

WINNING SPACES

OUR GLOBAL PORTFOLIO
OF SPORTS PROJECTS



**PARSONS
BRINCKERHOFF**

Melbourne Park Redevelopment Eastern Plaza - National Tennis Centre
Image courtesy of Major Projects Victoria - Peter Glenane

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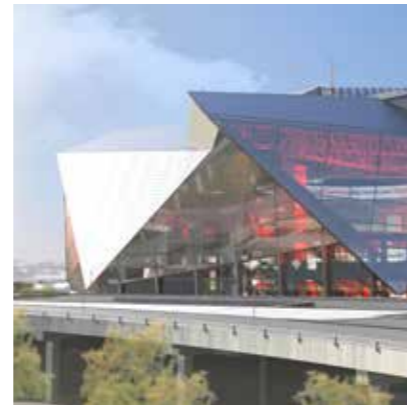
SPORTING PROWESS

WE HAVE BEEN A PROUD PLAYER IN GLOBAL SPORTS DEVELOPMENT FOR OVER FOUR DECADES, HELPING CLIENTS ENRICH COMMUNITIES AND ELECTRIFY AUDIENCES WITH STRIKING AND SUSTAINABLE VENUES.

At WSP | Parsons Brinckerhoff, we have a long history supporting the creation of diverse sports facilities for a rich array of clients. Our record covers everything from national stadia to school swimming pools, multipurpose arenas to specialist facilities, in a portfolio spanning the world.

We bring a global skill set, passion for beautiful buildings and matchless experience to every project, working with architects, owners, councils and developers to create iconic and cost-effective structures that reward both users and operators.

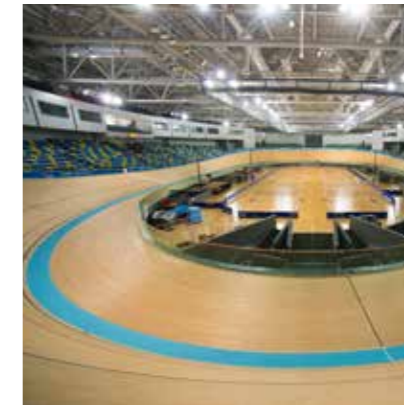
With an intimate understanding of international sports dynamics and creative and flexible teams, we tailor global best practice to meet the needs of every project. Whatever the sport, and wherever the venue, our experts know how to boost building performance and enhance spectator experience.



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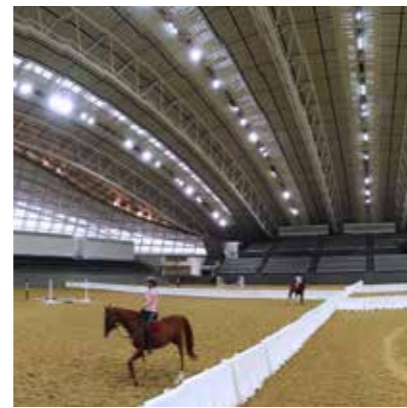
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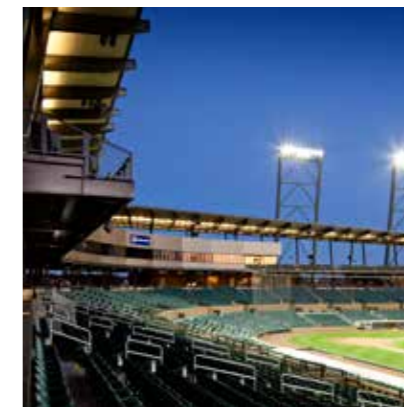
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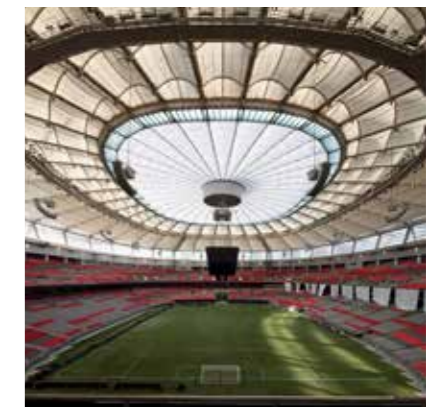
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COMMUNITY ICONS

SPORTS VENUES SHOULD BRING
COMMUNITIES TOGETHER, FOSTERING
LOCAL IDENTITY AND PRIDE.



Sports arenas have the power to light up a city's skyline, put a region on the map and bring together all parts of a diverse community. Getting people into pools and onto running tracks, they quite literally boost the health and vitality of a neighbourhood.

But juggling local needs and sensitivities with the intense pressures of the international sports world can be a challenge.

At WSP | Parsons Brinckerhoff we understand that all sports venues, from Olympic stadia to community swimming pools, must enrich the lives of those around them. We know how to respect the heritage of much-loved buildings, while keeping them relevant; how to create world-class facilities for schoolchildren and professional athletes alike; and how to minimise disruption during construction – making sure these crucial spaces stay in play for those who need them most.

VIDEOTRON CENTRE

AN ICONIC AMPHITHEATRE
DELIVERED ON TIME AND
BUDGET

QUEBEC, CANADA

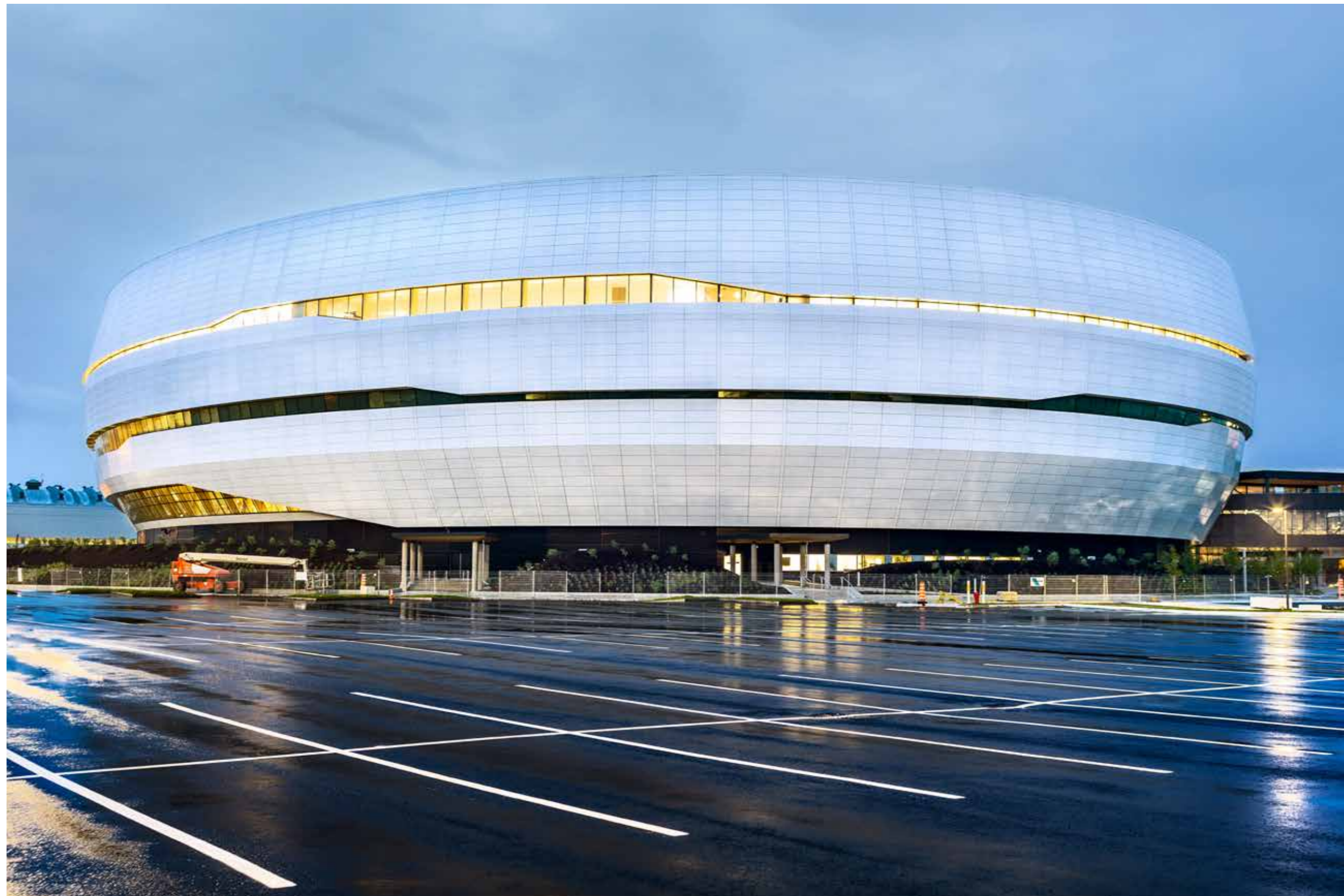
Quebec's long-awaited amphitheatre opened in September 2015 after a three-year building process hailed as a model of cost-effective, efficient construction. The multipurpose arena, which can seat more than 18,000 people, is set up to accommodate the potential return of the Quebec Nordiques ice hockey team and to host cultural events of international scale.

We served as project manager throughout the process, playing a key role in delivering this ambitious scheme on time and budget. Our work included preparation of a realistic budget and work schedule, management plans for all aspects on that massive undertaking as well as directing and supervising the professional and engineering teams, and overseeing the work of the construction manager.

Site coordination was a complex task on a project of this scale, and required frequent meetings, efficient communication and precise day-to-day collaboration. A key challenge was ensuring that all 500 workers working daily on site were able to perform their jobs efficiently, without posing any risk to each other.

In the final months of construction, the team choreographed a ballet of cranes and bucket trucks to enable installation of the communications, audio-visual and staging equipment as the mechanical and electrical facilities were being brought into service. These efforts allowed the facility's inaugural show to go ahead on September 12, 2015—as planned five years earlier.

Client	City of Quebec
Architect	ABCP and GLCRM Architects and Populous
Capacity	18,000
Home of	Quebec Nordiques ice hockey team
Our services	Project management
Project status	Completed in 2015



BC PLACE STADIUM

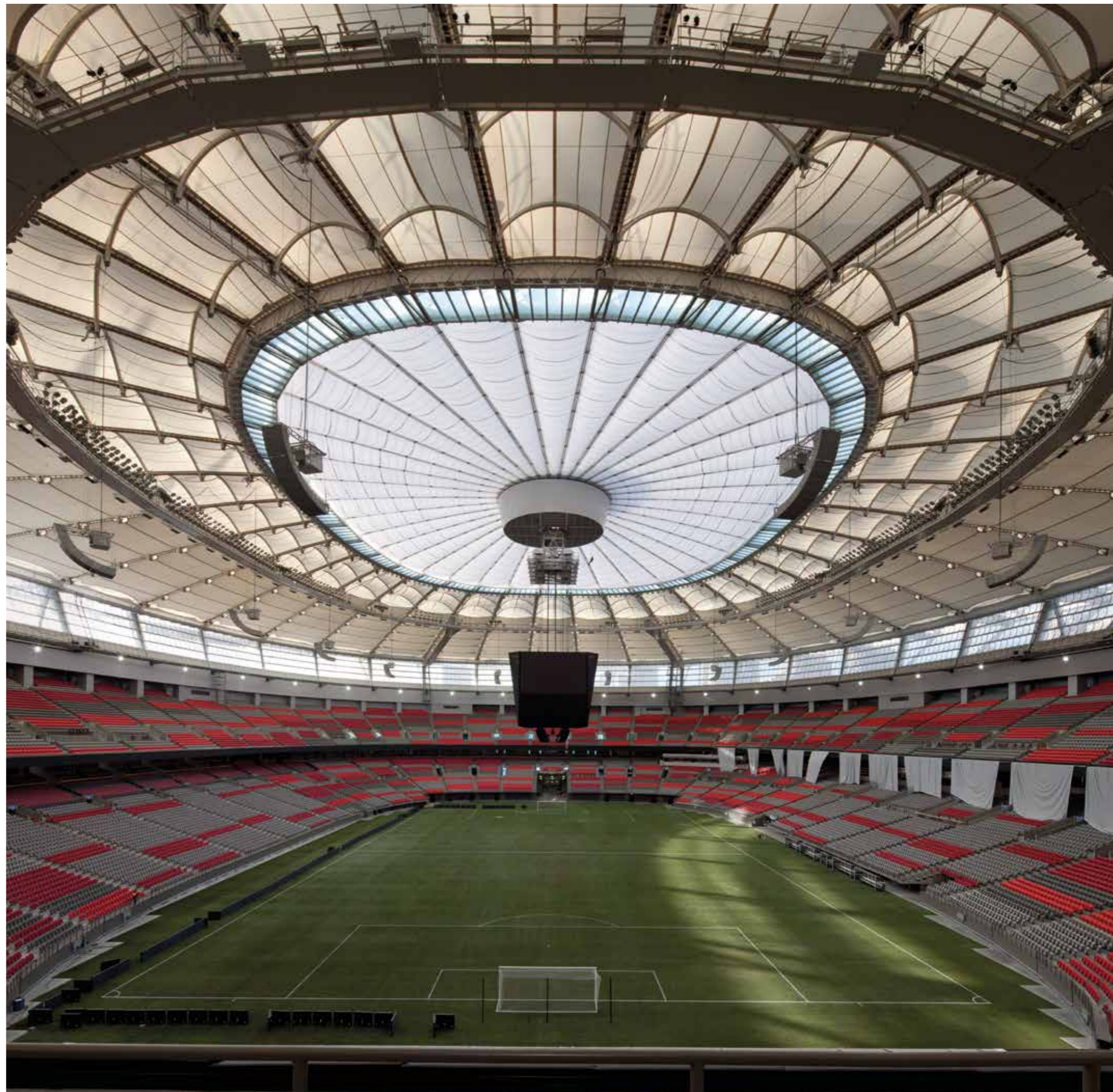
BREATHING NEW LIFE INTO A CITY LANDMARK
VANCOUVER, CANADA

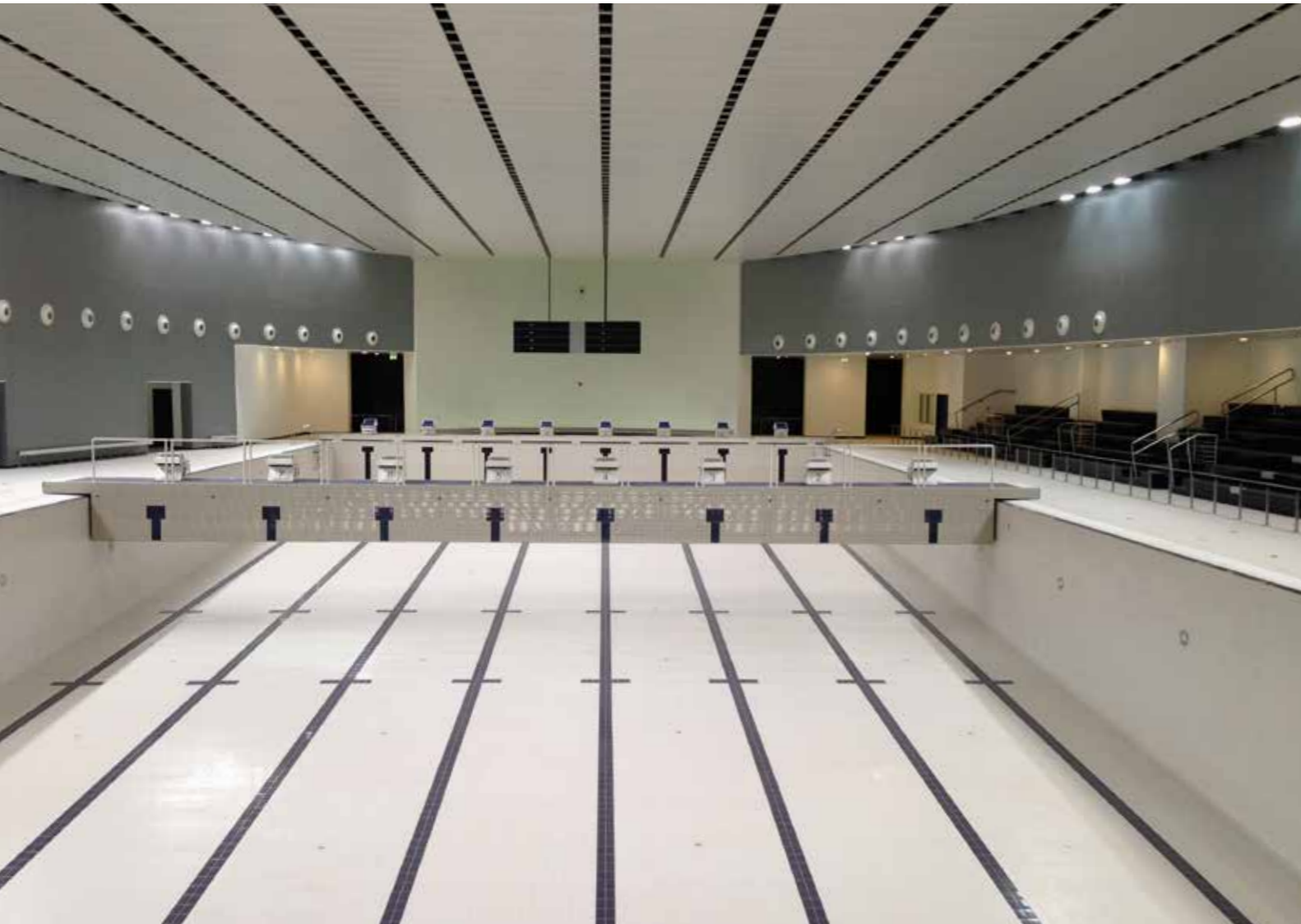
Part of the fabric of British Columbia, Vancouver's 55,000-seat BC Place Stadium hosts hundreds of events each year, including sports, concerts, trade shows, and conventions. The stadium opened in 1983 as Canada's first domed stadium, covered by the world's largest air-supported dome roof. 25 years later, it became clear a revitalisation was needed, both to renew the stadium's place as a Vancouver icon and make it a worthy host of the opening and closing ceremonies of the 2010 Winter Olympic Games.

As lead consultant, we worked with roof designer Geiger Engineers to produce an integrated design for the upgraded stadium, covering all engineering disciplines. The award-winning project was completed in two phases, starting with the interior upgrades to public spaces within the stadium, and as many structural upgrades as possible prior to the Olympics. In the second phase, the roof was replaced and the entrances and back-of-house areas revamped.

The stadium now enjoys enhanced amenities, including field, seating, audio-visual systems, acoustics, illumination and ventilation. Its cable truss retractable roof transforms the building into an open-air sports venue when needed, while an integrated network of energy-efficient, digitally controlled architectural lighting illuminates the stadium on command, animating the city's skyline. An innovative and holistic design approach has breathed new life into the stadium, transforming it into a world-class, modern facility and cementing its place as a Vancouver landmark.

Client	BC Pavilion Corporation
Architect	Stantec
Capacity	55,000
Home of	BC Lions
Our services	Base building structures, mechanical and electrical services
Project status	Completed in 2011





ABBOTSFORD ENTERTAINMENT & SPORTS CENTRE

A CELEBRATED GATEWAY TO A STUNNING CAMPUS
ABBOTSFORD, CANADA

The University of the Fraser Valley is the spectacular setting for the 7,000-seat Abbotsford Entertainment and Sports Centre. Developed as the entry to the existing campus, the facility has become an icon for both the college and city. Until 2014, it was home to the American Hockey League's Abbotsford Heat, the farm team of the National Hockey League's Calgary Flames.

Client	PCL Constructors Westcoast Inc
Architect	Architecture49
Capacity	7,000
Our services	Structural, civil, building services
Project status	Completed in 2009

We provided architectural services through our partner Architecture49, plus structural design and civil and MEP engineering services. The project was completed with the design-build delivery method.

NEW YORK UNIVERSITY, ABU DHABI

KEEPING STUDENTS ON TRACK WITH A STUNNING SPORTS CENTRE
ABU DHABI, UAE

New York University in Abu Dhabi is a new arts and science college, fully integrated into a major research university. Designed by Rafael Viñoly Architects, the campus accommodates 2,600 students with expansive academic space and accommodation – plus impressive indoor and outdoor sports facilities.

The project was procured on a design and build basis. We provided building services, infrastructure design and site supervision for the project.

An integral part of the university is an indoor, 21,500m sports and recreation centre, including an Olympic-size swimming pool, gym and 200m running track. Outside, students benefit from floodlit football fields, tennis and volleyball courts and a 400m synthetic running track with grandstand for 3,000 spectators.

The air-conditioning design of the indoor gymnasium posed a particular challenge due to the facility's range of uses and removable seating, as well as the need to comply with international badminton's rules on air velocity. Our solution was to use high induction radial outlet diffusers with a vertical central core to make sure that air flow penetrates to ground level.

Client	Tamkeen Abu Dhabi LLC
Architect	Rafael Viñoly Architects
Our services	Building services, infrastructure design, site supervision
Project status	Completed in 2014



CITI FIELD

INTIMATE ATMOSPHERE FOR A RETRO BASEBALL STADIUM

NEW YORK, USA

Citi Field in New York City's borough of Queens is home to the New York Mets baseball team. The award-winning, 45,000-capacity stadium includes a restaurant with field-view seating, a New York Mets interactive museum and a Hall of Fame.

We were the structural engineer for this world-class facility, which uses large cantilevers to create a vertically stacked seating arrangement, offering improved sightlines and an intimate, close-to-the-action feeling. The architecture is based on Ebbets Field, home of the Brooklyn Dodgers until the 1950s.

To achieve the stadium's 'retro' look, most of the support steel was left exposed. The seating bowl, stairs and field walls are made from pre-cast concrete.

The site's poor soil presented a challenge for our team, calling for piles to support not only the superstructure but also the ground-level floor slab and plaza area. It also increased seismic risk to the complex, while the need for open concourses restricted use of steel bracing. We overcame this by using powerful concrete shear walls around the stair towers to provide additional support and incorporating special concentrically braced frames.

The project was delivered in 36 months, in time for the Mets' April 2009 home opener, a timeline requiring extremely close coordination across the design team. We used building information modelling (BIM) to coordinate the stadium's structural and architectural design.

The project won the American Council of Engineering Companies' Diamond Award for Engineering Excellence in 2009.

Client	Queens Ballpark Company
Architect	Populous
Capacity	45,000
Home of	New York Mets baseball team
Our services	Structural, BIM
Project status	Completed 2009



ALLIANZ ARENA

EFFICIENT ACCESS TO A WORLD - CLASS STADIUM

MUNICH, GERMANY

The Allianz Arena is home to the world-famous football club Bayern Munich and hosted six of the 2006 FIFA World Cup matches in Germany. With a seating capacity of 75,024, its car park can hold up to 11,000 cars and 350 buses.

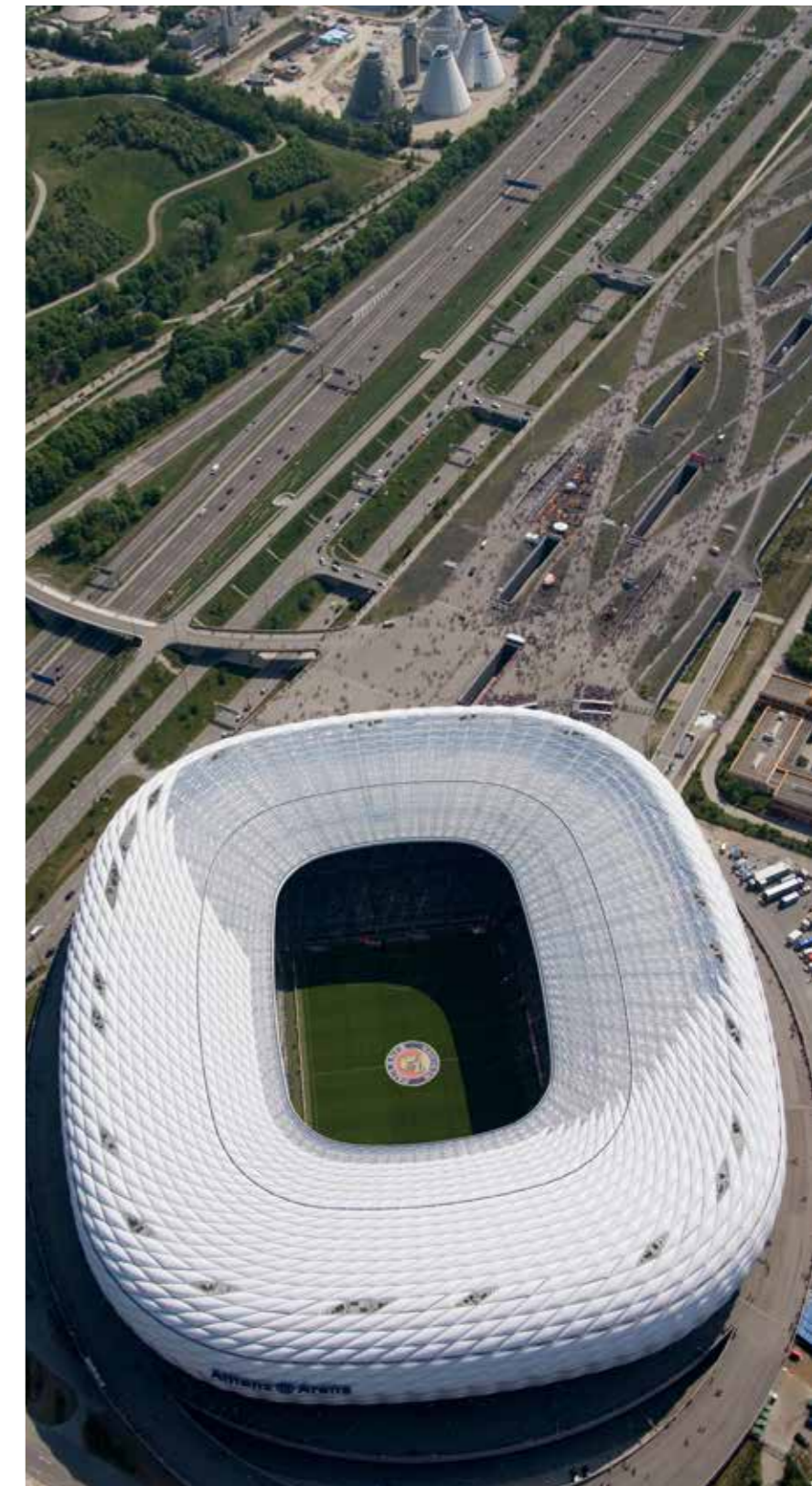
We were appointed to develop key infrastructure designs for the project including the planning of several bridges to ensure the smooth flowing of traffic. We were also responsible for the construction management for the entire infrastructure improvement.

In addition, a multi-lane road was constructed between the junctions of the A9 and A99 motorways to connect the stadium with the multi-storey car park. To allow for intersection-free traffic, both carriageways were vertically offset.

Several other constructions, primarily bridges, were designed to ensure intersection-free traffic across the site such as a 30m footbridge, built over the main road, allowing pedestrians to easily reach the three car parks. In addition, all the bridges on site have been designed to complement each other with recurring design features.

A flyover over the A9, A99 feeder road and Heisenberg-Allee ensured unobstructed access for emergency vehicles and to ensure minimum motorway closure during its construction we developed a modular construction system for the superstructure.

Client	Baureferat der Landeshauptstadt München
Architect	Schultz-Brauns & Reinhart Architekten GmbH (design consultant for bridges)
Capacity	75,000
Home of	FC Bayern Munich and TSV 1860 München
Our services	Civil, structural, construction management, HSE
Project status	Completed 2005





STAMFORD BRIDGE

A NEW, EXPANDED STADIUM
WITHIN HISTORIC SITE
BOUNDARIES
LONDON, UK

Stamford Bridge has been home to Chelsea Football Club since 1905. The owner has submitted a planning application to construct a new, larger stadium on its historic Stamford Bridge site in London, UK. The expansion will increase the stadium's capacity to approximately 60,000. Plans for the new venue also include upgrading the football-related facilities, including the museum and megastore, in addition to providing improved stadium access.

Our team provided structural engineering for the planning application working with schlaich bergemann partner, the world-leading roof specialist. We also provided civil engineering, transportation and environmental services.

A key challenge is to increase capacity within the confines of the current site, making maximum use of the space. Solutions include building a basement across the majority of the site and removing the existing hotels and a fitness club. Concrete decks over the Network Rail line to the east of the site and London Underground land to the north will create further space for the stadium and pedestrian egress.

The stadium will have five levels above ground and an extensive basement. It will feature a three-tier bowl which, along with the concourse areas, will be constructed in concrete. A steel roof clad on the underside extends inwards from the edge of the seating bowl. The pitch is lowered by approximately 5m compared to the existing level, to limit the overall height of the stadium and create space for the additional crowd capacity.

Client	Fordstam Ltd
Architect	Herzog & de Meuron
Capacity	60,000
Home of	Chelsea FC
Our services	Structural, geotechnical, rail systems, traffic and transportation, BREEAM advice, below-ground drainage, vertical transportation, waste management
Project status	Ongoing

© Herzog & de Meuron

COCKBURN REGIONAL PHYSICAL ACTIVITY & EDUCATION CENTRE

STATE-OF-THE-ART FACILITIES FOR THE WHOLE COMMUNITY

PERTH, AUSTRALIA

The City of Cockburn is partnering with the Fremantle Dockers AFL Football Club and Curtin University to deliver an AUS\$109m, world-class sporting centre, the largest of its kind ever undertaken in Western Australia. Facilities will include outdoor and indoor pools, water slides and an AFL football ground, plus community meeting spaces, a six-court stadium and learning facilities for local sports science students. The site is set to be the new home for the Fremantle Dockers AFL team.

The client's challenge was to create a landmark building that offers state-of-the-art facilities to the community with minimal environmental impact.

We are providing mechanical services engineering for the project, with the original design including a central chilled and heating water system, linked to deep aquifer geothermal to provide environmentally friendly heating for the pools. In such a large, mixed-use centre, it is crucial that all mechanical installations operate cost-effectively and efficiently whilst maintaining the comfort of the building's users.

Our approach has been to collaborate closely with all stakeholders in the large design team and diverse client user groups. To achieve this, we have held a number of workshops tackling some of the more design-intensive elements of the building's mechanical services.

Client	City of Cockburn
Architect	Sandover Pinder, dwp suters
Home of	The Fremantle Dockers
Our services	Mechanical services
Project status	Completion due in 2017



MERIDIAN CENTRE

AN ICY TRIUMPH FOR DOWNTOWN REVITALIZATION ST CATHARINES, CANADA

The Meridian Centre is a new sports and entertainment facility for the Ontario City of St Catharines and home to the Niagara IceDogs ice hockey team. It was designed and built by the Ball-Rankin construction team, which included WSP | Parsons Brinckerhoff and Architecture49. The facility, part of a wider revitalisation of downtown St Catharines, includes a U-shaped bowl with over 5,000 fixed seats and a three-level scheme with event, concourse and suite levels.

Client	Ball Construction and Rankin Construction
Architect	Architecture49
Capacity	5,000
Home of	Niagara IceDogs ice hockey team
Our services	Structural, building services
Project status	Completed in 2014



Image courtesy of Vaughn Ridley



HOLY AL-NAJAF STADIUM

A COOL, LATTICED HAVEN IN THE DESERT
NAJAF, IRAQ

The 30,000-seat soccer stadium is located at Najaf, approximately 100 miles south of Baghdad. It features two 1,000-seat training fields with related structures, remote practice field lockers, storage, concessions, ticket buildings and guard houses.

Unlike the oval-shaped Basra and Al-Mina'a stadia, Al-Najaf has an unusual square exterior, detailed with Islamic-influenced latticework reminiscent of the sacred Imam Ali Mosque in the heart of the city.

Our services included MEP and fire protection engineering, with an emphasis on sustainable design solutions. One example is the facility's passive cooling towers, included to keep the stadium concourse comfortable despite the region's high temperatures. We also provided sports lighting design.

Client	Government of Iraq
Architect	HOK
Capacity	30,000
Home of	Najaf FC
Our services	Building services, fire protection, sports lighting design
Project status	Completed in 2013

SEATTLE ARENA

DRAWING WORLD-CLASS PERFORMANCES WITH A CONTEMPORARY ARENA
SEATTLE, USA

Seattle Arena, or the Sonics Arena, is a proposed 18,500-seat multipurpose sports stadium, designed to host major-league ice hockey and basketball, concerts and other events. Also included in the project is a basketball training facility suitable for a National Basketball Association (NBA) franchise.

We are providing MEP services, specialist environmental design and lighting design to the scheme, which aims to create an intimate fan experience in a new landmark building for downtown Seattle. Besides the main stadium facilities, the design includes a courtside club, team stores, office and media space and building operations and support facilities. The arena and NBA-level training centre will share some space to minimise duplication in construction.

The scheme, which represents one of the largest private investments for an arena project in North America, is expected to turn Seattle into a pre-eminent concert destination, drawing greater numbers of world-class concerts and shows to the city than ever before.

Client	HOK
Architect	HOK
Capacity	18,500
Our services	Building services, environmental, lighting design
Project status	In design



PAN AM / PARAPAN AM AQUATICS CENTRE

A GREEN SWIMMING CENTRE NESTLED IN THE GROUND
TORONTO, CANADA



The Pan Am / Parapan Am Aquatics Centre and Field House on the University of Toronto's Scarborough Campus was a key venue for the 2015 Pan Am / Parapan Am Games, with a 6000-capacity main competition pool. The complex includes two 10-lane, 52m international competition pools and a 5.5m-deep diving tank, plus an indoor recreational track, fitness facilities and a field house for training and competition. The complex will now serve as a national high-performance aquatics and athletics facility and will house the Canadian Sport Institute of Ontario (CSIO), a world-leading sports research facility.

We provided structural engineering services, green building and energy services, and building envelope design and construction review for the project.

The building is depressed approximately eight metres into the ground, enabling its high volume spaces to be accommodated without overpowering the surrounding area. The foundations are made from cast-in-place concrete with a structural steel superstructure. Long span roofs are framed with structural steel trusses and beams, and the floors with concrete on steel deck, supported by composite steel beams. The competition and training pools are prefabricated.

Using energy modelling and design feedback, we helped the project's sponsors achieve an ambitious energy target. Green roofs cover around 60% of the structure's roof area. We also carried out daylight simulation to support strategies for controlling glare within the competition spaces.

Client	PCL Constructors Canada Inc.
Architect	Norr
Capacity	6,000
Our services	Structural, green building and energy services, building envelope consulting
Project status	Completed in 2014

Image courtesy of Shai Gil Photography



WORLD-CLASS EXPERIENCES

GOOD DESIGN IS THE FIRST STEP IN GIVING FANS AND ATHLETES THE TIME OF THEIR LIVES.



Sports events are special. They are times of excitement and tension, highs and lows, moments that make and break careers and are retold for generations.

The buildings where they happen are special too. Giving spectators and players outstanding experiences depends on inspiring, comfortable and reliable structures. At WSP | Parsons Brinckerhoff, we know that the venue and the action are intimately entwined.

We are experts in creating sports facilities that deliver every time, whether we're enhancing views of the pitch, using specialist lighting to impress the crowds or engineering retractable roofs that let play continue whatever the weather. So when that goal is scored, or finishing line reached, everyone can be in on the action.

AL SHAQAB EQUESTRIAN CENTRE

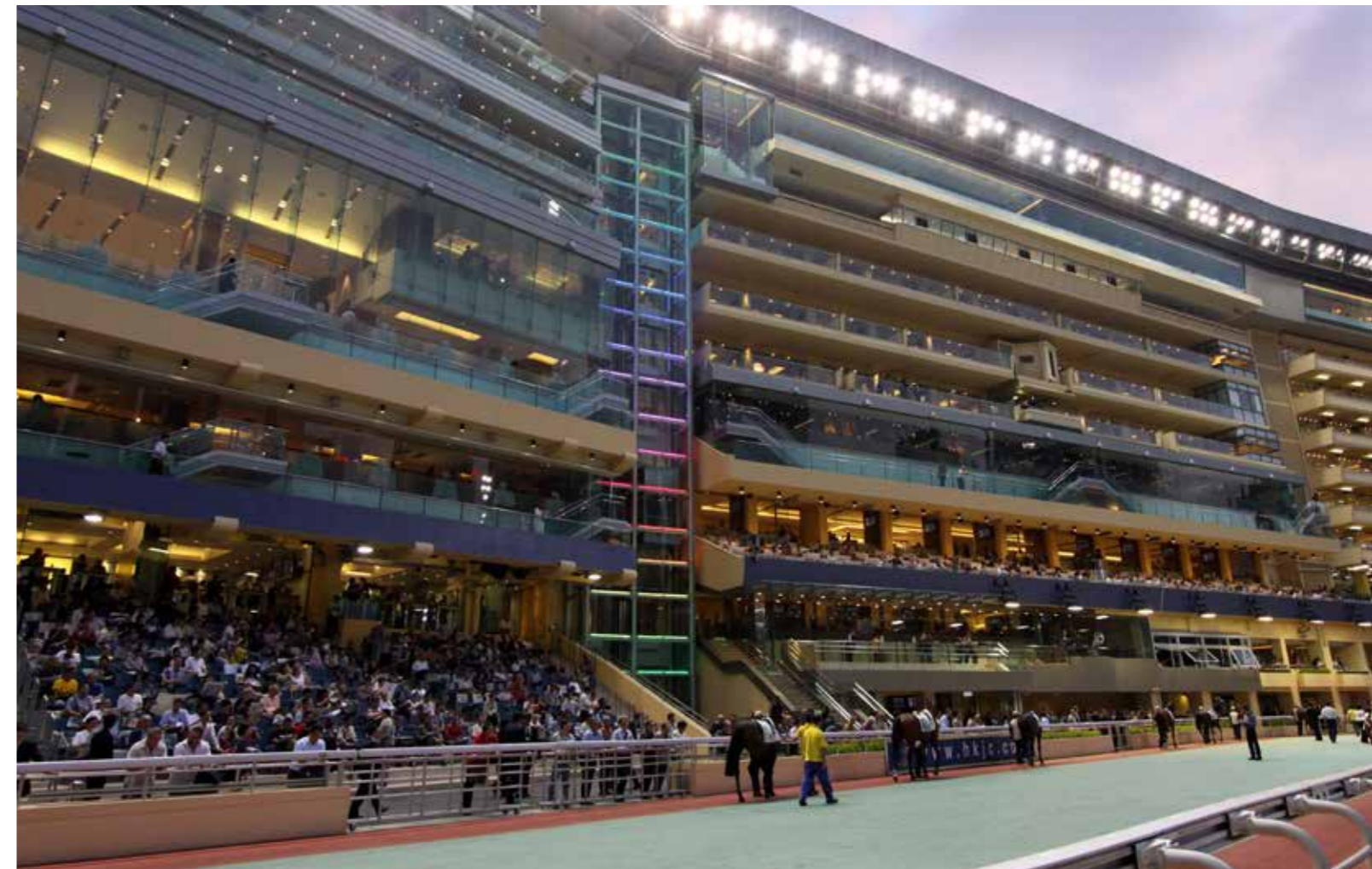
SHIELDING SPECTATORS FROM THE ARABIAN CLIMATE WITH A SPECTACULAR ROOF
DOHA, QATAR

Al Shaqab, Qatar Foundation's equestrian complex in Doha, is the region's leading equine education resource centre. We provided civil and structural engineering, building services and infrastructure design for the award-winning project, which includes a performance arena, equestrian club, riding school, mosque, museum, veterinary hospital, stable facilities and Royal accommodation. The centrepiece of the 980,000m² complex is the International Equestrian Arena, a combined indoor and outdoor competition facility capable of hosting Olympic-standard events.

We delivered the structural design for the internal arena's clam-shaped steel roof. Our visually strong and simple solution provides a clear expression of the 350m-long roof as an all-encompassing entity shielding the activities below from the harsh Arabian climate. We completed the design in just six months, a challenging time-scale dictated by the need to be ready for the 2006 Asian Games.

The roof profile is curved in two directions, with clear spans of up to 120 metres, and supported on steel trusses of triangular cross section. As it has no movement joints, our engineers had to find a way to reduce the locked-in forces caused by the large temperature range. We also carried out a wind tunnel aerodynamic stability study to minimise vibration risk. In addition, the roof supports the high-intensity performance lighting within the envelope instead of conventional high-mast configuration.

Client	Qatar Foundation
Architect	Leigh & Orange Architects
Our services	Structural, civil, building services, infrastructure design
Project status	Completed in 2006



HONG KONG JOCKEY CLUB

AN ENHANCED EXPERIENCE FOR RACE-GOERS
HONG KONG

Founded in 1884, the Hong Kong Jockey Club is one of the oldest institutions in Hong Kong. It recently upgraded the grandstand facilities of its two racecourses, Happy Valley and Shatin, to create more interactive, brighter and more stylish facilities for the punters. These included modernised public and members betting halls, new coffee shops and private boxes. The air-conditioning was also upgraded at both racecourses.

We were employed in a partnership arrangement to provide the engineering design of the building services. This included surveying the condition of the MEP infrastructure, modernising the lifts, upgrading the air conditioning infrastructure, implementing fire safety improvements and developing energy management and sustainability design initiatives. In addition we introduced a Horse Trakus system. This offers a tracking system which determines the exact location of each horse throughout a race to improve the race viewing experience.

Client	The Hong Kong Jockey Club
Architect	Aedas
Our services	Building Services
Project status	Completed in 2014

MERCEDES-BENZ STADIUM

TRAILBLAZING LIGHTING DESIGN TO BOOST FLEXIBILITY, PERFORMANCE AND FUN
ATLANTA, USA

Construction is under way on the Mercedes-Benz Stadium, the new Georgia home of the Atlanta Falcons American football team and Atlanta United soccer club. The multipurpose stadium will have an eight-panel retractable roof, resembling a camera oculus, responding to the Atlanta Falcons' desire to play outdoors except in the most extreme weather. The stadium, being built with an eye to hosting a future Super Bowl, will seat around 70,000 people, with 180 luxury suites and 7,500 club seats.

Our team is providing building services, specialist lighting design and sustainability consultancy. We are committed to creating a reliable and efficient building, maximising the fan experience and highlighting the unique architecture of what will be a signature building for Atlanta. We're also supporting the client's target of a LEED Platinum rating, with sustainable features including high-efficiency water fixtures that cut sanitary water consumption by 40%.

The stadium will mostly use LED lighting, including for sports lighting, an unusual step for a facility of this size. This will give the owners ultimate flexibility, while significantly cutting energy and maintenance costs. Other innovations include the use of light fittings as wayfinding devices for fans and colour-changing LEDs to illuminate the building's façade. We are also exploring the use of different light qualities for locker rooms, to help players achieve peak performance for the game and enjoy a relaxing post-match atmosphere.

Client	Arthur M Blank Group Sports and Entertainment Group
Architect	HOK
Capacity	70,000
Home of	Atlanta Falcons American Football team
Our services	Building services, specialist lighting design, sustainable design consultancy
Project status	Completion due in 2017



Image courtesy of HOK

BASRA SPORTS CITY

OLYMPIC CALIBRE FACILITIES FOR IRAQ'S SECOND CITY

BASRA, IRAQ

We provided MEP engineering, fire protection and full lighting design services for Basra Sports City, which hosted the Gulf Games in 2013. The project was split into two phases, with phase 1 covering the 65,000-seat main stadium, a 10,000-seat practice stadium, four practice fields, athlete housing, a VIP guesthouse, fire station and surface parking.

Phase 2 consists of around 20 new sporting venues in separate buildings. When complete, the government-backed project will be akin to an Olympic venue.

The main stadium was built to International Building Code and FIFA Standards. In addition to its 65,000 seats, the complex features a range of suites, VIP lounges and restaurants, facilities for spectators, athletes and employees, and building operation facilities, covering security, housekeeping, maintenance and trash management. It also has underground parking and a tunnel connecting the main stadium to the practice stadium.

Client	Iraq Ministry of Youth and Sports
Architect	HOK
Capacity	65,000
Our services	Building services, sports lighting design, fire protection
Project status	Completed in 2012



AL-MINA'A STADIUM

BRINGING A STADIUM TO LIFE WITH SPECIALIST LIGHTING

BASRA, IRAQ

The Al-Mina'a Stadium project in Basra includes a 30,000-seat soccer stadium, two 1,000-seat training fields, VIP lounges, a press box, ticket buildings, restaurants, concession areas, guard houses and offices.

We provided MEP and fire protection design services for all parts of the Al-Mina'a Stadium. We also provided sports lighting design for the entire site including the stadium and training fields and stadium façade.

Client	Iraq Ministry of Youth and Sports
Architect	HOK
Capacity	30,000
Home of	Al-Mina'a SC
Our services	Building services, sports lighting design, fire protection
Project status	Completed in 2013



© Jim Simmons

LEVI'S STADIUM

A SUSTAINABLE ARENA THAT KEEPS FANS CLOSE TO THE ACTION
SANTA CLARA, USA

Levi's Stadium is an open-air, multipurpose venue, home to the San Francisco 49ers American football team. The 77,000-seat facility, which opened on schedule in July 2014, is set up to host a variety of sports, including soccer, wrestling and motocross, as well as concerts and conferences. Its 200 luxury suites, built across two levels, are clustered on one side of the field, meaning fans in the upper deck of normal seating can be closer to the action.

We were the engineer of record for the stadium, designed with a strong focus on spectator experience and green technology. Our services included MEP, fire protection and sports lighting, as well as sustainable design.

The building is one of the most sustainable sporting venues in the United States, and currently the only professional football stadium to achieve LEED Gold certification. Environmentally friendly features include a heating, ventilation and air-conditioning system that avoids CFC-based refrigerants, instead relying on materials that minimise ozone-depleting compounds; use of recycled water for landscape irrigation; and a solar-panelled roof deck that powers the stadium through home games.

In addition to typical spectator amenities, such as clubs, restrooms and shops, the stadium features day-of-game team facilities, stadium and team administration offices and related back-of-house areas.

Client	HNTB Corporation
Architect	HNTB Architecture
Capacity	77,000
Home of	San Francisco 49ers American Football team
Our services	Building services, fire protection, environmental, event lighting
Project status	Completed in 2014

ARTHUR ASHE STADIUM

ALL-WEATHER PROTECTION FOR TENNIS STARS AND FANS

NEW YORK, USA

Arthur Ashe Stadium is the largest outdoor tennis-only venue in the world by capacity and the main stadium of the US Open. Named after champion player Arthur Ashe, the arena has over 22,500 seats, 90 luxury suites, five restaurants and a two-level players' lounge. It is part of the United States Tennis Association (USTA) Billie Jean King National Tennis Center, located in Flushing Meadows Corona Park in the New York borough of Queens.

We were the structural engineer for the stadium, which opened in 1997 on the site of the 1939 and 1964 World's Fairs. Following years of bad weather wreaking havoc with the US Open's schedule, USTA announced plans to put a roof on the stadium as part of a \$500m renovation.

We have been appointed structural engineer for the new retractable roof, which will continue to allow open-air events while providing all-weather protection. The primary challenge has been to create a visually compelling structural design for the tennis world's largest long-span retractable roof, on poor soil and within a tight budget. Our solution includes the use of just eight columns to support the lightweight fabric roof, maintaining good sightlines for spectators.

Client	United States Tennis Association
Architect	Rossetti
Capacity	22,500
Home of	US Open Tennis
Our services	Structural engineering
Project status	Stadium completed 1997; completion of retractable roof due in 2016/17



© Chris Nicholson

QUEENSLAND TENNIS CENTRE

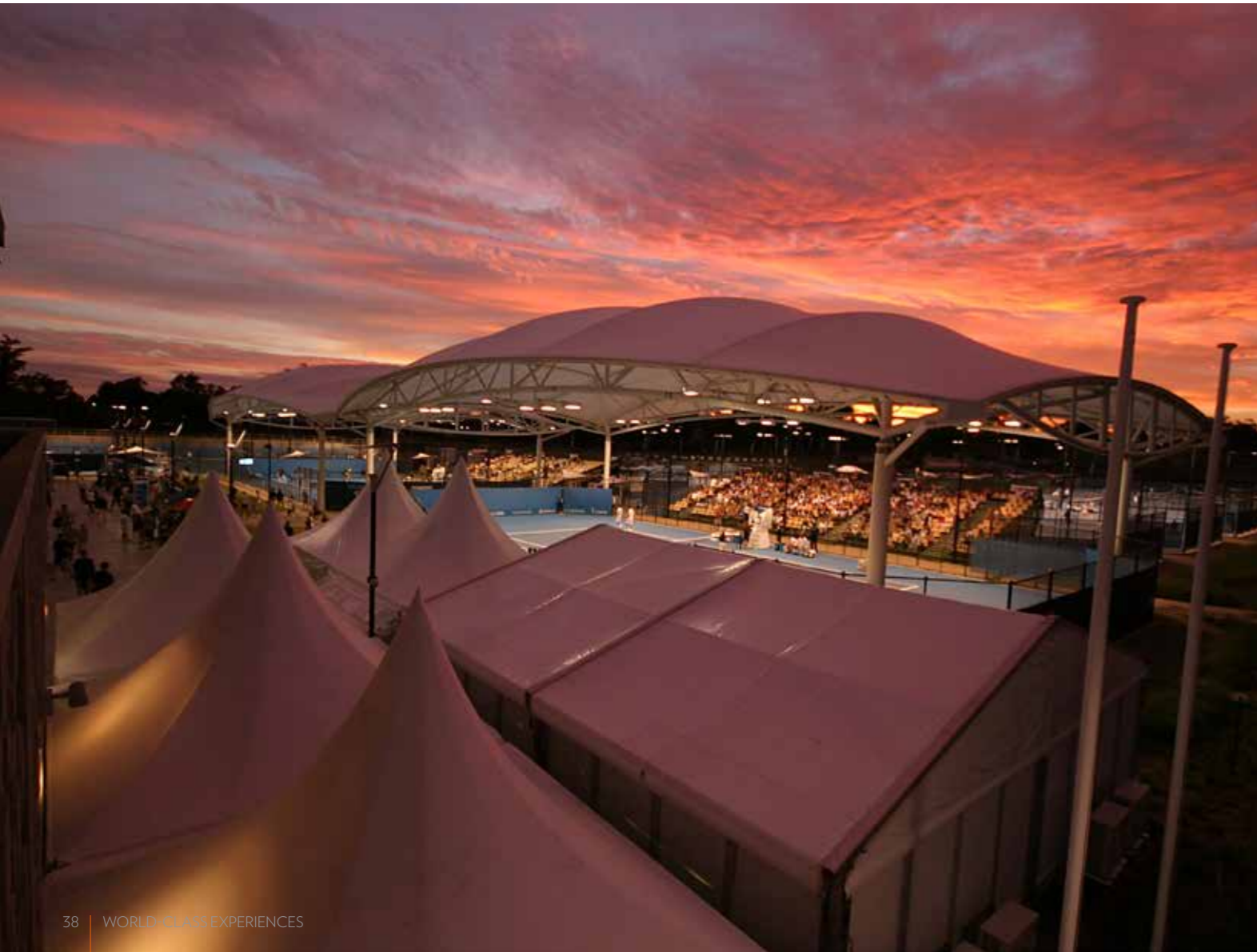
A WORLD CLASS LEGACY TO BE PROUD OF
BRISBANE, AUSTRALIA

Queensland Tennis Centre opened in January 2009 to provide a much-needed, world-class tennis centre for Queensland. It has 23 International Tennis Federation standard tennis courts including grass, clay and hard court surfaces and a 5,500-seat covered centre court, named the Pat Rafter Arena. In addition there are corporate suites, function venues and all the public and player facilities required to host an international tennis tournament.

We provided mechanical, electrical, fire, vertical transportation, and specialist sports lighting design services for the design and construction phases of the project.

Centre court is provided with a translucent, glass fibre, lightweight fabric roof that is open at the perimeters to allow cross ventilation. We also helped with comfort modelling of conditions within the seating bowl and centre court to allow the architects to fine-tune their roof design.

Client	Queensland State Government and Mirvac
Architect	Populous
Capacity	5,500 centre court
Our services	Building services, fire protection, vertical transportation, sports lighting
Project status	Completed in 2008



AVAYA STADIUM

NEW STATUS FOR SOCCER IN A MAGNIFICENT STADIUM
SAN JOSE, USA

The Avaya Stadium in San Jose, California, is the brand new home of Major League Soccer's San Jose Earthquakes. The specialist soccer stadium is located on a site to the west of San Jose International Airport and forms part of a mixed residential, retail, R&D and hotel development. The venue's steeply raked seating is designed to deliver the best experience for spectators. And with fans flooding in, the new facility looks set to propel a sport rapidly gaining popularity in the US to new heights.

We provided complete MEP systems and lighting design for the 18,000-seat stadium, which benefits from a lighted playing field and two-sided video display scoreboard. In addition, our building systems design covers all spaces for teams, officials and spectators on game day, including team locker and training facilities, press and broadcast facilities, administrative and ticket offices, concessions and spectator amenities.

Client	City of San Jose
Architect	HOK
Capacity	18,000
Home of	Major League Soccer's San Jose Earthquakes
Our services	Building services, lighting design, fire protection, technology systems and commissioning
Project status	Completed in 2015

FLEXIBILITY AND INNOVATION

SUCCESSFUL ARENAS JUGGLE MANY ROLES WITHOUT LOSING THEIR DISTINCTIVE CHARACTER.



© Vaughn Ridley

From hosting world-class tournaments and international concerts to training sessions and corporate away days, handling the competing needs of diverse events is par for the course for most sports venues. Ensuring such large spaces are used to the full, best serves the public – and makes good business sense.

But being the go-to place for a wide array of users is not easy. A multiuse facility must effortlessly adapt to its different roles, whatever the site's constraints. And it must do so without diluting the unique atmosphere that inspires all who visit.

We are experts in creating integrated, mixed-use spaces that combine commercial viability with stunning structures. Using cutting-edge technology and imagination we find ways around even the toughest engineering challenges. We also have a track record in innovative and cost-effective adaption of existing facilities, because sports venues must keep up with a changing world.

TELE2 ARENA

INGENIOUS STEELWORK CONQUERS A CHALLENGING SITE
STOCKHOLM, SWEDEN

The 40,000-capacity Tele2 Arena is a world-class entertainment centre in Stockholm. The complex includes a football stadium with retractable roof and facilities for other sports, concerts, conferences and exhibitions, plus an entertainment area with bars, restaurants, mini golf and more.

We played a central role in this development, providing project management, structural analysis and pre-construction technical studies, among other services. We also produced the basic design for the whole structure and detailed design for the steel roof and façade, generating tens of thousands of drawings for the steelwork and precast concrete. The accuracy of our work contributed significantly to the venue's rapid construction and successful completion, while Building Information Modelling (BIM) helped coordinate design work and boost cooperation between the many consultants involved.

An initial challenge was to fit a stadium of this size into a narrow, irregularly shaped site, hemmed in by a major road, railway sidings and large hotel. The finished arena is actually larger than the site's footprint, the floor space growing as the structure rises from its foundations and inclines outwards. With no room to store building materials, steel and concrete elements had to be positioned as soon as they were delivered, increasing logistical pressure.

Due to space and height limitations, the stadium has an asymmetric design, with a north stand that is taller and wider than the south stand. This prevented us from standardising the steel structure on the upper levels, meaning every element had to be individually designed.

The height differences also challenged designers of the vast sliding roof. Their solution was to span the roof space with two huge primary trusses, supported on pylons. The retractable roof runs on wheels on rails along these trusses, which also support lattice girders holding up the surrounding fixed roof.

Tele2 Arena was named Venue of the Year at the Stadium Business Awards 2014.

Client	City of Stockholm via subsidiary, SGA Fastigheter AB
Architect	White Arkitekter, Arup Sport
Capacity	40,000
Our services	Project management, structural, precast, building services, geotechnical, fire and risk, traffic, sustainability consultancy
Project status	Completed in 2013





SALT RIVER FIELDS AT TALKING STICK

A NATIVE AMERICAN HOME FOR MAJOR LEAGUE BASEBALL

ARIZONA, USA

Set on 140 acres of Native American resort land, Salt River Fields at Talking Stick is the spring training home for the Arizona Diamondbacks and Colorado Rockies baseball teams. The complex houses an 11,000-seat stadium, which includes team locker rooms and two club houses, plus other facilities required for the dual training needs of two Major League Baseball teams.

The site also has two observation towers with observation deck, concessions, novelty stands and restrooms at Minor League Cloverleaf Fields, and provides top-of-the-line facilities for players and fans alike.

We provided MEP and specialist environmental design consultancy for the project, plus a master plan for the site's lighting design. Our goal was to maintain a strong community identity throughout the complex while meeting the training requirements of two professional baseball clubs.

The project is located in the Salt River Pima-Maricopa Indian Community, near Scottsdale, Arizona. It is LEED Gold Certified.

Client	Salt River Pima-Maricopa Indian Community
Architect	HKS
Capacity	11,000
Home of	Arizona Diamondbacks and Colorado Rockies
Our services	Building Services, environmental consultancy, sports lighting
Project status	Completed in 2010

DIOCESAN SCHOOL FOR GIRLS AQUATIC CENTRE

TWO POOLS IN ONE FOR MIXED-ABILITY STUDENTS

AUCKLAND, NEW ZEALAND

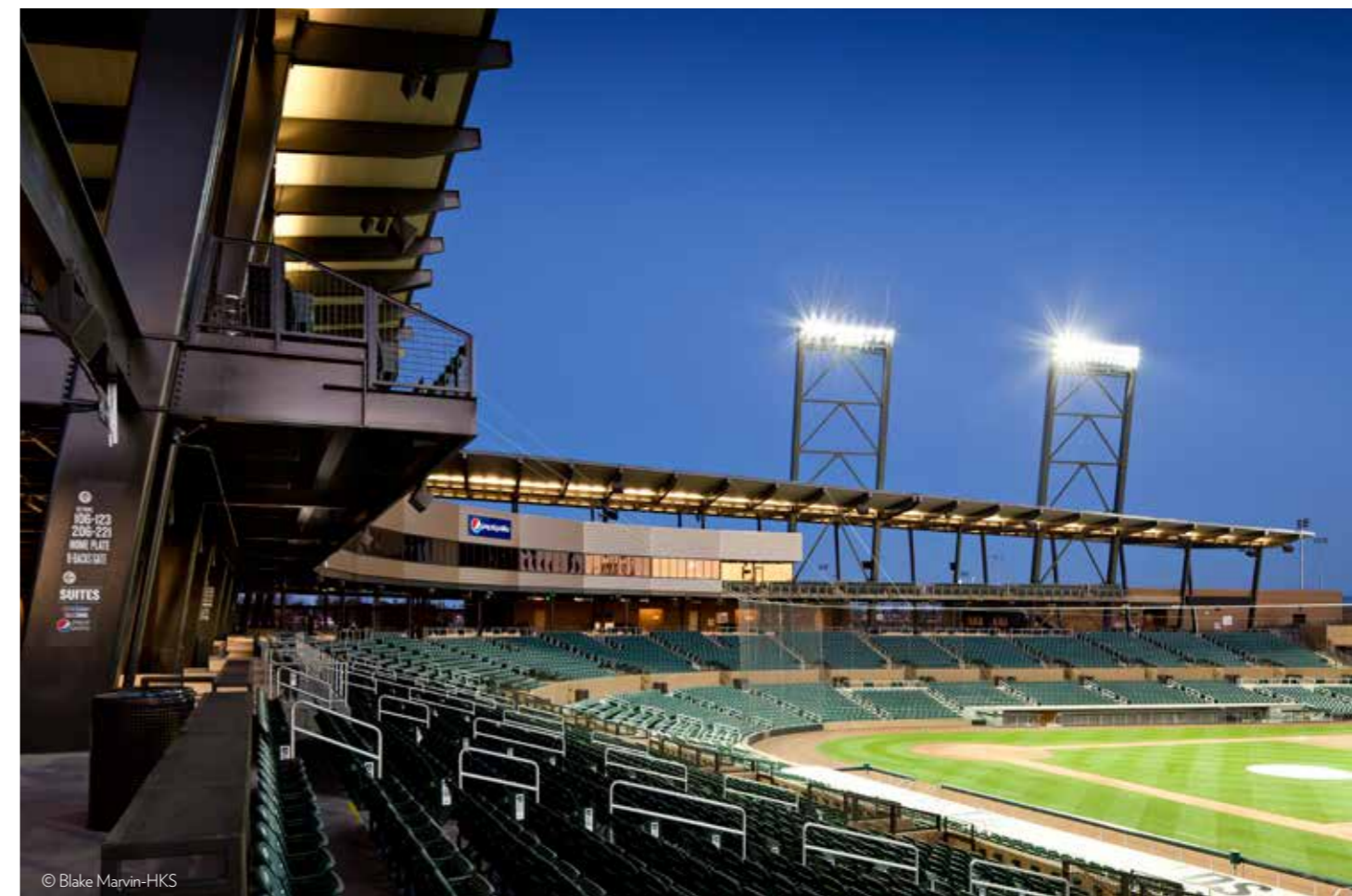
The Diocesan School for Girls Aquatic Centre is the first school facility in New Zealand to feature a pool with a movable floor. The cutting-edge centre houses a new swimming complex with two indoor pools, a classroom, gym, offices and amenities, across three levels.

The main swimming pool can be lowered to a depth of 2m for sports such as water polo, and raised for learn-to-swim classes. The floor also acts as an efficient insulation blanket when the pool is not in use.

We provided an integrated design service to the project, including mechanical, electrical, hydraulic services, communications, vertical transportation, fire protection and pool water treatment.

The project incorporates significant sustainable design features, such as heat recovery systems, a rainwater storage tank and intelligent ventilation for the pool hall.

Client	Diocesan School for Girls
Architect	Upton Architects, McIldowie Partners
Our services	Building services, vertical transportation, fire protection, pool water treatment services
Project status	Completed in 2009



© Blake Marvin-HKS

NELSON MANDELA BAY STADIUM

BOOSTING CONTROL AND EFFICIENCY WITH INTELLIGENT ICT
PORT ELIZABETH, SOUTH AFRICA

Nelson Mandela Bay Stadium is one of three coastal stadia built for the 2010 FIFA World Cup. The 46,000-seat stadium hosted eight World Cup matches, was a venue for the 2013 African Cup of Nations and regularly hosts large-scale rugby union and soccer games. It has also been used as a concert venue. The facility has 49 hospitality suites, two business lounges and gym, as well as lecture, function and conference rooms.

We provided all mechanical services and electronics installations for the stadium, pioneering a cutting-edge information and communication technologies (ICT) system that integrates a wide range of services – from closed circuit television and access control to air conditioning, plumbing and fire detection – onto a common Internet Protocol (IP) platform. The magnitude of the ICT installation matched the design ambition, from the 16km of fibre cabling to the 55m² LED video walls.

A human machine interface (HMI) provides a user-friendly, intuitive tool for the stadium operator to keep tabs on all aspects of the venue, from the switching on of lights to the opening of doors. We believe such a high-level monitoring and control system provides a significant boost to operational performance, safety and efficiency in a venue of such magnitude. Intelligent ICT installation brings other benefits too, including opportunities for additional revenue streams such as advertising on TV screens and video walls.

Client	Nelson Mandela Bay Metropolitan Municipality
Architect	Gerkan, Marg and Partners, Architectural Design Associates, Dominic Bonnesse Architects
Capacity	46,000
Our services	Building services, ICT, audio-visual
Project status	Completed in 2009



© Blake Marvin-HKS

LUCAS OIL STADIUM

A MOVEABLE WALL AND RETRACTABLE ROOF FOR MAXIMUM FLEXIBILITY
INDIANAPOLIS, USA

Lucas Oil Stadium is a multipurpose stadium in downtown Indianapolis and home to the Indianapolis Colts American football team. It is no stranger to major competitions, as host of the 2012 Super Bowl and annual National College Athletic Association's Final Four basketball tournaments. It is also the venue for two high-profile US music competitions, the Bands of America Grand National Championships and the Drum Corps International Championships. The building can also be configured for conventions, exhibitions, fairs and concerts.

The nine-storey, state-of-the-art stadium features a fully retractable roof with seating for up to 63,000 spectators, expandable to over 70,000 for large events such as the Super Bowl. It also has 150 luxury suites.

Designed by HKS, the stadium incorporates brick, steel and glass. In addition to the retractable roof, it features a moveable north wall system and hinged tall entrance doors at all four main entry points, enhancing flexibility and functionality.

We were initially appointed to provide unit concept engineering for the project feasibility study, used to secure legislative approval. Our brief was then extended to cover MEP, fire protection and sports lighting design services. We used Computational Fluid Dynamics (CFD) modelling to analyse air flows in the stadium seating bowl and optimise our air-system design, so as to provide maximum comfort for spectators. All designs were required to meet stringent industry standards for television broadcast.

Client	Indiana Stadium and Convention Building Authority
Architect	HKS
Capacity	70,000
Home of	Indianapolis Colts American football team
Our services	Building services, sports lighting design, fire protection, CFD
Project status	Completed in 2008

KENNEDY TOWN SWIMMING POOL, PHASE II

MORE POOLS WITH A VIEW
ON HONG KONG ISLAND
HONG KONG

Kennedy Town Swimming Pool is a local landmark overlooking the Hong Kong's Victoria Harbour. The first phase of the pool, with two outdoor pools, opened in the summer of 2011. Phase II will add two indoor pools and two indoor Jacuzzis.

Structured into a triangular space-shuttle-like shape with steel roof and metal cladding, the new swimming complex has been strategically designed in a low rise complex to complement the views of the harbour whilst minimising obstruction to neighbouring residential buildings.

We are providing civil and structural engineering and building services design for Phase II of the pool.

The pools are spanned by a column-free roof of light-weight PTFE (Polytetrafluoroethylene) synthetic sheets. Our civil and structural design scope is to review, modify and enhance the steel roof design for mounting the PTFE panels, and to meet the new user requirement of fire resistance protection. In addition we are modifying the foundation design of the swimming pool and rationalising the civil works interface so that its construction is not affected by the current West Island Line tunnelling works.

The scope of our MEP design is to modify the swimming pool filtration plant to meet the updated code of practice and optimise the maintenance space inside the plant rooms; to review and modify the fire services design so that it meets the prevailing buildings' fire safety requirements; and to enhance the MEP designs to suit the unique needs of the venue management and maintenance teams.

Client MTR Corporation Ltd
Architect TFP Farrells
Our services Civil, structural, building services
Project status Due for completion in 2016





Image courtesy of Cameron Chisholm Nicol and ARM, photographer Greg Hocking

PERTH ARENA

ADAPTABLE AIR-CONDITIONING PUTS THE WIND BEHIND
A MAJOR REGENERATION SCHEME
PERTH, AUSTRALIA

Perth Arena is an entertainment and sporting venue in the heart of Western Australia's city of Perth, designed to hold up to 15,000 people. With its geometric architecture, the landmark building is the first stage of a major urban regeneration programme. The venue has a retractable roof and supporting facilities including VIP boxes, multipurpose event rooms, refreshment outlets and a 700-space basement car park.

We provided mechanical, electrical and fire protection services engineering, along with specialist sustainability and lighting consultancy for the arena, first assisting the architectural consortium win the design competition and then working on the concept and detailed design.

Although the architectural vision was bold, it responded to an ambitious and functional brief aiming to maximise the facility's commercial potential while minimising environmental impact. We met this challenge with a flexible design, incorporating a variety of air-conditioning solutions that deliver considerable savings in both energy and operating costs. When fully occupied, the arena is cooled with displacement ventilation, supplied through the tiered seating stands. The public circulation area surrounding the stadium is treated with natural ventilation but can operate in mixed-mode if needed.

The result is a commercially viable stadium with a high level of adaptability, capable of hosting large-scale live events, from international concerts and dance spectacles to World BMX, netball and basketball championships and major tennis tournaments, including the Davis Cup.

Client	WA Department of Housing & Works
Architect	ARM Architecture, RTKL, Cameron Chisholm Nicol
Capacity	15,000 seats
Our services	Mechanical, electrical and fire protection services, specialist environmental design, specialist lighting design
Project status	Completed in 2012

PACE AND EFFICIENCY

A SPECTACULAR FINISH STARTS WITH PRAGMATIC DESIGN.



© Vaughn Ridley

Deadlines are deadlines in the fast-paced world of international sports. No matter what challenges the construction process throws up, opening matches don't wait. But the need for efficiency doesn't stop when the season begins. Even the most impressive structures must operate cost-effectively and energy-efficiently to ensure commercial viability and a sustainable legacy for future generations.

With a calm, creative and high-tech approach, we make sure tight construction timelines are met with the minimum fuss. And we deliver high-quality buildings that continue to save money, energy and time without sacrificing spectator experience, whether through cutting-edge ICT or innovative green solutions.



© Bruce Damonte

BARCLAYS CENTER

BRINGING ENERGY-EFFICIENT DESIGN TO THE HEART OF BROOKLYN'S REVAMP NEW YORK, USA

The Barclays Center is a 19,000-seat arena in the heart of Brooklyn, New York. Home to the Brooklyn Nets basketball team, the arena hosts professional and college basketball games, concerts, fine arts performances, circuses, hockey tournaments, graduation ceremonies, trade shows and other events. The project is the centrepiece of the Pacific Park mixed-use complex, a development at the forefront of Brooklyn's revitalisation.

We provided MEP, lighting design, sustainable design consulting and structural steel detailing for the project, in an approach that involved subcontractors in the design phase. This collaboration helped speed up construction through fast resolution of buildability issues and early procurement of long-lead equipment.

Our energy-efficient design includes free cooling for the majority of the year provided by a 100% air-side economiser with heat recovery systems to pre-heat and pre-cool the vast amount of outside air required for ventilation. Demand controlled ventilation allows the system to adapt to more intimate events, thereby saving energy.

High efficiency gas-fired domestic water heaters supply the whole arena including showers, kitchens and hydrotherapy equipment. Hot water is delivered via a centralised system to ensure availability at all times. Low-flow plumbing and

waterless systems conserve water in restrooms, while two underground storage tanks collect and retain storm water to control outflow.

The lighting is designed to maximise audience experience while minimising energy consumption. It is directly controlled by a building-wide programmable system, capable of tailoring lighting effects and levels for a wide variety of events.

The Barclays Center was the first professional sports and entertainment venue in the New York metro area to achieve LEED Silver Certification for New Construction.

Client	Brooklyn Events Center, LLC
Architect	Ellerbe Beckett/AECOM
Capacity	19,000
Home of	Brooklyn Nets Baseball team
Our services	Building services, lighting design, specialist environmental design, commissioning and security
Project status	Completed in 2012



WEMBLEY STADIUM

KEEPING A KEEN EYE ON COSTS IN A LANDMARK PROJECT
LONDON, UK

With 90,000 seats, Wembley is the second-largest stadium in Europe and serves as England's national stadium. It is the home venue of the England national football team and hosts major matches, including the FA Cup Final. The stadium opened in 2007 on the site of the earlier Wembley Stadium, which was demolished in 2003.

Our involvement with the project dates back to 2000, when we carried out due diligence on behalf of the financiers. We were then appointed technical advisor, and provided consultancy on detailed design development during construction and commissioning. We gave advice on cost planning, civil and structural engineering and building services design and construction. The challenge for our client was to gain a clear understanding of the financial implications of design decisions and construction delivery on potential future income streams.

We acted as project manager for the technical review process, in which we were supported by the architectural and cost consultants. And we continued as the Lender's Advisor through the construction phase and for the first five years of operation.

During the project our work covered the whole range of technical issues relevant to a major stadium and landmark building, from planning consents to risk analysis, environmental assessment to safety and licensing.

Client	West LB
Architect	Foster + Partners, Populous
Capacity	90,000
Home of	England's national football team
Our services	Technical advisory services
Project status	Completed in 2007

HAZZA BIN ZAYED STADIUM

COMPLEX GEOMETRY MADE SIMPLE
ABU DHABI, UAE

The new Hazza Bin Zayed Stadium in Abu Dhabi's Al Ain is home to the city's football club. With room for 25,000 spectators over three tiers, it is a compact and intimate arena, inspired by the natural landscape of Al Ain and encompassing both traditional and innovative design. As well as the football stadium, the development includes a six-storey commercial building and sports complex with kids' club.

We were commissioned by contractor BAM to review the initial design and identify areas where the client could make savings. And we met this challenge head on, significantly reducing construction costs and building time by rationalising the concrete-based structure while retaining its original shape and form.

Our team worked closely with the roof designers to ensure that all aspects of the steel roof's unique and complex geometry were coordinated and compatible, using parametric modelling to increase efficiency and simplicity of fabrication through repetition of details and elements.

The planned opening game in January 2015 created a fixed deadline for the stadium's completion. To fast-track the construction process, we made innovative use of pre-cast concrete and aligned our design process with the contractor's programme, making sure pre-cast elements were ready at each stage. We also used Building Information Modelling (BIM) to coordinate with the rest of the construction team, minimising the risk of problems on site and completing the project within the tight time frame.

Client	AAFAQ Holding
Architect	Pattern
Capacity	25,000
Home of	Al Ain FC
Our services	Structural design, BIM
Project status	Completed in 2014





CAPE TOWN STADIUM

MOVING THE EARTH TO MEET AN IMMOVABLE DEADLINE

CAPE TOWN, SOUTH AFRICA

The Cape Town Stadium was built for the 2010 FIFA World Cup, during which it hosted nine matches. Able to seat 68,000 people for sports events, the stadium also features corporate hospitality suites, plus medical, training and conferencing facilities.

Our team provided ground engineering for the stadium and surrounding urban park and was lead mechanical consultant and ICT consultant.

Construction began in 2007 with a fast-track programme of ground engineering for foundations and bulk earthworks. A lengthy planning process left us with a tight timeline that called for a rapid and innovative approach. We responded with creative reuse of excavated soil materials to eliminate waste and cut importation of earth fill.

As the site was in use as a golf course, only limited geotechnical investigation was possible before construction. In collaboration with BKS Consulting Engineers, we used non-invasive seismic refraction and ground penetrating radar to inform the foundation design and pitch level selection. Our hands-on quality control programme and ability to adapt to variable ground conditions contributed to the project's punctual delivery.

For the building itself, we introduced a new, sustainable system of air conditioning with flexibility to cater for both large-scale matches and quiet periods. And we were behind the stadium's cutting-edge, centralised computer network, which links all stadium functions – from smoke detection and electrics to turnstiles, score boards and access control – to a single point of control. The first of its kind in South Africa, the system significantly boosts energy efficiency and performance.

Client	City of Cape Town
Architect	Gerkan, Marg and Partners, Louis Karol, Point Architects
Capacity	68,000
Home of	Ajax Cape Town FC
Our services	Building services, ICT, audio-visual, ground engineering
Project status	Completed in 2009





COMMONWEALTH GAMES ATHLETES VILLAGE

DEFYING DELAYS WITH TIGHT COORDINATION

GLASGOW, UK

Glasgow's Commonwealth Games Athletes Village is set to become a 1,400-home mixed-tenure community on the banks of the River Clyde. We were integral to planning and designing the first phase of this ambitious scheme, which delivered 700 residential units, transport hub, care and energy centres in time to host 6,500 athletes, officials and media at the 2014 Commonwealth Games.

Our multidisciplinary team provided transport and infrastructure investigation and design, plus detailed engineering and structural design. We were also responsible for the environmental impact assessment, geo-environmental consultation and archaeological investigations, and provided acoustics services, fire consulting and thermal modelling.

With the approach of the 2014 games, we faced an extremely challenging, inflexible deadline. This was exacerbated by the fact the site contained one of the first public health water treatment works in the UK, requiring archaeological investigations that impacted significantly on the programme. In the end, work on the superstructure could not start until May 2012.

We demonstrated our ability to co-ordinate with all members of the client consortium, Glasgow City Council and the other contractors and suppliers involved to overcome the project's many challenges and deliver an impressive and lasting legacy for Glasgow's communities.

Client	Glasgow 2014/City Legacy
Architect	RMJM
Our services	Transport and infrastructure, structural design, environmental, acoustics, fire consulting, archaeological investigations
Project status	Completed in 2013

DUHAIL HANDBALL SPORTS HALL

A SUSTAINABLE HOME FOR HANDBALL IN THE MIDDLE EAST

DOHA, QATAR

The Duhail Handball Sports Hall was built for the 2015 Men's Handball World Championship. The 5,500-capacity facility includes an indoor stadium, two practice courts and back-of-house facilities suitable for hosting international sports events. It also houses 60-bedroom player accommodation and a 25m, four-lane swimming pool with grandstands.

We provided structural and building services design, transport integrated systems (TIS) and fire & life safety services to the project.

Our aim was to provide an efficient system that would be simple to build and meet the client's need for a very fast construction programme with rigid deadlines. We also sought to maximise the building's sustainable credentials, designing an efficient heating, ventilation and air-conditioning system to reduce the arena's cooling and energy requirements.

The venue is the headquarters of the Qatar Handball Association and home ground for Qatar's national handball teams.

Client	REDCO Construction Almana
Architect	IGH
Capacity	5,500
Home of	Qatar's National Handball Teams
Our services	Structural, building services, TIS, fire & life safety
Project status	Completed in 2014



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HONG KONG VELODROME

AN INTEGRATED GREEN APPROACH TO A PREMIER CYCLING TRACK

HONG KONG

The Hong Kong Velodrome, in Tseung Kwan O bay, has a 250-metre cycling track and spectator facilities for 3,000 people. In addition to providing a world-class training base for cyclists and premier venue for cycling competitions, it is designed to accommodate basketball, volleyball, badminton, gymnastics and other sports, plus concerts and exhibitions.

We provided full building services engineering consultancy for the project, incorporating a significant number of green features. Solar panels are integrated into the roof to generate renewable energy while a 3m vertical green wall screens the mechanical plant rooms and integrates with the walkway of the landscaped park. The heating, ventilation and air-conditioning system uses high-efficiency motors, occupancy sensors and other advanced features to reduce energy consumption. Water-cooled frictionless chillers, a greywater recycling system and rainwater harvesting further save power and water.

We also conducted a discounted cash flow analysis to compare the efficiency of air-cooled and water-cooled air-conditioning systems, concluding that a water-cooled system would start to pay for itself after six years, subject to the operation and usage of the building.

Client	HKSAR Government
Architect	P&T Group
Capacity	3,000
Our services	Building services
Project status	Completed in 2013

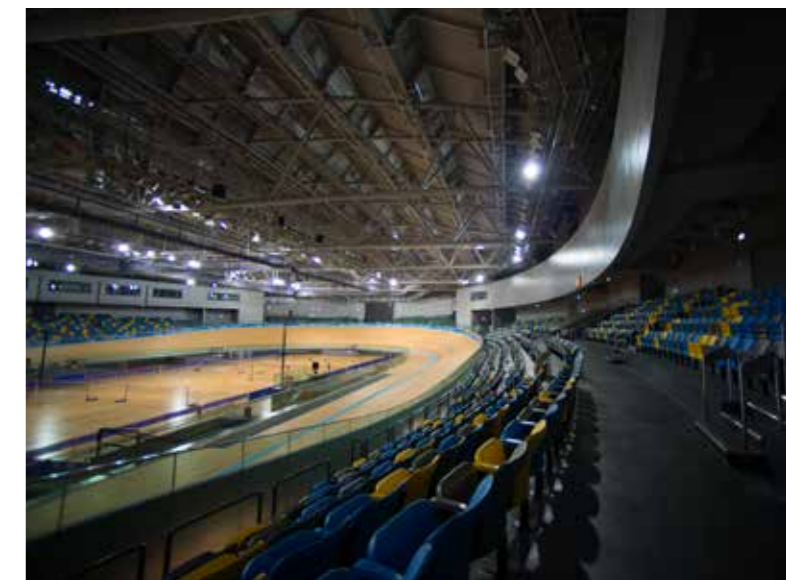




Image courtesy of Martin Saunders



Image courtesy of MPV - Peter Glenane

MELBOURNE PARK REDEVELOPMENT EASTERN PLAZA – NATIONAL TENNIS CENTRE

A BREATH OF FRESH AIR FOR VICTORIA'S TOP SPORTING PRECINCT MELBOURNE, AUSTRALIA

Melbourne Park is the premier tennis venue of Australia's Victoria state, hosting events including the Australian Open, the first tournament on the Grand Slam calendar. The venue hosts more than two million visitors each year and is one of the world's most prestigious sporting facilities.

As part of a major redevelopment to maintain Melbourne Park's status as a world-class sporting precinct and cater for increased use, the National Tennis Centre and elevated Eastern Plaza added 16 'Plexicushion' tennis courts as well as an elite training facility with gymnasium and pools, administration offices for Tennis Australia, and large public plaza / gathering space above a multistorey car park.

controlled, natural fresh air across the indoor tennis courts, while the high-level windows are designed to restrict direct sunlight onto the playing surface. In the car park, jet fans support predominantly natural ventilation during peak use only, keeping energy demand low for much of the year.

Our proposed strategies were validated through detailed thermal and computational fluid dynamic (CFD) modelling, as well as sophisticated daylight modelling. The project achieved a Gold LEED rating for new construction and a Master Builders Award for Excellence in Commercial Construction over \$80M.

We were commissioned to provide a wide range of consultancy services to this award-winning project, including mechanical, electrical and hydraulics engineering, specialist lighting design, fire protection, structural and civil services.

The \$115M Design & Construct project includes the construction of eight indoor tennis courts, 8 outdoor tennis courts, all on a suspended slab above the multi-deck carpark, plus another five clay courts at ground level to better prepare Australia's tennis athletes for the French Open.

Our integrated brief also covered environmental consultancy. Sustainability is a key feature of the redevelopment and was incorporated into all aspects of the design to ensure optimal efficiency and maximum comfort. No mechanical ventilation is needed in the high performance tennis centre, as the building form draws

Client	Major Projects Victoria via Watpac Construction
Architect	Jackson Architecture
Home of	Australian Open Tennis
Our services	Building services, specialist environmental consultancy, specialist lighting design, structural, civil and CFD
Project status	Completed in 2012



Image courtesy of MPV - Peter Glenane

OUR SERVICES

OUR WIDE-RANGING EXPERTISE ENSURES A SPECIALISED SERVICE FOR EVERY CLIENT.

We deliver landmark structures and highly efficient systems, as well as a broad range of essential technical services – just some of which are highlighted on these pages.

At WSP | Parsons Brinckerhoff, we understand that every sports projects presents a range of unique challenges, and that no two venues are ever the same. We can draw on our global network of experts to provide a bespoke team tailored to the demands of every project, from the earliest planning stages to a successful completion and faultless operation throughout the life of the building.

So whether our clients need a fully integrated multidisciplinary service or expert consultancy in a very specialised field, we can help.



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Commonwealth Games Athletes Village
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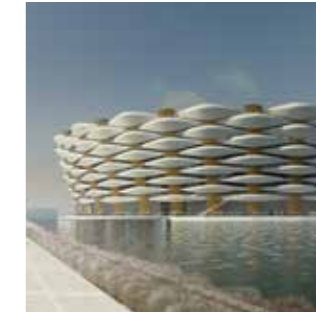
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BUILDING ENVELOPE CONSULTING
Pan Am / Parapan Am Aquatics Centre
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BUILDING INFORMATION MODELLING
Citi Field
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COMMISSIONING
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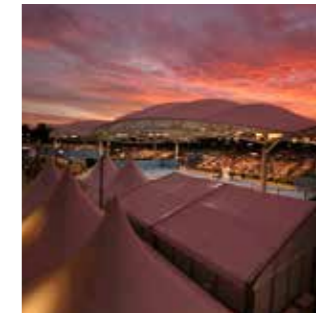
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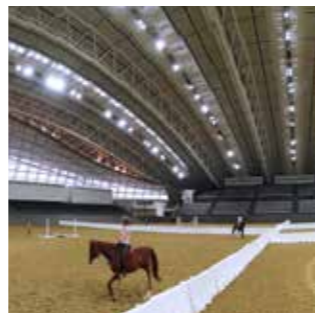
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Wembley Stadium
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Commonwealth Games Athletes Village
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VERTICAL TRANSPORTATION
Stamford Bridge
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EMPLOYEES



8,300 CANADA
6,400 USA
1,200 SOUTH AMERICA

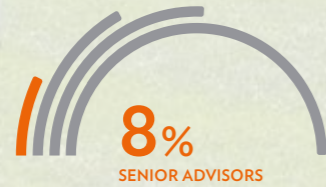
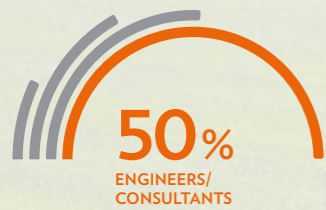


680 CONTINENTAL EUROPE
5,100 UK
3,970 NORDICS
1,400 MIDDLE EAST
500 INDIA
950 AFRICA



2,000 AUSTRALIA & NEW ZEALAND
3,500 ASIA

ROLE

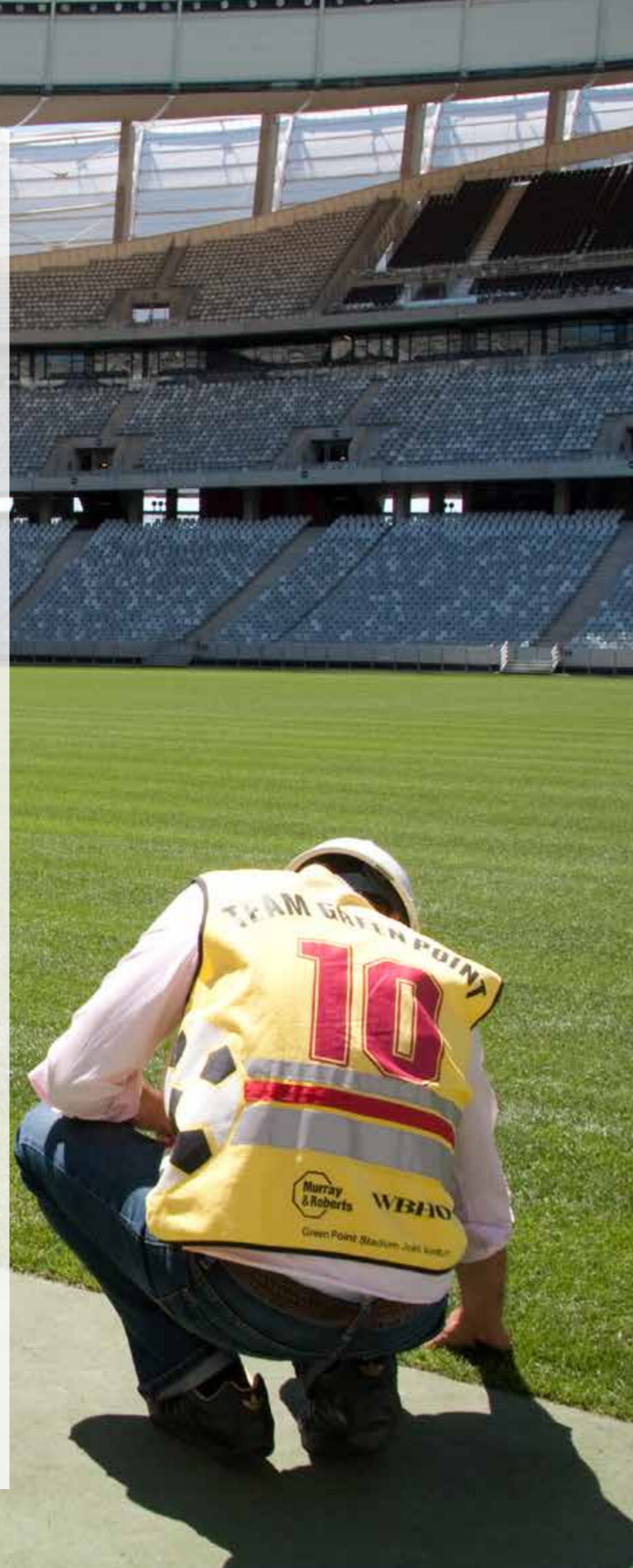
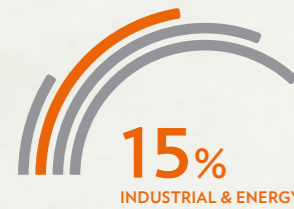
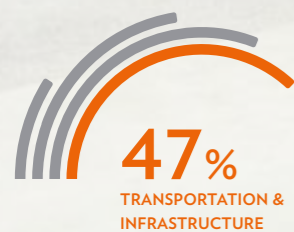


34,000
employees

500
offices

40
countries

NET REVENUES BY MARKET SEGMENT Based on 2015 net revenues



ABOUT US

WSP | PARSONS BRINCKERHOFF IS ONE OF THE WORLD'S LEADING ENGINEERING AND DESIGN CONSULTANCIES.

We provide services to transform the built environment and restore the natural environment. Our expertise ranges from environmental remediation to urban planning, from engineering iconic buildings to designing sustainable transport networks, and from developing the energy sources of the future to discovering new ways of extracting essential resources.

Our people come from a wide range of backgrounds, but we are united by the pride we take in our work and our passion for solving clients' problems.

Our unique combination of specialist and integrated skills, backed by our global reach, enables us to offer not only the latest thinking and most innovative technologies but also the most responsive client service, whatever and wherever the challenge.

OUR SPORTS & STADIA COMMUNITY

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ABOUT WSP | PARSONS BRINCKERHOFF

WSP | Parsons Brinckerhoff is one of the world's leading professional services firms, working with governments, businesses, architects and planners and providing integrated solutions across many disciplines. We provide services to transform the built environment and restore the natural environment, and our expertise ranges from environmental remediation to urban planning, from engineering iconic buildings to designing sustainable transport networks, and from developing the energy sources of the future to enabling new ways of extracting essential resources. We employ 34,000 engineers, technicians, scientists, architects, planners, surveyors and environmental experts, based in more than 500 offices across 40 countries.



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