steel X-TEND® mesh had been chosen to clad the transparent ribbon-like fence of the public pool, as it was proven un-climbable. So when the exterior of the 4.5 metre high balloon needed securing, we chose to capture this space with the same silver netting. Serendipitously it now resembles drawings of Mr Gale in his balloon!
Sue Barnsley, Sue Barnsley Design

Ronstan Structural Cables
RPA112

Ronstan Structural Rods
RPA113

Ronstan Balustrades
RPA114

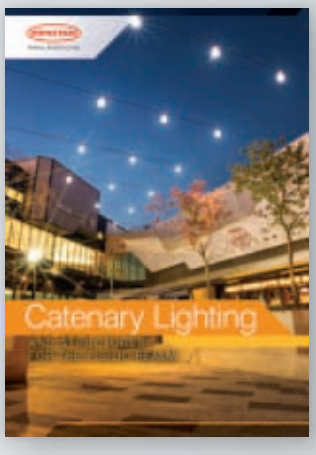


Ronstan Cable Trellis Systems
RPA120

Carl Stahl® I-SYS®
Cable Fittings
RPA107

Carl Stahl® X-TEND®
Stainless Steel Mesh
RPA105

Carl Stahl® POSILOCK®
Cable Suspension Systems
RPA104



Ronstan Catenary Lighting
RPA125

For your copy of any of our product catalogues or one of our capability brochures please email your request to arch@ronstan.com.au

Ronstan catalogue range

The Ronstan Tensile Architecture range of architectural rigging products represents a collection of highly relevant Ronstan manufactured and complimentary products for tensile applications. It is a range that our competitors aspire to and that we continue to develop and improve in collaboration with our customers and clients. Our partners and suppliers have been selected for their quality, innovation and leadership within their categories; attributes that mirror our own position and see our product offering amongst those of the world leaders of tensile architecture.

Product information and warranty

All catalogue information is subject to specification changes during a product's life cycle. The website www.ronstantensilearch.com, should be considered the most up to date source of product information. Warranty and other important information is also available at the website.

RONSTAN

TENSILE ARCHITECTURE

www.RonstanTensileArch.com

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