Children's hospitals

Designed
for their future

wsp

Designing world-class children's hospitals

Children's hospitals are among the most complex of all healthcare buildings. Offering many medical specialties in one place, and caring for patients from the very youngest to those approaching adulthood, they present many design challenges – from tailoring every aspect of the fit-out to small people who love to explore, to creating safe, comfortable working environments for caregivers, to stacking and grouping functions so that large, diverse facilities can operate with maximum efficiency.

We are passionate about supporting our clients to provide the very best care, and we're proud to have worked on some very special buildings dedicated to children, as well as some of the most efficient and sustainable facilities in the world.

We've helped to create a state-of-the-art 'health park' for one of Europe's busiest children's hospitals, and designed the groundbreaking building services for the world's first hospital to achieve LEED Platinum accreditation. We play a key consultancy role on the transformation of some of the world's most renowned children's hospitals and provide a range of technical and project management services on facilities large and small, across the globe. We're assisting our clients to implement smart technologies and to transition to a net-zero world – ensuring facilities are flexible enough to adapt to the change we know is coming, and the change we can't foresee.

Every project presents unique challenges, but we never lose sight of the overall goal: creating safe, supportive, efficient environments for young patients, their families and the people who care for them.

Cover image: The Royal Hospital for Children
Image courtesy of IBI Group & Infinite 3D

"Being ready for the next generation in paediatric care means addressing two key topics: resiliency and flexibility. It means ensuring that the built environment and supporting infrastructure is sustainably equipped to deliver new models of care, new treatments and technologies, and also engaging with caregivers, patients and their families to provide a genuinely holistic experience"

Nolan Rome, US healthcare director, WSP in the USA

Contents

What makes a world-class children's hospital?

Positive experiences

A children's hospital is never just a building – it's a place that touches patients and their families at a critical moment in their lives, often when they are at their most vulnerable. We think differently about how to create a nurturing environment for everyone, from the parents of premature babies, to youngsters keen to explore their surroundings and teenagers on the cusp of independence. How can we give every patient access to greenery and nature? How can we make places that capture the imagination and turn a stressful experience into a positive one? How do we fit in more single rooms so parents can stay over, and enough space to store prams and pushchairs safely? And why not make emergency buttons blue instead of red so they're not so enticing to curious minds? These are just some of the questions that we constantly ask ourselves to make a visit to one of our children's hospitals as rewarding as it can be.

Healing environments

Patient safety is a guiding principle in every decision we take, and never more so than when we're designing for children. Our specialist teams integrate hygiene and infection control into the earliest concept drawings, to actively promote wellbeing and protect the very youngest and most delicate patients, as well as the caregivers who look after them. We make sure rooms and staff facilities are laid out to prevent cross-contamination, carry out meticulous detailing to eliminate germ traps, and design effective, high-performance building systems to reduce airborne pathogens and stop the spread of disease. We implement secure-by-design principles and systems to keep intruders out and stop adventurous young patients from roaming where it isn't safe, and use smart technologies to improve monitoring and safety. And we take a child's eye view to create positive distractions and childproof fixtures and fittings that keep little fingers (and vital equipment) out of harm's way.

Operational excellence

Providing high-quality, affordable, sustainable healthcare means making the best possible use of limited resources, while meeting the most exacting technical standards. Reducing carbon emissions to net-zero will also influence the way that facilities are designed and maintained. Our clients rely on us to deliver buildings that perform flawlessly while being cost-effective to operate, leaving them free to focus on delivering for the children and communities who depend on them.
Our expert teams leave no stone unturned when it comes to considering exactly how a hospital will run, and what we can do to make it function better. We design structures and finishes that minimize cleaning and maintenance, building systems that use energy and water as efficiently as possible, and layouts that mirror hospital workflows, to maximize patient visibility and reduce travel time for staff.

"Design is evolving to become more inclusive, from visioning through to construction. We bring stakeholders such as family advocates, nurses, systems integrators or prefabrication experts together to input into early decision making, to help marry operations with patient experience and so improve future flexibility and models of care"

Nolan Rome, US healthcare director, WSP in the USA

Efficiency and performance

Children's hospitals are complex, highly serviced, power-hungry buildings that must perform flawlessly around the clock: there can be no downtime when many young lives depend on the constant, consistent functioning of hundreds of essential systems.

But that doesn't mean they can't be exemplars of resource efficiency and sustainability too, or help lead the transition to net-zero carbon. Our teams bring specialist expertise in many disciplines to ensure that every component of our buildings responds perfectly to the needs of healthcare practitioners, patients and their families, while making the lightest impact on the environment. From the biggest decisions over vital infrastructure to the smallest touch-panel control, we can provide clear, relevant advice on hot topics such as district energy, combined cooling, heat and power, the Internet of Things and smart buildings, and on how each client can derive the greatest possible value from them.

Of course, children are often the most demanding clients when it comes to sustainability – they understand that clean energy and saving water now is key to their world in the future. We invite young people to contribute to our designs and we listen to their concerns. Then, we work hard to find the smartest, most sustainable solutions so that when they ask the tough questions, we have some good answers.

"Healthcare systems around the world are signing up to some very ambitious targets with regard to achieving decarbonization. This will be game-changing for every aspect of hospital operations, from ambulance fleets to the infrastructure for supplying anaesthetic gases"

Kevin Cassidy, global healthcare lead,
head of healthcare, WSP in Canada

Dell Children's Medical Center of Central Texas

Cutting-edge care in the world's greenest hospital

Location: Austin, Texas, USA

Client: Seton Family of Hospitals

Architects: Polkinghorn Group Architects, Karlsberger

Services: Mechanical, electrical and plumbing, fire engineering, commissioning and start-up management

Project status: Completed in 2007 and 2014

Dell Children's Medical Center was an ambitious project from the get-go. Its owner, the Seton Family of Hospitals, envisioned a forward-thinking, innovative facility offering premium paediatric care in a truly sustainable environment. The resulting building is the world's first hospital to achieve LEED Platinum certification, making it not just the premier healthcare provider for children and teens in Central Texas but an exemplar for the healthcare industry worldwide.

Sustainability was central to the 170-bed hospital from the earliest design stages, when we were engaged to model the building's energy use to maximize conservation and comfort. This involved the implementation of the facility's on-site combined heat and power (CHP) plant, which boosts efficient energy generation and recycles waste products. It includes a 4-3MW combustion turbine generator, steam generator and absorption water chiller. By optimizing heat recovery, ventilation and lighting design, and using as much daylight as possible, our designers cut net energy use by 40% compared with a similarly occupied building in the same climate. Thanks to our team's innovative and collaborative thinking, as well as achieving one of the most energy-efficient hospitals in the world, the owners saved US$8m in capital outlay through the decision to outsource power, heating and chilled water needs to Austin Energy, which owns and operates the CHP plant.

Built on the former site of the Robert Mueller Municipal Airport, the low, horizontal hospital blends into the landscape, setting a positive example for the rest of the brownfield site. Its courtyards and use of local materials reflect and celebrate the community it serves, not only as the region's sole dedicated, freestanding paediatric centre but as one of just four Level 1 trauma centres in the state.

As evidence mounts that access to nature aids healing, the hospital has harnessed outside space, serving its commitments to the environment and medical excellence. A 2013 extension, also designated LEED Platinum, adds an outdoor labyrinth and sensory garden alongside an epilepsy monitoring unit, toddler rehab centre and therapy gym. We served as mechanical, electrical and plumbing engineer on the US$25m expansion.

LEED Gold

green building certification

Image courtesy of Thomas McConnell LLC

Ron Joyce Children's Health Centre

Family-centred care in specialties from autism to prosthetics

Location: Hamilton, Ontario, Canada

Client: Ontario Infrastructure and Lands Corporation

Architect: Stantec

Services: Structural engineering, building sciences, mechanical and electrical engineering, lighting design, civil engineering, sustainability and energy, IT and security

Project status: Completed in 2015

Many of the children and teenagers at Ron Joyce Children's Health Centre (RJCHC) are dealing with lifelong cognitive, behavioural or physical issues. The aim of this new facility, in addition to offering the broadest range of paediatric services in Canada, was to foster a more welcoming and close-knit approach to family-centred care. All of the programmes and medical teams are located in one building, and a 'teen lounge' and family resource centre add to the nurturing environment. Each element of the design, including the lighting, was carefully considered to engage patients, and thereby support the healing process.

The 180,000ft² facility is fully accessible and includes an outdoor wheeling track, therapeutic playground and physiotherapy space. Specialties include autism spectrum disorder, child and youth mental health, and developmental paediatrics and rehabilitation. Part of McMaster Children's Hospital, the RJCHC also houses Canada's largest prosthetics and orthotics programme, which serves both children and adults from across the country. It was built on an industrial brownfield site, and has become a catalyst for urban regeneration in its downtown Hamilton neighbourhood. The hospital itself also benefits from this close connection to the community, as well as its public transit links.

With this in mind, it was important to minimize the environmental footprint of the project on the surrounding area. Its innovative design and construction process ensured that 32% of building materials used recycled content, 45% of materials were sourced or manufactured locally, and 86% of construction and demolition waste was diverted from landfill.

The environmental focus extends to the operation of the building too. Technologies such as individual lighting controls for at least 90% of building occupants, as well as energy-efficient HVAC systems, reduce energy use by about 60%, while low-flow fixtures cut water use by over one-third. The indoor air quality management plan stipulated the use of low-emission materials, and passive energy-saving measures include a thermally resistant envelope and a heat-reflecting white roof membrane. As a result of this wide-ranging strategy, the hospital has achieved a LEED Gold certification.

"This will be an environment in which children and youth will find a place to be the best they can be"

Dr Peter Fitzgerald, president, McMaster Children's Hospital

Kuwait Children's Hospital

The world's biggest dedicated facility, delivered by a global team

Location: Al Shuwaikh, Kuwait

Client: Kuwait Ministry of Health and Ministry of Public Works

Architects: HKS, SSH Design

Services: Mechanical, electrical and plumbing, fire life safety

Project status: Scheduled for completion in 2022

With more than 11,000 rooms, 792 beds and 30 operating theatres, Kuwait Children's Hospital (KCH) will be the largest facility of its kind in the world. The 595,000m² hospital will provide a full range of clinical services, tertiary care and wellness programmes, as well as state-of-the-art facilities for specialized medical research and teaching.

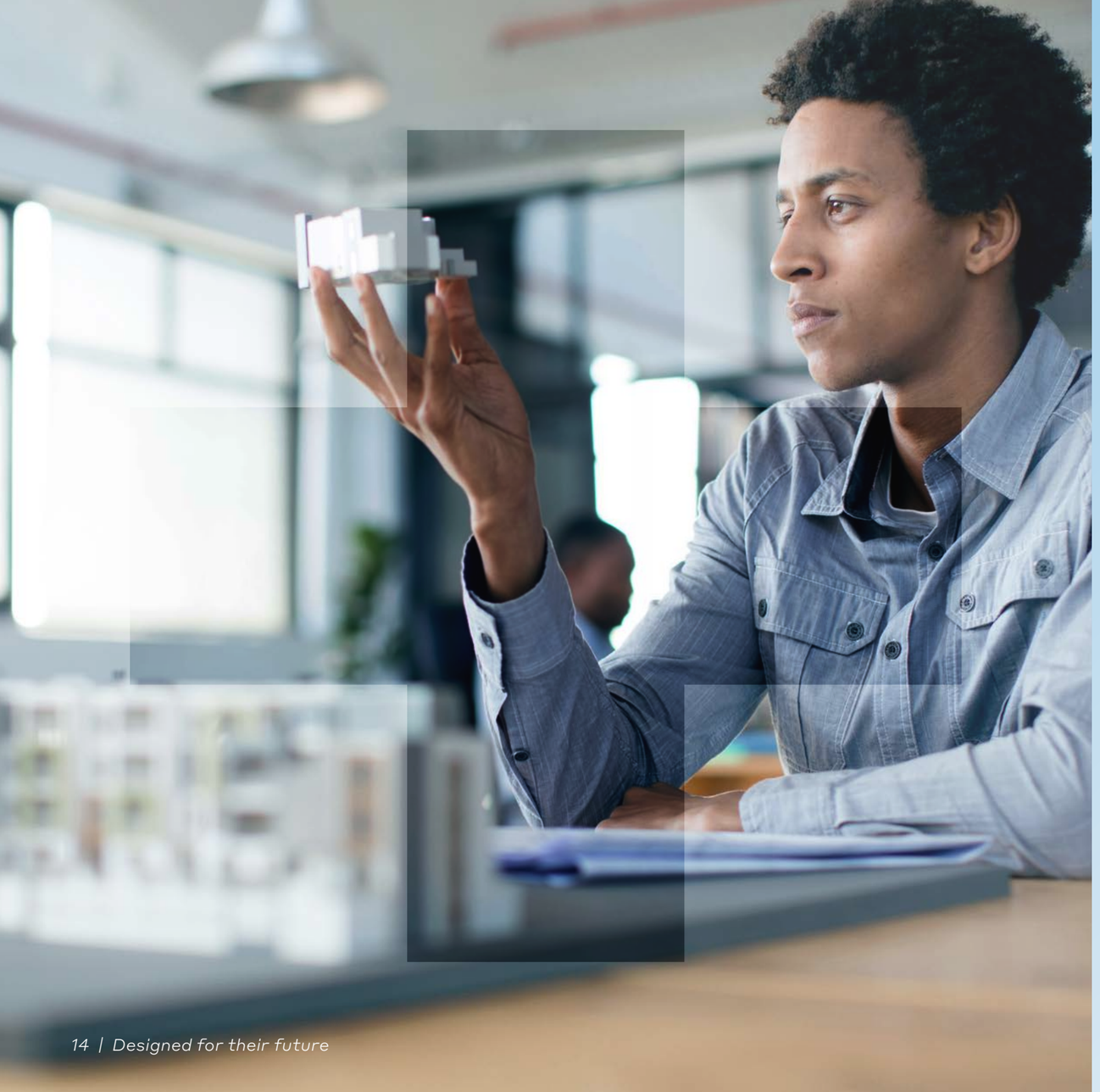
Situated on the coastline, within the Al Sabah Speciality Medical Area in Al Shuwaikh, the hospital's distinctive design concept is based on crystalline forms. The main entrance is via a five-storey, 457m-long, climate-controlled atrium. This area will combine a blend of civic, hospitality and retail services, including play areas with a 'sea adventure' theme.

From the outset, the Kuwait Ministry of Health and Ministry of Public Works envisaged KCH as a highly resilient and sustainable building. A major challenge was to find an efficient solution to supply energy and HVAC to such an immense building. Our response was to create a central energy plant with 40MW generator backup capacity, providing 100% redundancy in case of supply failure.

Efficient water use was also a key requirement. Our services design features a chilled water plant with a 1.1 million litre domestic water storage tank, a quadraplex pumping system sized at 10,300 litre/min, 350,000 litre fire water storage tanks with two electric fire pumps sized at 3,800 litre/min and a 1.7 million litre cooling tower storage tank.

We have collaborated closely with architects HKS and SSH to meet these energy and water-use goals, combining the expertise of our teams from around the world. We worked on the concept phase of the central utilities and energy plant in Dallas and oversaw the design and development in Canada, including the air handling floor and building tower. ICT support was provided in Dubai, and building information modelling and drafting support in India.

Image courtesy of HKS



Innovative design

Children's healthcare is changing all the time, so we provide design solutions to help our clients keep up with the demands of 21st-century medicine.

We create inspiring spaces that incorporate new kinds of treatment and new ideas about wellbeing, supporting our clients to care for young patients with increasingly complex needs and to meet and exceed their parents' expectations of what a children's hospital should offer.

Our teams draw on the best available science about what makes a healing environment, and use proven technologies to put it into practice. We collaborate with healthcare practitioners to find out how we can support them to deliver better care, and we spend time listening to patients big and small about the spaces that make a difference to them. Within our children's hospitals, you'll find abundant natural light, fresh air and greenery, great views for patients and their families to enjoy, and attractive spaces that encourage exploration and play or provide a calming backdrop for quieter moments.

There's plenty of innovation that the patients don't see too, in the structures and systems that underpin a perfectly functioning children's hospital. At Alder Hey, for example, we designed an innovative precast-concrete facade that doubles as both structure and cladding, reducing internal columns, materials and embodied carbon. And we're using the latest design tools and off-site manufacturing techniques, improving speed and accuracy – and ensuring that the final product will perform just as it should.

"The pace of innovation in medical technologies just keeps increasing. We need to make sure facilities are flexible enough to readily accommodate these changes"

Kevin Cassidy, global healthcare lead, head of healthcare, WSP in Canada

Alder Hey Children's Health Park

A hospital designed through the eyes of children

Location: Liverpool, UK

Client: Alder Hey Children's NHS Foundation Trust

Architect: BDP

Services: Structural engineering, geotechnical and ground engineering, transport planning, building acoustics, noise and vibration

Project status: Completed in 2015

Alder Hey is one of Europe's busiest children's hospitals but until 2015 it was housed in an almost century-old building with a leaky roof. When the local NHS trust decided to modernize, its vision went far beyond a simple revamp: why not integrate the new hospital into neighbouring parkland and use green space to boost wellbeing?

The result is a trailblazing 'health park' that connects patients with nature and sets new standards for paediatric care. We worked with architect BDP on the design, but the vision was uniquely inspired by the children themselves – with patients and families consulted throughout the project on aspects such as effective access to fresh air and artwork on the walls. The patient-friendly hospital has been set out to create a calming and happy environment that doesn't feel like a hospital and enhances the children's healing.

The cutting-edge facility, which has 16 operating theatres and is set to treat 270,000 young people each year, is seamlessly entwined with the surrounding park. Its three sections blend into the landscape by reaching into the green space like fingers, while grass continues from the ground over the curved hospital roofs. With patient windows, specifically designed at children's level, opening onto the park and all departments looking over gardens or parkland, the 270-bed hospital is flooded with natural light. Room layout is also optimized to reduce distances covered by staff, while space has also been created for a striking atrium at the heart of the building. It also features a giant indoor tree house that provides relaxation areas and play space. Specialist acoustics contain noise from hospital equipment, alarms and beepers, while protecting the privacy of individual rooms.

As well as an extraordinary building with outdoor space, the client wanted affordability and efficiency. We met this challenge head on with an innovative building-envelope design. More than 1,250 precast-concrete sandwich panels on the building's perimeter distribute loads to the foundations, removing the need for conventional columns, thus allowing for maximum flexibility of room layouts. The design of the panels themselves also cut cladding requirements, removing the need for external scaffolding and the associated health and safety implications. In addition, effective installation and the use of high quality, robust and durable materials reduces the need for future maintenance. The vast majority of components were manufactured offsite, decreasing build time, boosting energy efficiency and contributing to the most sustainable 24-hour hospital ever. Clinicians were able to visualize progress throughout the project thanks to the advanced use of 3D design that could walk them through the room flows, illustrate slices of the building and particular design specifications.

The old building will be demolished and reclaimed as parkland, proving that this is more than a hospital project – it is a regeneration scheme for the whole community.

Park views for 75%

of single rooms

Image courtesy of HKS

Image courtesy of Frank Stößel Photography

Klinikum Mönchengladbach

Specialized neonatal care in a safe and reassuring environment

Location: Mönchengladbach, North Rhine-Westphalia, Germany

Client: Städtische Kliniken Mönchengladbach

Architect: HDR TMK Architects

Services: Project management

Project status: Completed in 2014

Concerned that too many babies are still dying in high-risk births, the German government has been funding a string of new perinatal centres to care for preterm infants and their mothers. Our Frankfurt-based health team has already helped to build three of these dedicated facilities. One is the specialized mother and child clinic at the Städtische Kliniken Mönchengladbach, a redevelopment of the Elisabeth Hospital in Rheydt, which also includes a centre for geriatric care.

Designed by HDR TMK Architects, the 34-bed Level 1 perinatal centre is geared to the special needs of significantly underweight new-borns. Level 1 clinics care for mothers and babies where the estimated birth weight is below 1.25kg or the baby is born before 29 weeks' gestation; where the mother is pregnant with triplets (or more multiples); or where serious conditions requiring specialized intensive care of the baby, such as critical heart defects or diaphragmatic hernias, are prenatally diagnosed. They feature an interconnected maternity ward, operating room and neonatal intensive care unit with at least six places.

The facility at Städtische Kliniken is designed to combine a relaxed and friendly environment for the whole family with maximum safety for mother and child. Its facilities, decorated in warm and varied colours, include state-of-the-art delivery rooms and operating theatres, plus a newborn nursery equipped to support breastfeeding, family rooms and a gym. The hospital's layout supports the drive for enhanced safety, with the delivery rooms located just 25 steps from the paediatric intensive care unit next door. A new car park has also been built to meet demand from increased patient numbers.

We provided project management services to the scheme, implementing stringent cost-management measures to make sure it finished on time and budget. A central challenge was overseeing construction of this significant new facility on a working hospital campus. In particular, the direct link between the mother and baby clinic and the neighbouring paediatric unit called for the highest hygiene standards and minimal noise and pollution.

Monash Children's Hospital

A healing space that nurtures young imaginations too

Location: Melbourne, Australia

Client: Silver Thomas Hanley / Monash Health, Victorian Department of Health

Architect: Silver Thomas Hanley

Services: Structural and civil engineering

Project status: Completed in 2017

Paediatric hospitals are places for children to receive physical treatment, but they should also be spaces where they can heal emotionally. This sense of wellbeing is at the heart of the new Monash Children's Hospital in Melbourne – in the form of the Disney-designed 'Imagination Tree', a multi-level sculpture in the central atrium that encourages exploration and play through a variety of sensory experiences and is visible from all directions. This sense of playfulness extends throughout the building, with animal sculptures helping families find their way through the hospital and acting as a calming distraction for its young patients.

We became involved because of our long-standing working relationship with the Victorian Department of Health and architect Silver Thomas Hanley. The hospital is only the second purpose-built paediatric hospital in the state and one of the largest of its kind in Australia. It is an extension to the existing 1980s Monash Medical Centre Clayton, which previously had paediatric facilities integrated into it.

The structure is built on an old car park. It has its own entrances but remains connected to the original hospital at several levels to allow some elements to be shared – including a new prefabricated helipad that was constructed on the roof. To link the two, we created a 40m-long tunnel and two 30m-long bridges. This involved underground works, removing columns and lifting prefabricated steel frames into place, all while highly sensitive departments such as nuclear medicine and MRI scanning remained operational. We designed a staged process of underpinning, excavation, spoil removal and construction to help control any movement that might affect the delicate medical equipment inside. Designing a thin structure that aligned with the tight floor heights of the original building also required a high level of precision and expertise.

The new building adds 230 beds, and the capacity to treat more than 7,000 patients a year, setting the institution up for future growth and expansion. The building itself is also ready for the long haul, designed for repeated refurbishment over its lifetime and flexible enough to change as the hospital's needs adapt.

"Together with the Royal Children's Hospital and Joan Kirner Women's and Children's, we are proud to have been instrumental in delivering all of Victoria's purpose-built paediatric hospitals"

Barry Roben, principal director, WSP in Australia

Image courtesy Dianna Snape Photography

State-of-the-art care

Advances in medical care bring new hope for patients and their families, but they also present great challenges for the design of children's hospitals. Often encompassing many different departments under one roof, these buildings have to accommodate a growing range of highly specialized equipment and smart technologies, all be tailored to the needs of younger patients.

WSP has delivered some of the world's most technologically advanced healthcare facilities, so we understand the unique demands that they present. We can offer efficient design solutions to manage the risks of housing powerful but sensitive machines in close proximity to busy clinical areas, and meet very precise requirements on electricity, water, vibrations and radiation shielding.

We support children's healthcare providers to make the most effective use of smart building technologies, IT and communications to operate more efficiently, offer a higher quality of service, and both improve patient safety and create a more welcoming, reassuring experience. After all, today's patients are tomorrow's digital natives, for whom seamless networks and interactive devices are second nature. Our digital experts share their enthusiasm for what technology can offer – but we combine it with a very grown-up scrutiny of the real costs and benefits to your organization, in a world where infection control is paramount.

"We're exploring how building design and technology can address the social impacts of a condition or disease, as well as the physical side. We're finding ways to connect patients with friends and classmates back home, and creating spaces to accommodate siblings and family members when they visit. It's really important that kids are still able to be kids, and that they can maintain a sense of normalcy while they're going through treatment"

Kevin Cassidy, global healthcare lead,
head of healthcare, WSP in Canada

Cutting-edge research facilities

for 33% of the building

Image courtesy of Tom Arban Photography Inc

The Hospital for Sick Children

30-year collaboration propels care facilities to new heights

Location: Toronto, Ontario, Canada

Client: The Hospital for Sick Children

Services: Mechanical, electrical and plumbing, surveying, mapping and GIS, security consulting

Project status: Ongoing

First hired by The Hospital for Sick Children in 1985, our engineers have worked with this world-renowned centre for paediatric care for more than 30 years. The initial project, which saw construction of a new inpatient tower and a masterplan for redevelopment of the older annex buildings, laid the ground for an enduring relationship. We have since worked with the hospital to deliver the state-of-the-art cardiac diagnostic intervention unit, magnetic resonance imaging facilities and computerized genomics laboratory space, and have provided civil and building science services on a major research laboratory occupying over a third of the hospital building area. As the capacity of the hospital has grown, our teams have also taken on tasks from operating room and central plant upgrades to the synchronization of generators across three different buildings in order to boost available emergency power.

Over the years, we have worked closely with architects, interior designers and client advocates to understand the complex requirements of a facility that cares for newborns and teenagers alike. Specialist design needs range from tamper-resistant lighting and covered emergency buttons (less tempting for little hands to press than the standard red ones) to child-adapted CT scanners and soothing lighting systems. In addition, the hospital has to cater not just for patients but also for their families, so environments that minimize stress are crucial.

One major challenge was the phased renovation of a 1,394m² emergency department in 2009. Our team ensured this critical facility stayed operational throughout, overseeing complex coordination of mechanical and electrical services through three phases of construction as well as incorporating plans for a future diagnostic imaging department into the building services design. The project also included 28 new examination rooms, five isolation units, procedural rooms and administrative space.

Scottish Rite for Children Orthopedic and Sports Medicine Center

Groundbreaking campus for treating sports injuries in children

Location: Frisco, Texas, USA

Client: Scottish Rite for Children

Architect: HKS Architects

Services: Mechanical, electrical and plumbing, fire protection, life safety, building technology systems design, security, telecom systems, acoustic consulting

Project status: Completed in 2018

Because young athletes are still growing and developing, treating their injuries is often very different to caring for adults with the same condition. Over the past century, Scottish Rite for Children in Dallas has developed a niche of treating sports injuries in children, and consistently ranks in the top five US hospitals for paediatric orthopaedics. Its new US$157m campus in Frisco expands its care facilities as well as its research programme, which aims to increase understanding of injury risk and develop prevention strategies for children.

The first stand-alone campus that Scottish Rite has built outside Dallas, the 350,000ft² Center for Excellence in Sports Medicine provides facilities ranging from standard treatment rooms, a fracture clinic, a gym and therapy pools, to a prosthetics workshop, a 155-seat lecture hall and a motion-capture laboratory. A large indoor-outdoor sports therapy area includes turfed sections and a short running track to replicate real-world conditions.

Several of the specialist areas required carefully considered mechanical, electrical, plumbing and technology (MEPT) design. In the Movement Science Lab, for example, cameras capture images of children performing activities such as running, jumping, throwing and kicking. These isolate specific movements, and therefore play a crucial role in determining individualized care. To enable this, the cameras had to be closely coordinated with in-floor sensing and measuring devices, medical equipment and MEPT services. The prosthetics and orthotics workshop, meanwhile, needed precise air flow and environmental conditions due to the materials used in the fabrication of prosthetics and orthotics.

The building has an attached central utility plant, as well as shell space for a future in-patient ward. WSP and architect HKS designed the facility to meet both Texas ambulatory surgery guidelines and hospital guidelines so that it can easily transition to in-patient care in the future.

There are also a number of features that make the centre feel inviting to a child, such as the abundant use of colour. Of particular note is the Movement Science Lab's colour-changing facade, which WSP developed with HKS to bring a creative concept to reality.

"Scottish Rite for Children is quite a special place, and it is super-fulfilling to see this project emerge from a multi-year masterplan, and know how many lives that this place will touch and improve"

Douglas Lacy, senior vice president for buildings, WSP in the USA

Image courtesy of Thomas McConnell LLC

“At the same time as creating a highly technical environment, we also had to consider how to create a homely atmosphere for the children”

Marcus Frost, project manager, WSP in Sweden

Image courtesy of White Architect

Queen Silvia’s Children’s Hospital

A vast range of services under one roof – all tailored to children

Location: Gothenburg, Sweden

Client: Västfastigheter

Architect: HKS Architects

Services: Building acoustics, noise and vibration, mechanical, electrical and plumbing, building information modelling, logistics

Project status: Completed in 2020

With its new premises, Queen Silvia’s Children’s Hospital aims to embrace a completely new way of thinking about children’s hospitals, putting the patient at the heart of every aspect of design and operations. The hospital has been in its current home since 1973, so the new building is needed to update its ageing facilities and to meet an increased need, including for more specialized equipment.

The eight-storey hospital will cover 33,000m², with facilities including outpatient clinics, intensive care, operating theatres, a sterilization unit and wards, across many medical specialties, as well as a rehabilitation pool, helipad and library. To create a more home-like and secure environment, all patients are accommodated in single rooms, which allow parents to stay overnight and reduces the risk of cross-infection.

We have provided engineering services including mechanical and electrical design, acoustics, systems engineering, logistics and developing and coordinating the building information modelling (BIM) strategy. Extensive use of BIM has been essential to keeping track of 450 systems – including security, lighting, x-ray equipment, electricity and ventilation – and the complex logistics of the project. BIM was used to connect a database of user and technical requirement specifications to the different CAD tools, and was also essential for maintaining good communications with the project stakeholders. Planning for how BIM can play a valuable role in maintenance and adaptations throughout the building’s lifecycle is ongoing.

The energy-efficient design includes advanced lighting technologies that only activate in occupied rooms, and ventilation that is tailored to the precise need in each space. Flexibility is also a key part of the design – each operating theatre can be isolated from the rest of the building and can therefore be rebuilt with minimal impact on adjoining rooms.

Great effort is also being made to stimulate children’s imaginations and encourage them to think beyond their illness. There are facilities for education and therapy, a music studio, play areas for younger children, a dedicated area for teenagers, relaxation spaces and places for activities such as table tennis and video games. And with technology second nature to young people today, each patient will have their own page on a dedicated site, with information about the day’s events, details of their medication and treatment and a place where they can send questions to the doctors.

Fit for the future

Successful children's hospitals become landmarks for their communities, caring for generation after generation. We never lose sight of their true value and the role that building design plays in creating it. To ensure their longevity, we create solutions which can be adapted to accommodate new treatments and technologies, as well as having the flexibility to respond to changing patterns of demand or urgent crises.

We know that facilities for children have to withstand a lot over their lifetime. We design buildings to last, with robust fit-outs that stay clean and look good, even as thousands of patients and their families put them through their paces every day. We understand the importance of finishes and fixtures that are easy to maintain, and flexible structures and systems that can be altered or upgraded as needs change or new treatments become available. For older buildings in need of modernization, we collaborate with stakeholders young and old to give them a new lease of life, retaining what makes them special, without compromising on safety, comfort or efficiency.

As the world transitions towards net-zero, healthcare buildings cannot be left behind. But we can't ignore the fact that the climate is already changing, so our expert teams assess and mitigate the potential risks to building structures and operations. We keep one eye on the future, so that internal temperatures remain safe during warmer summers and essential systems won't fail in the event of flooding or storms. That's part of our rigorous, holistic approach to future-proofing an investment in children's care, equipping our clients to meet today's highest standards and whatever tomorrow brings.

"Climate change is influencing our environmental design, but it also means an increase in catastrophic events such as flooding, extreme weather and epidemics. We need to design facilities to be resilient so that we can continue to protect future generations"

Kevin Cassidy, global healthcare lead,
head of healthcare, WSP in Canada

Image courtesy of White Architect

Children's Healthcare of Atlanta at North Druid Hills

New 19-storey hospital ready for the challenges of the future

Location: Atlanta, Georgia, USA

Client: Children's Healthcare of Atlanta

Architects: Earl Swensson Associates, HKS Architects

Services: Mechanical, electrical and plumbing, lighting, fire life safety

Project status: Ongoing, with proposed opening in 2025

The new North Druid Hills campus of Children's Healthcare of Atlanta – the city's only dedicated paediatric healthcare system – is designed to provide transformative care for patients and families, leveraging the latest advances in technology and sustainability. We were invited to participate in the masterplanning phase of the project and were retained by Earl Swensson Associates to continue into the design phases for some of the most specialized components due to our extensive experience in delivering complex healthcare schemes.

The new facility is indeed complex and forward-thinking. One example: the creation of a six-bed special care unit within the emergency department for the treatment of patients with potentially highly infectious diseases. If a case of Ebola or another easily transmittable virus is detected, this area can be rapidly converted from a normal emergency department to a sealed-off facility, where the flow of people, decontamination procedures and the removal and incineration of objects can be managed. Additional operating rooms to isolate patients with other infectious diseases will allow the hospital to continue to function during a viral outbreak – a consideration given renewed prominence by the COVID-19 pandemic.

Our remit includes the 19-storey, 446-bed hospital, with its intensive care facilities and diagnostic and treatment areas. We are also responsible for the central utility plant, which is designed for the hospital's long-term growth, and will provide the option of powering the entire facility during a power outage.

The complexity of the project means the way we have been working – being self-sufficient and engaging with the client in a thoughtful way – is just as important as the work we are doing. We are part of a closely integrated, multidisciplinary team of consultants and contractors who are together shepherding the project through the design process. The construction and evolution of the campus will continue throughout the next decade, and we will remain part of the team as construction progresses.

"Children's Healthcare of Atlanta wants to solidify its reputation for the future, and a modern facility designed to serve Georgia's children and families is key to that effort. They need a space where everything from mechanical systems to telecommunications is integrated and creates efficiency for all of its clinical team"

Douglas Lacy, senior vice president for buildings, WSP in the USA

Image courtesy of Children's Healthcare of Atlanta

Image courtesy of Christopher Frederick Jones

Centre for Children's Health Research

Room for expansion thanks to inventive building services design

Location: South Brisbane, Queensland, Australia

Client: Queensland Health

Architect: Hassell

Services: Mechanical, electrical and plumbing, security consulting, fire engineering, vertical transportation

Project status: Completed in 2015

Representing the largest single investment in paediatric health research in Queensland's history, South Brisbane's Centre for Children's Health Research marks a major, long-term commitment to this field of study. This is reflected in the design of the nine-storey centre, which shares a precinct with the new Lady Cilento Children's Hospital and a central energy facility.

The building, which can currently house over 400 researchers, has been deliberately 'future-proofed' to allow for expansion, ensuring it has the flexibility to meet the state's child health research needs for the long term. Most notably, all building services are designed with sufficient spare capacity for future demand and in a way that allows the 14,108m² facility to expand horizontally when the time comes.

Today, five of its nine floors are dedicated to research, including wet and dry laboratories. The remaining storeys accommodate a pathology service for the Lady Cilento Children's Hospital as well as office areas, retail space and car parking. A service tunnel connects the centre to the hospital.

Our services on the project included mechanical, electrical and plumbing and fire protection engineering, plus security and communications consultancy. A major challenge for the team was to provide a fully operational pathology department to serve the hospital next door while the Centre for Children's Health Research was still under construction. Again, careful building services design provided the solution, allowing the pathology clinic a level of independence from the rest of the building.

In addition, chilled and hot water, gas, power, communications and security monitoring are all provided on a precinct basis, meaning a significant coordination effort was required from our engineers to guarantee high performance across the site.

The Royal Hospital for Children

A low-carbon new-build for an acclaimed institution

Location: Glasgow, UK

Client: Brookfield Multiplex / NHS Greater Glasgow and Clyde

Architect: IBI Group

Services: Structural engineering, fire engineering, green building design, geotechnical and ground engineering

Project status: Completed in 2015

Glasgow's Royal Hospital for Children is synonymous with world-class paediatric care. The hospital reopened in 2015 on a new site at The Queen Elizabeth University Hospital Campus, providing the young people of Scotland with new buildings and spaces for a consistently exceptional patient experience. This 256-bed children's hospital has created a cutting-edge clinical environment with the highest standards of sustainability.

The new hospital is physically linked to the refurbished maternity unit and the new adult hospital in order to provide the best possible care for babies, children, young people and their families. The overall site is equivalent in size to 11 football pitches, making it one of the biggest construction projects ever undertaken by the NHS. It also has one of the largest reinforced concrete frames in Europe, allowing for an in-built fire protection, improved acoustic performance for enhanced patient experience, better ability to resist vibration and increased thermal mass for reduced energy consumption.

This outstanding hospital was designed around the needs of children, with key insight from the young patients themselves as well as architects, nurses, doctors and other clinical staff. The comfortable single-room environment provides for increased privacy and reduced infection rates, and enables parents to stay at their child's bedside overnight. The hospital is a fun and vibrant space designed in collaboration with the Glasgow Science Museum. Flooded with natural light and decorated with soft colourful furnishings and interactive technology, the non-institutional design helps to distract children by positively impacting their senses. There are indoor and outdoor play areas and a cinema, and the building is surrounded by parkland, offering patients a place of sanctuary and wellbeing.

Efficiency and sustainability were high on the hospital's list of priorities and our designers fully embraced this aspect of the brief, contributing to an award-winning environmental strategy, which included BREEAM Excellent. The design of the building has been optimized and uses a high-quality, airtight cladding system to ensure a draught free environment, lower energy costs and improved internal air quality control.

Minimizing and managing waste generation was an essential aspect of the construction phase. Early in the project we provided waste management licensing and exemption registration support to the client by demonstrating to the Scottish Environmental Protection Agency that a full site waste management licence would not be needed for the on-site waste sorting facility. This enabled a range of environmental, economic and operational benefits including a 96% diversion of construction waste from landfill, reduced traffic movements, and increased quality and value of recyclable materials.

Throughout construction we monitored the operation and performance of the sorting facility against the exemptions registered and applicable waste regulations. We also audited the development's progressive BREEAM performance against the waste related credits targeted by Brookfield Multiplex.

In addition we worked with the construction team to maximize the amount of off-site fabrication, such as precast columns, edge beams and stairs, which assisted in further waste reduction.

Can we trace horizons,
hold true to our ambitions,
and hold ourselves accountable?

What if we can?