Enduring Projects Born of Complexity

In presenting a selection of our projects across geographies, we aim to demonstrate the strength of our client relationships and our local knowledge, which is supported by our global expertise. In 2018, we marked the end of several long-term assignments with exceptional results, as well as opened a new chapter on different challenges. Supported by our client-focus and innovations, we believe that our solutions will shape cities and communities, helping societies thrive sustainably for generations to come.

Optimizing Space for Marlow Foods' Manufacturing Processes

Marlow Foods' Belasis Site

County Durham, United Kingdom

We have switched the process of manufacturing Quorn from the horizontal to the vertical to future proof Marlow Foods' new Belasis site in County Durham.

"It's been a pleasure for me to work with Marlow Foods again on this latest phase of work – the third we've worked on together. Twelve years ago, I was the project manager on our first project with the client and we've kept in touch ever since.

"It's also been great to be involved with this project and collaborate with WSP colleagues and the subcontractors, who are all working together to help realize Marlow Foods' vision. We have not only increased the production of Quorn to meet growing demand, but have also made this possible at one facility, bringing together all the stages of production that have, until now, been at geographically separate sites."

— **Brian Parker**
Senior Project Manager

The design for the full-scale plan was modelled in 3D so the client could walk around it virtually. This helped the team to find the ideal layout for the pipework and to balance efficient use of the site with ease of access for operations and maintenance.

Excellent Safety Record

With around 150 people constructing a large, complex building consisting of lots of different sections, the atmosphere of collaboration was very positive. As a result, everyone was clear about what was expected, and everyone stayed safe.

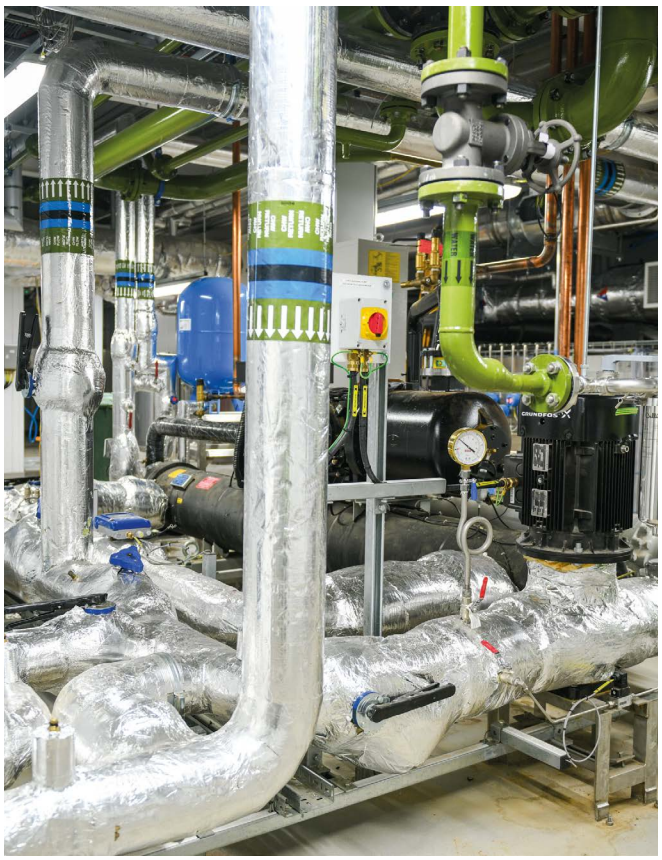
Collaborative Improvements

All manufacturing equipment in the process has to be carefully cleaned, and because the Quorn production process is unique, standard cleaning regimes are not always suitable. With input from Marlow Foods' staff, we were able to automate some processes and configure the layout to make cleaning easier, safer and more efficient.

We have saved space at the Marlow Foods' site so that new facilities can be added later for extra production of the sustainable, low-fat protein Quorn. At the same time, we have designed and built – in collaboration with other specialists – a high-specification water treatment plant to remove waste and chemicals, including phosphorous and nitrogen, produced in the fermentation process.

The new production facility will enable Marlow Foods to increase the supply of Quorn across the UK, Europe and North America to meet demand.

The new three-storey factory at the County Durham site is a departure from the usual single-storey, linear production process. Bespoke equipment had been sourced from different suppliers and had to be integrated into a successful end-to-end process.



Our engineers accompanied the client on visits to suppliers to see how different items would affect the building services. This was time well spent, as it helped streamline the design process, ensuring each piece of equipment was factored in individually along with its electricity and water supply requirements.

Cooperation between our team, client, engineers, contractors, suppliers and scientists was a constant positive. Marlow Foods' personnel shared their knowledge of the production process, which made it easier for us to cater for the specialist equipment and staff at the facility. Together, we could make sure that the layout and design would help them do their jobs more efficiently.

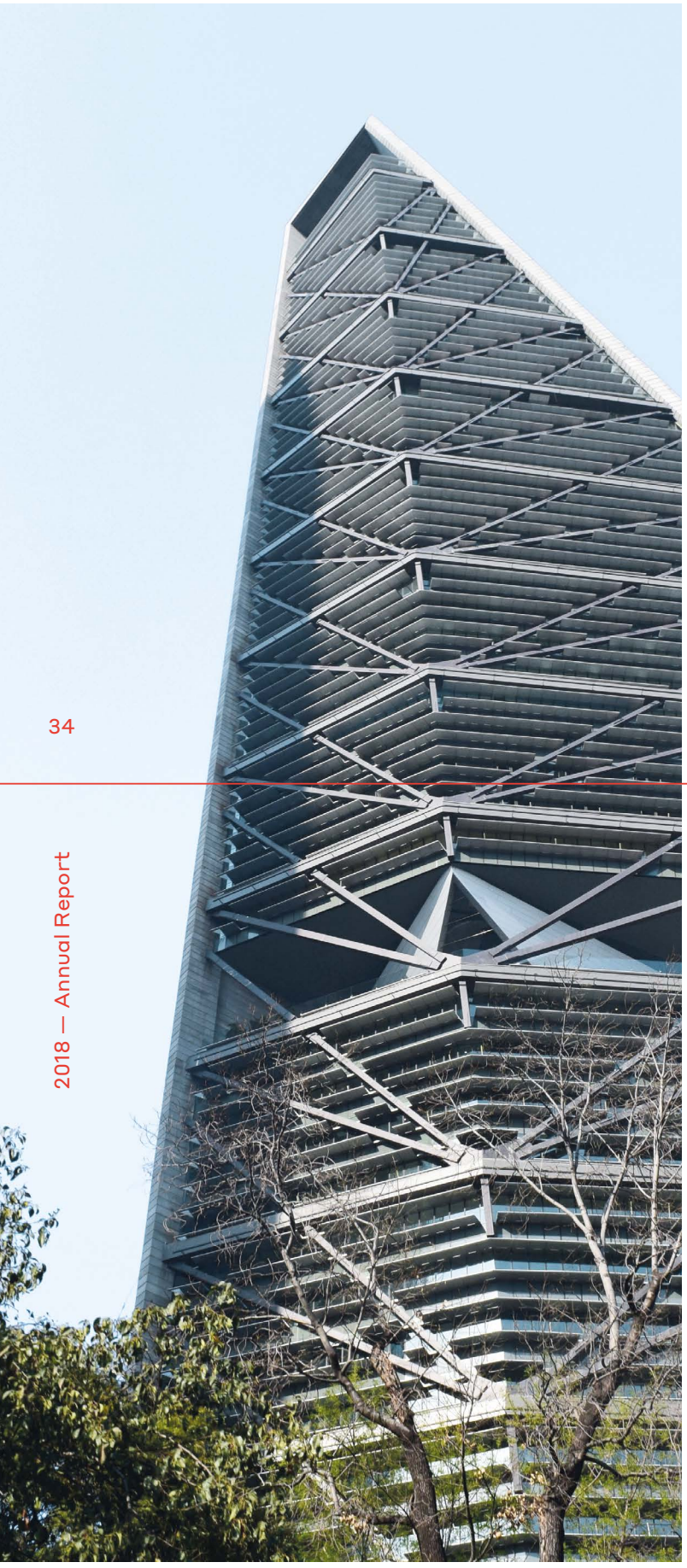
The building was completed on time, and production began in 2018.

50

50 cubic metres per hour of effluent treated to exceed environmental standards

150

150 people on the site from many different suppliers, performing complex tasks



Reforma Tower

Mexico City, Mexico

At 246 metres high, the Reforma Tower is currently the tallest building in Mexico and boasts many exceptional features such as superior air quality, natural lighting and a view towards Chapultepec Park and Castle. WSP carried out the earthquake-resistant structural design; structural adaptation for local code requirements and practices; development of construction documents; design of temporary support elements; and site supervision for its client Fondo Hexa. In sustainability terms, the Platinum LEED certification for this office building speaks to the efforts made in its design.

Winner of the International High-Rise Award 2018

100%

100% of wastewater treated on site

25%

25% reduction in energy use

Image courtesy of Odense Letbane P/S

Odense Light Rail

Odense, Denmark

As advisor and long-term delivery partner for its client Odense Letbane P/S, WSP is providing a wide range of services on the tramway, including project management, design assurance and construction supervision. Knowledge continuity has been conserved in WSP's team from design into the manufacturing and construction phase, enabling us to assist the client in reaching all major milestones to date. The integrated team is able to draw upon WSP's global expertise, which is a great advantage in our service offering.

"Finding solutions to complex technical challenges allowed us to increase the capacity of the plant as required by our client."

— **Alindor Galarreta Díaz**
Engineering Manager

La Quinua Effluent Water Treatment Plant Upgrade

Cajamarca, Peru

Owing to issues in plant capacity, an upgrade was required for La Quinua Effluent Water Treatment Plant. WSP was engaged to provide a range of services including structural, civil, mechanical, process, piping, electricity and instrumentation, for our client Minera Yanacocha S.R.L., a Newmont company. Our colleagues in Chile supported us with quality assurance services. This was the first project delivered by our mining engineering team in this important sector in Peru, and we were proud to deliver a successful upgrade in a timely manner.

Image courtesy of Grocon Pty Ltd

Creating a Vibrant and Sustainable Mixed-Use Community for the Gold Coast

Parklands

Gold Coast, Queensland, Australia

The Parklands project provided a purpose-built development to be used initially for the 2018 Commonwealth Games, with a long-term vision as a place for the Gold Coast community to live, work and play.

"With sustainability and community at the core of design, working on Parklands was a true once-in-a-lifetime experience professionally. With the acknowledgement and integration of culture, heritage and community identity in the project design, it was rewarding to feel that a positive impact would be realized in the long term.

"As one of the most significant urban renewal projects to be undertaken in Queensland, a key issue and by far the greatest opportunity was developing the project on a brownfield site. The innovative design breathed new life into the site, providing seven hectares of green and landscaped areas, along with substantial ecological value improvements."

— **Rikki-Lea James**
Sustainability Consultant

"The sheer number of stakeholders, multiple clients and tight deadlines made this a project where our core team and great relationships with our partners played an exceptionally important role."

— **Kevin Sheppard**
Principal, Building Services and Project Manager

Third-Party Sustainability Ratings

The project achieved a 6-Star Green Star Communities v0.2 PILOT rating (the maximum possible), an EnviroDevelopment Mixed Use 6-Leaf certification from the UDIA, and an average NatHERS (Nationwide House Energy Rating Scheme) rating of 6 or above.

Inclusivity and Community Engagement

A successful Reconciliation Action Plan and an Indigenous Participation Plan were established, as well as community partnerships with several local organizations including the Gold Coast School of Construction, Griffith University, Southport Special School and TAFE (Technical and Further Education) Queensland.

The project team was recognized with the President's Award, the Master Planned Development Award and the Consultants' Excellence Award at the 2018 Urban Development Institute of Australia's (UDIA) Queensland Awards for Excellence.

Five kilometres from Surfers Paradise on the Gold Coast, the Parklands development accommodated 6,600 athletes and officials during the 2018 Commonwealth Games.

Our transport, property and sustainability consultants collaborated to deliver all four stages of the Commonwealth Games Village and Gold Coast Commonwealth Games Corporation (GOLDOC) headquarters on behalf of our client Grocon.

After the Games, transformation began to create a mixed-use residential, retail and business community that will be integrated into the adjacent Gold Coast Health and Knowledge Precinct. The visionary masterplan, coupled with innovative approaches to project delivery, has enabled the site to be easily repurposed with minimal adaptations to be made.

WSP provided the following services on this project: Building Services, Sustainability, Transport Planning, Rail, Traffic Modelling, Integrated Transport Systems and GIS. Having played a key role in every stage of the development of the Village, our teams became fully part of the project journey and gained an in-depth understanding of the Games' overarching vision.

Following its adaptation to legacy mode, the site has been renamed as Smith Collective. It will become one of Australia's first build-to-rent developments, with 1,252 apartments and townhouses available to rent from early 2019.

52

52 packages of works delivered during a six-year period

1,252

1,252 properties available for rent from 2019

Image courtesy of Grocon Pty Ltd

Image courtesy of WXCA Biuro Architektoniczne

Polish History Museum

Warsaw, Poland

The Polish History Museum is being constructed in a new complex within the grounds of the Warsaw Citadel. The permanent exhibition space will tell the story of 1,000 years of Polish history, life and culture, through genuine antiques as well as scenography and multimedia displays. The building will also include a restoration department, laboratories, conference and educational centres, restaurant facilities and office space. WSP is providing mechanical and electrical services alongside structural design for our client WXCA Biuro Architektoniczne.

Usine 4.0 Latécoère

Toulouse, France

Groupe Latécoère's new plant was digital from the start, beginning with its 3D plant-and-equipment model. Using it meant we could fine-tune the design and integrate models of the production process, an enormous advantage since production space needs to be rapidly reconfigurable to accommodate new equipment, processes or products. As owner's engineer, WSP had to demonstrate tremendous flexibility in producing the front-end engineering design, as well as during compliance monitoring and project management.

6,000

Area of the new plant: 6,000 m²

Image courtesy of Deutsche Bahn AG / Frank Barteld

German Unity Transport Project 8

Nuremberg–Erfurt–Leipzig/Halle–Berlin High-Speed Railway Line, Germany

This major new high-speed rail link connecting Berlin to Munich via Nuremberg is a ten-billion-euro project approved by the German federal government in 1991. We supported the German railway company Deutsche Bahn and dedicated contractors with engineering design services in several sections along the 500 km-long new and upgraded route, through all stages to completion. This included signalling systems; overhead catenary lines; electrical power and point heating systems; and telecommunications and remote-control systems. Trains run with a speed of up to 300 km/hour on the new line, which was inaugurated at the end of 2017.

Lahti University of Applied Sciences ("LAMK") Campus

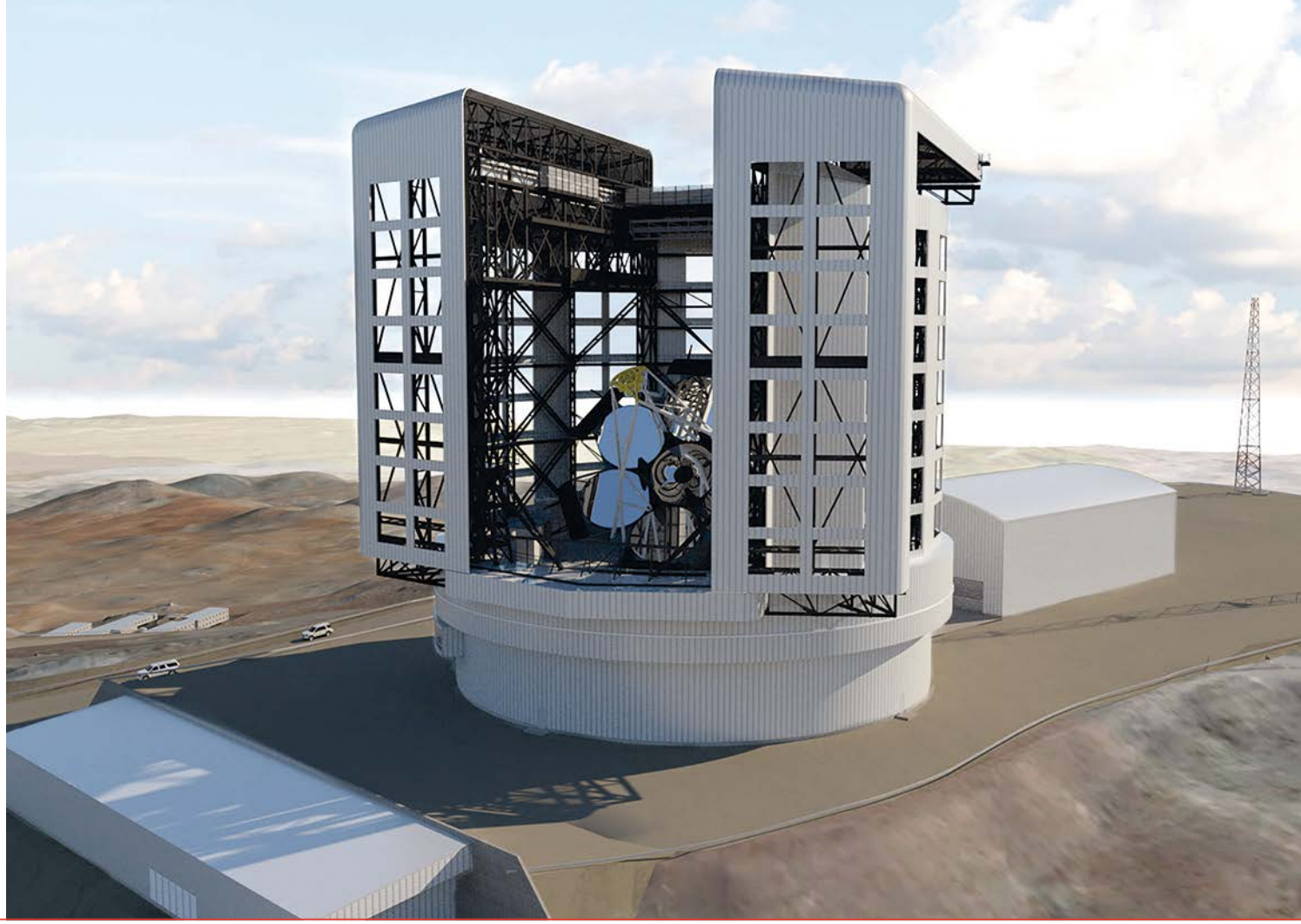
Lahti, Finland

Opened in November 2018, the new Lahti University of Applied Sciences campus and restaurant area were developed from a former industrial building combined with newly built sections. From the outset, sustainability considerations prevailed: BREEAM certification is being sought, leading to the selection of carbon-neutral heating and cooling solutions, including geothermal and solar energy. We were responsible for project management and contractor supervision during this fast-paced development for our client Isku Invest Oy (Keskusportti Koy being the parent company).

Image courtesy of Isku Interior/Tuomas Heikkilä

23,000

Campus floor area of 23,000 m²



Giant Telescope, Giant Challenge

The Giant Magellan Telescope (GMT) will be a ground-based telescope that promises to revolutionize our vision and understanding of the universe.

The telescope is 25 metres in diameter and will consist of seven 8.4-metre mirrors, mounted together in a steel structure. With its unique design, the GMT will offer images with a resolution 10 times greater than those captured by the Hubble Space Telescope orbiting the Earth.

"We are working at altitude, in desert conditions, 600 kilometres north of Santiago," says Andrés Navarro, Site Manager. "In addition to the remarkable location, the quality requirements for the project are one-of-a-kind. Flexibility in the construction stage is also key, since the technology for the telescope is still under development."

Giant Magellan Telescope

Cerro Las Campanas, Atacama Desert, Chile

The Giant Magellan Telescope will be the largest telescope in the world, situated at one of the best astronomical sites on the planet.

60,000

More than 60,000 hours worked with no lost-time injuries.

2,000

Expected weight of the telescope is approximately 2,000 metric tons.

The WSP team is undertaking construction management, technical inspection, engineering and constructability reviews and health, safety and environment support services on the telescope site, on behalf of our client the GMTO Corporation (GMTO).

"Working on this global, collaborative project is quite simply a unique experience," explains Ricardo Glade, Construction Manager. "We were chosen to be part of an initiative that will mark a generation of engineers, astronomers and other scientists. As trusted consultants, we are rising to the challenge of maintaining and continuously raising the quality levels of our work in this complex environment."

Highlights

- WSP's team members are based in California and Colorado in the U.S.; Santiago, Chile; and at the project site.
- The GMTO is an international consortium of leading universities and science institutions from the U.S., Australia, South Korea and Brazil.
- Advanced technology is vital, for example the state-of-the-art project information management system.
- The telescope will be housed in a rotating building 60 metres in diameter and 65 metres high.

Canada's Largest and Most Complex Heritage Rehabilitation Project

Centre Block Rehabilitation Project

Parliament Hill, Ottawa, Canada

Centre Block is one of Canada's most iconic buildings and houses the seat of government for the country, including the House of Commons and Senate Chamber.

"Our successful bid for this fascinating project was the result of a combined interdisciplinary effort and collaborative approach that successfully leveraged the strength of our local and global teams. The keywords on this project being innovation, technology and sustainability, we are proud to work with our partners to maximize our support on these aspects."

— **Bruce Carter**
Lead Program Manager

"As design of the building's rehabilitation and modernization progresses, we will be advising on opportunities to reduce the environmental footprint; optimize energy use; enhance occupant health and well-being; and produce designs which are ready for the future."

— **Bruce Carter**
Lead Program Manager

Seismic Modelling

We are performing advanced, analytical, non-linear modelling of this historic building to determine its response to seismic shaking. Various seismic upgrade strategies are being explored, including the use of seismic isolation technology as a means of minimizing the structural intervention and its impact on the building's heritage finishes.

The scope of the Centre Block Rehabilitation (CBR) project includes comprehensive restoration of Centre Block and its integrated Peace Tower, along with the completion of the Visitor Welcome Centre Complex, and over 25 enabling and 40 investigative sub-projects.

WSP is leading the joint venture partnership, branded as CENTRUS, and is providing all engineering and design management services. HOK, our partner in this joint venture, will lead all architectural and conservation efforts, supported by strategic partners Architecture49 and DFS Inc. architecture & design. The CENTRUS team is located close to the site with the construction management team, our client and user representatives in an integrated project delivery office.

2019

Multiyear project with the full work schedule to be determined by the end of 2019

400

Up to 400 people will be mobilized in the joint venture at peak

An established team of Building Information Modelling (BIM) experts is providing cutting-edge tools to the design team to deliver this project.

The restoration is a complex blend of heritage conservation with appropriate and sensitive contemporary interventions such as new mechanical, electrical and security systems, as well as a comprehensive seismic upgrade strategy. The joint venture is driving improvements to the long-term durability of the building enclosure at Centre Block, while maintaining and enhancing the prestige of this unique and high-profile cultural asset.

Centre Block was closed for Parliamentary and Senate operations at the end of 2018 to enable the initial investigative work and subsequent refurbishment to commence.

Framework Agreement with Norske tog AS

Oslo, Norway

Becoming part of the current major railway reforms in Norway was a proud moment for our team. Combining our skills with the expertise of our Swedish colleagues, we have been awarded a framework agreement with Norske tog AS, the state-owned company which acquires, manages and leases passenger rolling stock to Norwegian rail companies. The framework includes technical services and advisory, and project management. WSP was recently awarded the first contract related to our agreement, which involves the management of a portfolio of projects for the technical improvement of Norske tog's existing fleet.

95

Estimated total value of the framework is CAD 95 million

Image courtesy of Norske tog AS

One Verdi Park

Bucharest, Romania

One Verdi Park is a mixed-use, twin-tower complex in northern Bucharest, which is currently at the building permit stage. Tower A is a 16-storey office block, and Tower B is a 20-storey residential building with 140 units. Gross building area of the development is 60,000 m^2, and both towers will have ground floor retail and commercial spaces. Our team is providing a full range of services, including structural and MEP design; schematics; building permit; technical and detailed design; LEED Gold certification; tender assistance and site supervision. Our client is the developer One United Properties and the architect is X Architecture & Engineering.

Image courtesy of One United Properties SA and X Architecture & Engineering

Sengkang General and Community Hospital

Singapore

This integrated development is Singapore's largest hospital and was opened in August 2018, offering cutting-edge facilities with community-based care. A green podium roof, highly efficient chilled water plant, heat recovery, low-loss transformers and state-of-the-art UPS systems are among the many features designed for environmental sustainability. WSP was the Mechanical and Electrical Consultant, on behalf of the Singapore Ministry of Health.

1,000

1,000-bed general hospital

400

400-bed community hospital

30%

30% energy savings compared to local building code

Widening of the Rande Bridge: A Unique Challenge

As the first structural widening of a cable-stayed bridge in the world, the project represented an exciting technical challenge. In a joint venture with MC2 Estudio de Ingeniería and Manuel Juliá Vilardell (original designers of the widening), we were selected by our client Audasa to provide structural supervision and advisory services including detailed design, review of workshop drawings and temporary works, and supervision of singular manoeuvres. The team was also in charge of some of the most challenging tasks, including full aeroelastic wind tunnel tests, vibration analysis on old and new cables and evaluation of riding comfort.

Rande Bridge

AP-9 Atlántico Highway linking Portugal's A-3 highway with Vigo, Santiago de Compostela, A Coruña and Ferrol in Spain

The original Rande viaduct, a 400-metre span cable-stayed bridge, was opened to traffic in 1981. Nearly 40 years later, congestion was a chronic problem and a successful widening solution was implemented.

400

Span of 400 metres

60,000

Average traffic intensity of almost 60,000 vehicles per day

"Adding two new lanes in separate decks cut time and cost by at least half compared to building a new bridge, and construction work was carried out without interruption to existing traffic flow," explained Oscar Ramón Ramos, Director, Bridges. "The team is proud to have supported the client to result in high-quality work and successful execution, with the widening being completed in only 18 months."

The Rande Bridge project was honoured with the Spanish Civil Engineering Foundation's 2018 Segovia Aqueduct Award (Public Works and Environment). The project was chosen for its technical and functional strengths, its social and cultural importance, the quality of corrective measures and its success in blending into and enhancing the landscape.

Highlights

- The widening took full advantage of the existing structure, with its important heritage value.
- Existing main towers utilized with new decks, new stays and composite box girders.
- Traffic capacity of the bridge extended from four to six lanes.
- Execution respectful of sensitive ecological conditions in the Vigo Estuary.

Replacing an Outdated Structure with a State-of-the-Art Venue

Slussen Bus Terminal

Stockholm, Sweden

A meeting point where public transit, boats, bicycles, cars and pedestrians come together, the Slussen Bus Terminal structure has reached the end of its serviceable life and is being rebuilt.

"The WSP team is very proud to be part of the complex journey to rebuild the terminal, and is responsible for many different aspects of the project. We look forward to the outcome, where modern planning will allow public transport, pedestrians and cyclists to have more space and enjoy much-improved facilities.

"At the beginning of 2019, we entered an intensive phase of the project, as the two-year task of blasting space for the new terminal in the rock underneath the Katarina Mountain began. Blasting in close proximity to a dense urban area requires highly sophisticated expertise in rock mechanics and structures; the experience and ability of our wider team has allowed us to take this on for our client, the City of Stockholm."

— **Patrik Vännström**
Senior Project Manager

Our experience with BIM (Building Information Modelling) plays a crucial role in the project, as the detailed design is delivered almost completely in the form of BIM models.

The new Slussen Bus Terminal will be located in a rock cavern, which is being created under the Katarina Mountain in the city of Stockholm. Once completed, it will provide a modern hub for commuters from the Eastern part of the city. The bus terminal is being developed to seamlessly integrate with commuter train and underground services, allowing for smooth interchanges without having to leave the station. The surrounding Slussen area will be converted into one of Stockholm's most attractive venues, with new squares, docks and a park.

This project presents many challenges, including fire and risk management; logistics around the construction site; an extremely short time frame for design and construction; high traffic volume; evacuation safety; and initial consensus surrounding the location of the terminal.

Addressing Key Safety Concerns

The gas-fuelled buses used in Stockholm create huge demands for effective ventilation and gas detection systems, as well as a need for both the rock and structural elements to withstand extreme fire and explosion loads should an accident occur.

Preserving a Part of our Cultural Heritage

A small but important part of the rebuilding of Slussen is the restoration of the Lokatten staircase. The staircase has not been used for several decades, and our team is providing the specific expertise required for its restoration.

90

Number of full-time employees on the project

12

Height of the new tunnel: 12 metres

Based on Foster + Partners' architectural design, the preliminary design was executed by our team and we are providing a wide range of services within our Transport & Infrastructure, Property & Buildings and Environment sectors. The detailed scope of our services includes rock mechanics; structural engineering; road design; geotechnics; surveying; geohydrology; project management; water and sewerage.

300,000

300,000 m³ of rock to be excavated

12,000

12,000 m³ of concrete for construction

Delivering Transport Benefits on Auckland's North Shore

The Northern Corridor Improvements Project will provide improved links for motorway travellers in Auckland and expand travel choices on the North Shore for freight, cars, pedestrians and cyclists.

Communities will experience easing congestion, improved safety through the separation of local and motorway traffic, and benefit from new walking and cycling links. The project will also support future freight and economic growth.

Providing detailed design, environmental, planning and construction-phase services on behalf of the New Zealand Transport Agency (NZTA), we collaborated across many of our New Zealand offices, and were proud to call on international expertise from our offices in Australia (tunnel fire protection design) and design partners in the U.S. (bridge and tunnel design).

Northern Corridor Improvements (NCI) Project

Auckland, New Zealand

This multimodal transportation project delivers a new motorway-to-motorway connection, increased motorway capacity, a 4-km-long dedicated busway and a 7-km-long shared-use path to support active transportation.

6 km

6-km upgrade of existing state highway

4 km

4-km-long dedicated busway

7 km

7-km-long shared-use path

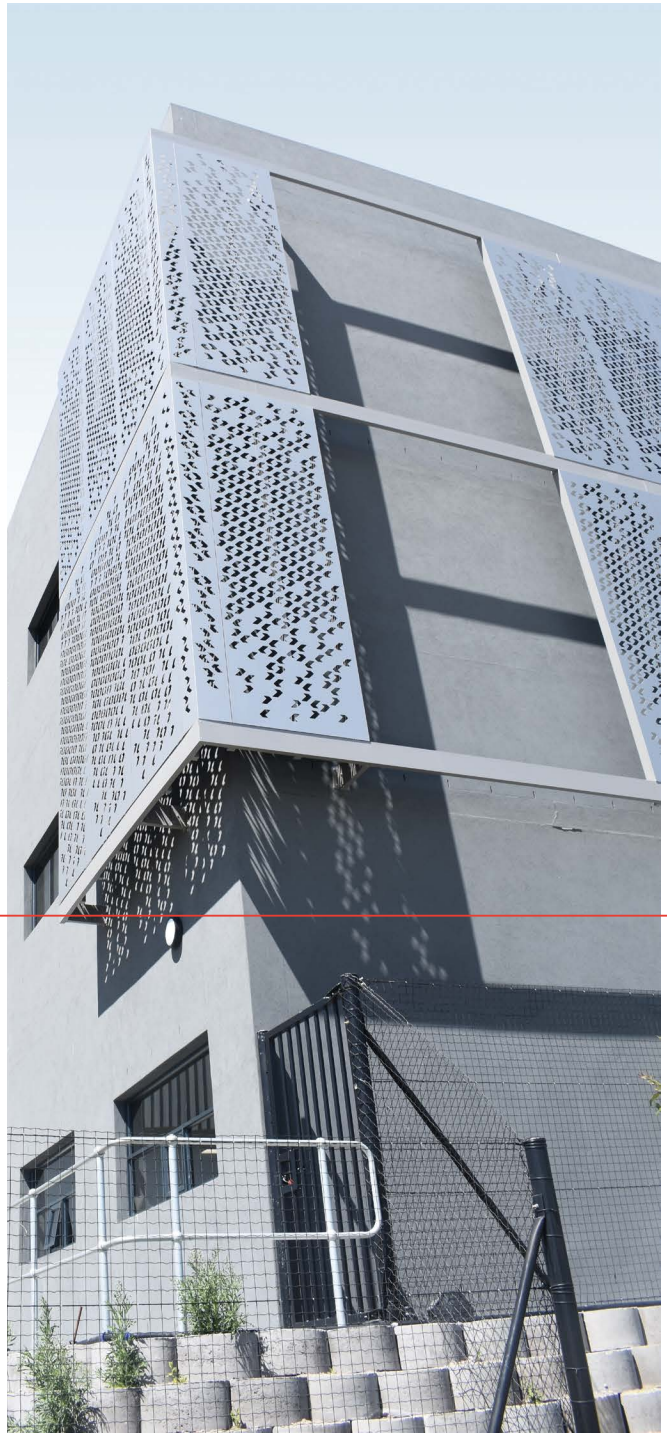
"A key feature contributing to the success of our tender was an overarching concept of prioritizing safety to influence traffic management, and developing the design to facilitate that methodology," explains Darrell Oosterbeek, Project Manager and Zone 2 Design Manager.

Safety in Design has been integral to the design process, with requirements in the construction, operation, maintenance and decommissioning phases under consideration. Direct consultation with key stakeholders, including the Auckland Motorway Alliance and Auckland Transport, was carried out and requirements incorporated into the design accordingly.

The overall project is being delivered by the Northern Corridor Improvements Alliance for the NZ Transport Agency and is scheduled to be completed in 2022.

Highlights

- IAP2 International Project of the Year at the International Core Values Awards (2018).
- On track to achieve bronze "Greenroads" status (measure of sustainability on highway improvements).
- A dedicated busway future proofed for possible conversion to light rail (LRT).
- Relocation and improvement of international standard field hockey and BMX facilities, and a pony club.



The Shoprite Group Cilmor Distribution Centre was honoured in the 'Factory and Warehouse' and the 'Global Roofing Solutions Metal Cladding' categories at the 2018 Southern African Institute of Steel Construction (SAISC) Awards.

Cilmor Distribution Centre

Cape Town, South Africa

Shoprite Group's Cilmor Distribution Centre project consisted of the construction of multiple buildings including warehouses, a cold storage facility and peripheral buildings. WSP was appointed for a range of services, including structural design of warehouse floors and superstructures, HVAC and vertical transportation. Having previously delivered five similar projects for our client, our internal teams were able to ensure smooth project coordination. Despite tight timelines, the client relationship made it possible to foresee requirements and accurately assess risks, allowing for highly successful delivery.

Southwest Reinforcement Project

Colombia, South America

The Southwest Reinforcement Project comprises upgrades to substations and transmission lines to strengthen the transmission of electrical energy to Colombia's central and southwest regions. WSP was commissioned to complete detailed designs of the transmission lines and the environmental impact studies. Through an optimal design that minimized the project's environmental impact, we supported the electrical interconnection of two large areas for economic growth, supplanted the need for energy generation based on thermal sources, and attained social acceptance for its construction and operation.

Image courtesy of Benedikt Redmann

"We are innovating with a sustainable energy concept for the new building, which will include geothermal heat pumps and probes, plus a photovoltaic system on the roof."

— **Feer Konrad**
Project Manager

Sennhof Nursing Home (Pflegeheim Sennhof)

Vordemwald, Switzerland

Situated in a beautiful park, Pflegeheim Sennhof is a retirement and nursing home for long-term and chronically ill residents. The project consists of reorganizing the layout and building an extension to the historical core, while increasing natural light in all rooms. Our team is responsible for providing HVAC services, as well as building automation, for our client Pflegeheim Sennhof AG, Vordemwald. This involves the installation of a new control system including switchgear assemblies, and enhancement of the building systems to optimize functionality.

Opening the East Coast's Largest Seaport to New Panamax Ships

Bayonne Bridge Navigational Clearance Project

Bayonne, New Jersey and Staten Island, New York, United States

Raising the roadbed of the Bayonne Bridge by 19.5 metres allowed huge New Panamax ships to reach ports in New York and New Jersey.

"The expansion of the Panama Canal and the emergence of New Panamax ships has been a game changer for the global movement of goods. Without raising the Bayonne Bridge to accommodate these new vessels, our ports would have diminished access to global markets.

"When the first New Panamax ship passed under Bayonne Bridge to enter the Port of Newark-Elizabeth it was an amazing moment, not only because of the impressive size of the ship, but because of how this improvement will benefit our community."

— **Beth DeAngelo**
Project Director

"Raising the roadbed of the bridge without completely shutting the bridge to traffic posed an extremely complex engineering challenge. This is not only the largest project of my career, but also the project that has had the most impact on the community in which I live and work."

— **Beth DeAngelo**
Project Director

The expansion of the Panama Canal, completed in 2016, and the emergence of New Panamax cargo ships placed the Bayonne Bridge at a crossroads. The once ample clearance for the bridge that connects Bayonne, New Jersey and Staten Island, New York, was now too low to permit passage of these huge ships.

The solution was an ambitious plan to strengthen the arch and raise the roadway to a height of 65.5 metres over the waterway, followed by the demolition of the original roadbed. Our team provided design services in a joint venture with HDR, on behalf of our client, the Port Authority of New York and New Jersey.

This project was honoured with the 2018 Grand Conceptor Award from the American Council of Engineering Companies, signifying the "year's most outstanding engineering achievement."

19.5

Bridge roadbed raised by 19.5 metres

4,000

More than 4,000 tons of steel plates

65.5

New clearance of 65.5 metres

Future Proofing

Raising the roadway of the bridge allows it to accommodate current (New Panamax) and future marine traffic, and the bridge will be able to accommodate light rail in the future. Stainless steel reinforcing bar was used in the roadway deck to ensure a 100-year design life.

Bridge Reinforcement

More than 4,000 tons of steel plates were used to strengthen the bridge and accommodate higher wind loads. This reinforcement brought the bridge into compliance with the American Association of State Highway and Transportation Officials' load and resistance factor design standards.

With USD 200 billion worth of goods flowing through the ports annually, 3.5 million vehicles crossing the bridge and limited alternative routes for traffic, it was not practical to close either the bridge or the shipping channel during construction. With carefully planned staged construction coordinated among numerous project partners, the bridge successfully remained open to traffic during peak hours, with lane closures usually limited to weekends and nights. The shipping channel remained open throughout construction.

As of February 2019, both of the bridge's roadways are open to traffic, marking the first time since 2013 that four lanes of traffic are traversing the Bayonne Bridge. Completion of the Bayonne Bridge Navigational Clearance Project is targeted for mid-2019.

Designing the World's Largest Ferris Wheel

As Lead Designer and Architect of Record on this unparalleled project, WSP oversees the design of the wheel structure and is responsible for detailed design of the terminal building, in close collaboration with the internationally renowned architect Snøhetta. We are also responsible for coordinating the multitude of other international consultants and suppliers on this record-breaking project.

With no precedent for an observation wheel this tall, much of what our team is accomplishing with the client is highly innovative. For example, for the ride time on the wheel to remain similar to other wheels, we are introducing a travellator on the boarding platform to ensure passengers can safely enter and exit the moving capsules.

Ain Dubai (“Dubai Eye”)

Dubai, United Arab Emirates

The Ain Dubai is located on the Bluewaters Island complex in Dubai Marina and will give a spectacular view over the Jumeirah Beach Residence and Palm Jumeirah.

Specialist access provisions have also been designed to ensure maintenance can be carried out as efficiently as possible.

We have an excellent relationship with our client Hyundai, and our ultimate client, Meraas, has also realized the value we are providing. Indeed, we are involved to a greater degree than would be normal practice for a design-build project, a fact that is appreciated by Hyundai and Meraas alike.

“We are proud that the client has really come to trust and rely on the WSP team for our specialist skills, our timely delivery and our management of challenging situations as they have arisen,” states Darren Brooke, Project Director.

The highly anticipated inauguration of the wheel will take place in time for Expo 2020.

210

210-metre-high observation wheel

48

48 luxury capsules capable of holding 1,920 visitors

Highlights

- WSP led the Hazard Identification Analysis and the Safety Case.
- Advanced structural monitoring to prolong the life of the structure.
- Full-time safety advisor upholding excellent standards on the construction site.
- Strong relationships between all partners, contributing to project success.

Bringing a Vision to Reality: InterContinental's Shanghai Wonderland

InterContinental Shanghai Wonderland Hotel

Shanghai, China

The InterContinental Shanghai Wonderland Hotel is located 35 kilometres from Shanghai city centre in an unusual spot for a 5-star hotel – an abandoned quarry.

"Working on such an unusual project in a fascinating location was highly enjoyable and a wonderful professional challenge. True to our brand, this project gave us the opportunity to 'design the unthinkable.' As the MEP Consultant Engineer, we provided comprehensive advice and solutions to our client, Shimeo Group, and also to the InterContinental Hotel team to address the unique challenges of this project."

— **Ming-Kwan Yeung**
Senior Associate

Onwards and upwards? Not necessarily. In this project we headed below ground level with the project team to work on this 18-storey hotel, with two floors above ground and sixteen floors below ground – two of which are situated below the water level of the lake in this former quarry.

By building the hotel where it is, the developer intends to impact the surrounding environment positively. The design of the hotel reflects the natural landscape of the quarry and the rocky cliff faces, waterfalls and nearby hills. All rooms have a balcony with view of the lake, and the two underwater levels are home to a restaurant, guest rooms, and an aquarium where guests can watch schools of fish swim by.

16

16 floors situated below ground in the cliff face

88

Hotel reaches 88 metres underground

Project honours include Winner of “Asia's Leading Hotel Development Project” at the 2018 World Travel Awards.

Sustainable Features

A green roof has been created on the hotel, and many other interesting features have been included, ranging from geothermal to solar energy. The green roof allows the hotel to blend into the surrounding environment as a natural element, and there are considerable benefits from the related energy savings.

Future Proofing

As part of the flood risk control design, extensive analysis of historical and projected rainfall data for the Shanghai and Songjiang districts was carried out alongside a study of water run-off and seepage from the quarry cliff face.

We resolved some captivating technical challenges during the design development stage. Mitigation of flood risk was clearly of the utmost importance; in the event of exceptionally heavy rainfall for example, emergency pumps are activated to reduce the level of the lake under a controlled environment to prevent flooding. We performed extensive computational fluid dynamics analyses to model the microclimate of the quarry under different scenarios.

The WSP team shared a proud moment with its client and partners at the grand opening of the hotel on November 15th, 2018.

61,087

Gross floor area is 61,087 m^2

1,000

Conference facilities for up to 1,000 people