DESIGNED FOR CRITICAL CARE

ACUTE HOSPITALS
Acute care hospitals are on the frontline of public healthcare services. Acute patients require immediate, often life-saving, care for a range of medical emergencies and conditions, including trauma, serious illness and disease. The hugely diverse and complex needs of these delicate patients present a number of design challenges. Acute care staff need access to various specialist medical resources without delay, while care rooms need to be adaptable to suit the rapidly changing requirements of patients. Importantly, vulnerable acute patients need to be protected from the risk of infection.

At WSP Parsons Brinckerhoff we are dedicated to helping our clients provide the best possible care to critical patients. Through our many years’ experience in the acute care field, we understand this means more than looking after patients’ physical needs – it also means considering patients’ wider welfare.

Our aim as a key project consultant is to create acute care environments that promote patient wellbeing as well as supporting the work of care staff. In British Columbia, a scheme to create the province’s largest ever healthcare centre typifies our approach. This acute facility provides patients with suites that are flooded with natural light and offer ample space to visitors, helping to create a warm and positive care setting.

We also understand the need to create efficient, low energy buildings. Demands on acute health services are increasing due to growing and aging populations the world over. Resources are stretched and efficient buildings can ease the pressure. Glasgow, for example, saw the delivery of one of Europe’s largest acute care hospitals. It uses a range of energy efficient features to help reduce the hospital’s running and whole-life cycle costs.

From large-scale, new build hospitals to upgrades of existing acute facilities, we always place patient and care staff wellbeing at the heart of our designs. It is our people-centred approach that has won us the privilege of working on some of the most advanced acute hospitals in the world.
Acute patients are by definition those patients who are in the most delicate and critical conditions. Every possible precaution must be taken to reduce the risk of further medical complications. This means providing a clean, orderly and safe care environment that minimises the chances of hospital acquired infections.

Our specialist engineers integrate infection control into the design concept from the outset. Creating floor layouts, building services and ventilation systems that prevent cross-contamination between rooms, wards, staff facilities and operating theatres. We go into meticulous detail to ‘design out’ germ traps and reduce airborne pathogens and stop the spread of disease.

We also offer a balance between the need to secure patients’ safety against intruders, while ensuring care staff can move fluidly around a facility. Time is a critical factor in the successful delivery of acute care and an easily navigable hospital, with good vertical and horizontal connections between different zones, is an essential component to reducing staff fatigue and stress.

Those admitted for treatment in acute units are at a critical moment in their lives. Our aim is make the experience as positive as possible and create a warm, welcoming setting to reassure patients that they are in a supportive environment.

We do this by first and foremost thinking of patients as people. What kind of environment makes people thrive? A growing body of evidence suggests that providing patients with access to natural light, fresh air and greenery aides the healing process. Contact and closeness to loved ones is another key contributor to patients’ overall wellbeing, as well as reduced noise levels, especially at night.

We approach all our designs with this holistic idea of patient welfare in mind and create quiet and private rooms for patients with space to accommodate visitors, where possible. We maximise the use of natural light and natural ventilation, and create landscaped external areas to create interesting views. Some of our acute hospitals even have gardens that are specially adapted to accommodate patients in acute care beds, allowing the most critically ill people to experience nature first hand.

According to the NHS, the total number of acute hospital admissions in England rose from 11.3 million in 2003/4 to 14.7 million in 2013/14 – a rise of 30%, due in part to an ageing society. These figures are typical of the global trend for increasing demand for acute care services. Effective resource management in acute medicine is key to managing this challenge.

Our clients rely on us to deliver buildings in a cost effective way by minimising waste, managing an efficient build schedule and adding value where possible. Clients require a building that is efficient to operate and maintain, taking a long-term view of the building’s total cost.

Our expert teams create building systems that minimise energy and water consumption taking advantage of the latest techniques, for example chilled beam technologies, to cool and ventilate hospitals. Many of our acute care units have become environmental showcases, winning prestigious awards for their efficient energy use and low impact on the environment.

WHAT MAKES A WORLD-CLASS ACUTE HOSPITAL?
Acute care in the 21st century is about taking a holistic approach to patient welfare, as well as accommodating ever-advancing medical technologies. We create acute care facilities that are uplifting for patients and carers, making the best use of available space, natural light and fresh air to provide a welcoming and healing environment.

At Ng Teng Fong General Hospital, for example, we consulted with clinical staff and patients to gain an insight into the kind of space that would best facilitate the healing process. The result is a hospital that makes full use of green space with terraced gardens featuring at every level of the hospital’s main towers, and outdoor space available for patients to enjoy.

Our designs are informed by the latest and best science too about how best to promote patient welfare. At Surrey Memorial Hospital over 80% of acute care rooms are single-patient and include a ‘family zone’, enabling visitors to stay close to their loved ones. Privacy, quiet and family contact have all been proven to aid the healing process.

Creating space with the flexibility to adapt to new uses or clinical techniques is also important. We design building systems with one eye on the future to produce buildings with inbuilt longevity. Our floorplans and systems can readily adapt to a sudden change of use, for example, a disaster scenario.
Enhancing patient care through mould-breaking design

Singapore’s healthcare hub of Ng Teng Fong General Hospital (NTFGH) and Jurong Community Hospital offers patients a continuum of support from acute to step-down care that breaks the mould of traditional hospital design.

Patient-centred space planning informed every aspect of the scheme to create these next-generation hospitals for the densely populated areas to the east of the city-state. The 16-storey NTFGH provides Accident and Emergency (A&E), an intensive care unit (ICU) and a high dependency unit (HDU), in addition to general hospital services. Its neighbour, the 12-storey Jurong Community Hospital, readies patients to return home, providing a range of community and therapeutic services.

In total, the two hospitals cover a floor area of 169,000m² and accommodate 986 beds of which 700 are located in NTFGH, with the remaining 286 in Jurong Community Hospital. The aim of our client was to create a truly integrated healthcare facility that used resources with maximum efficiency across different clinical departments and the two hospitals. Importantly, this approach called for a highly sophisticated bed management system to minimise transfer times for patients.

As M&E consultant for the two structures, our primary role was to create designs and systems that permitted this integrated approach to healthcare, while reinforcing hospital security and reducing the risks of cross-contamination.

The emergency department has a separate unit with isolation rooms which ensure contagious illnesses are contained. Related facilities such as operating theatres and intensive care units, as well as each hospital ward, have also been equipped with isolation facilities.

Key to the integrated acute care approach was the co-location of vital clinical departments. On level 4 of NTFGH are the 28-bed ICU and 42-bed HDU. These units are connected to A&E on level 1 and the NTFGH’s 16 operating theatres on level 3, by a pair of specially designed, and fully equipped, trauma lifts. A 15-bed isolation ward is situated next to A&E to allow for immediate patient transfer, helping to halt the spread of infection.

In a break with design convention, every bed in the general care areas is positioned next to a window thanks to these wards’ innovative herringbone or fan-shape. Patients benefit from a positive, healing environment full of natural light with improved air flow, which also helps mitigate the risk of hospital-acquired infections and offers a pleasant work environment for staff.

Bringing nature and green space into the care environment was another guiding design concept for NTFGH, and terraced gardens feature at every level of the hospital’s main towers. Stable acute care patients are provided with intensive care-ready outdoor areas, ensuring that even critical patients can enjoy some sunshine and fresh air.

In addition to offering advanced health care facilities in a green and positive environment, NTFGH is also a highly energy efficient building. In 2013, the development received a Green Mark Award (Platinum) from Singapore’s Building Construction Authority, its highest certification for an environmentally responsible building.
ACUTE HOSPITALS

SURREY MEMORIAL HOSPITAL ACUTE CARE TOWER
Pushing design boundaries to achieve health care excellence

When Fraser Health Authority decided to commission a new eight-storey critical care tower for Surrey Memorial Hospital, its vision for British Columbia’s largest ever healthcare project was clear. The public health authority wanted to create a beacon of innovation where services were designed around the needs of patients and their families, further boosting the standards of excellence at Canada’s second largest emergency department.

The tower’s guiding design concept of a welcoming, people-centred place informed every aspect of this extension to the existing Surrey Memorial Hospital. It was also important that the new critical care facility could accommodate the sheer weight of demand for services. When Surrey Memorial Hospital was built in 1959, it served a city populace of around 50,000. By around 2013, this figure had ballooned to more than 474,000, with the number growing by around 9,000 every year.

A design that offered spacious, easy-to-navigate floor plans with generous use of natural light was devised that nevertheless increased the existing hospital’s capacity. The layout created an additional 150 beds, expanding the hospital’s capacity by 30% to a total of 650 beds, and accommodating an additional 650 clinical staff and 300 support staff.

The new tower has doubled the capacity of the neonatal intensive care unit (NICU) for babies, which also houses a new neonatal and paediatric pharmacy – the first of its kind in Canada. Expanded stroke and intensive care units, as well as other specialist units have also been created. The capacities of the Intensive Care Unit and High Acuteness Unit has been boosted to 25 beds in each case, up from 15 and 10 beds respectively.

Importantly over 80% of the tower rooms are single-patient for privacy and improved infection prevention and control. Each room includes a family zone with a sofa bed or recliner enabling visitors to stay close to their loved ones. Around 20% of patient rooms are special infection control rooms with their own air flow to prevent the spread of infection.

From the outset of the scheme, we consulted clinical staff to feed frontline experience into our plans. This close collaboration resulted in innovations such as the installation of special plumbing hook-ups for renal dialysis in patient rooms on floors 5, 6 and 7. Patients are able to receive dialysis at their bedside rather than being transported to a separate renal unit. We also designed a highly accessible heliport for air ambulance admissions, minimising transfer times to the emergency department.

A key complexity of this scheme was the construction of the new tower next to, and to some extent inside, a fully functioning hospital. This required us to work with the project team to fast-track the building process and keep disruption to an absolute minimum.

The client wanted to create a resource efficient building that minimised running costs. Our response was to incorporate a range of sustainable design initiatives throughout the building and the construction process. For example, we utilised durable natural materials, including wood and masonry. We selected materials that emit low amounts of volatile organic compounds (VOC) and designed state-of-the-art, energy efficient technologies.

These initiatives saw the critical care tower achieve a Leadership in Energy & Environmental Design (LEED) Gold certification that recognises best-in-class building practices. Furthermore, the Association of Consulting Engineering Companies British Columbia (ACEC-BC) presented us with an Award of Merit in Buildings for our contribution in creating Surrey’s new, cutting-edge facility.

LOCATION
Surrey, British Columbia, Canada

CLIENT
Fraser Health Authority

ARCHITECT
CEI Architecture/Parkin Architects

SERVICES
Mechanical engineering
Electrical engineering
Communications / Information Technology
Security
Sustainability & energy modelling
Civil engineering
Heliport design
Transportation design

PROJECT STATUS
Emergency department completed October 2013 with the remainder of the tower completed in February 2014.

LEED GOLD certification

LOCATION
Surrey, British Columbia, Canada

CLIENT
Fraser Health Authority

ARCHITECT
CEI Architecture/Parkin Architects

SERVICES
Mechanical engineering
Electrical engineering
Communications / Information Technology
Security
Sustainability & energy modelling
Civil engineering
Heliport design
Transportation design

PROJECT STATUS
Emergency department completed October 2013 with the remainder of the tower completed in February 2014.
Providing acute care is an around-the-clock service with no downtime. It follows that acute care hospitals are highly serviced buildings with high energy needs with zero margin for error in meeting their occupants’ needs.

We understand that our clients rely on their buildings to provide an infrastructure that enables care staff to carry out their vital work. And this infrastructure must be provided in a highly efficient way allowing healthcare providers to focus their time, and budgets, on their core role of looking after patients.

Our track record demonstrates that even large, power hungry acute hospitals can be beacons of sustainability. Queen Elizabeth University Hospital uses one of the largest concrete frames ever built in Europe yet is a model of energy and resource efficiency. Box Hill Hospital, Victoria’s largest suburban health infrastructure project, achieved a 4-star Green Star rating for its use of sustainable initiatives.

Our engineers consider every possible way of reducing our building’s impact on the environment and never lose sight of acute hospitals’ whole-life cycle cost.
QUEEN ELIZABETH UNIVERSITY HOSPITAL, GLASGOW
Creating one of the UK’s largest acute healthcare facilities.

Glasgow’s 14-storey Queen Elizabeth University Hospital (QEUH) is home to one of the largest adult acute hospitals in the UK. With 1,109 beds, the new build unit is a flagship facility with a focus on individual patient wellbeing that befits its grand-scale setting and where patients have their own single, en-suite room with a view.

Despite covering some 175,000m² including the children’s hospital, the facility is also a model of energy and resource efficiency. The entire project team worked from the outset of the scheme to create a low carbon structure that will create significant cost and energy savings over its whole-lifecycle.

QEUH’s acute facility is part of a wider healthcare hub that includes a children’s hospital of 256 beds, paediatric and adult A&E departments, a maternity hospital and laboratory services. Together with the existing facilities it forms QEUH – the UK’s largest hospital campus. We provided services across the superstructure of the campus, as well as for each individual unit.

Our involvement with the scheme started in 2009 after we successfully demonstrated to the client our full commitment to meeting the development’s stringent sustainability agenda. Targets included diverting 96% of waste from landfill during the construction process, and helping achieve demanding carbon emissions of no greater than 80kg/m² per year.

Measures to limit waste and reduce costs included minimising the amount of excavations, and setting out masonry to minimise cut-offs. Our civil and structural team specified materials for their longevity and low maintenance with a view to the whole-lifecycle costs of the building. In a building that is constantly occupied and where the comfort of its users is of utmost priority, the high thermal mass of the floorplate was utilised to mitigate energy demands. Other benefits included in-built fire protection to the concrete frame, which is one of the largest ever built in Europe.

One of the greatest challenges was the scale of the QEUH development, which is equivalent in area to 11 football pitches (some 3.5 hectares). Against this context even small changes had the potential to make a huge impact on cost plans.

We used the full potential of Building Information Modelling (BIM) to deal with the project’s complexities, communicating design intent, detecting problems and analysing the future flexibility of the buildings through this technology. Our technical teams created a rich data model of the development to visualise designs, manage change, quantity and procure materials, and produce project time lines.

Our use of cutting-edge BIM, along with close collaborative working with the project team and a commitment to working towards a BREEAM rating of Excellent (the client’s initial goal), have helped to create one of Europe’s most advanced hospital buildings. QEUH was crowned Best Healthcare Development at the 2016 MIPIM awards.

LOCATION
Glasgow, Scotland, UK

CLIENT
Brookfield Multiplex and NHS, Greater Glasgow & Clyde Board

ARCHITECT
IBI Group

SERVICES
Structural engineering
Civil infrastructure
Geo-environmental engineering
Environmental services
Fire engineering
Sustainability
Traffic & Transportation engineering

PROJECT STATUS
2009-2012

96% diversion of construction waste from landfill

CARBON EMISSIONS
No greater than 80kg CO₂/m²

QEUH development area equivalent to 11 football pitches.
Box Hill Hospital

A state-of-the-art acute care facility

Established in 1956, Box Hill Hospital is a highly regarded teaching and referral hospital with a reputation for excellence in providing acute services, as well as general health care. It admits upwards of 48,000 patients each year from the eastern suburbs of Melbourne.

With demands on the hospital’s facilities ever increasing, Eastern Health and the Victorian Department of Health decided that a radical redevelopment programme was needed to maintain Box Hill’s world-class clinical services. The programme set in motion Victoria’s largest suburban health infrastructure project and saw the creation of a new, ten-storey facility to the existing Box Hill site.

As a preferred services provider to the hospital with two decades’ experience of improving the existing facility, we were involved from the outset of the project to create the new, 52,000m² unit. The aim was to create a wholly fit-for-purpose facility that would house all Box Hill’s acute services under one roof, enabling staff to move quickly across the diverse areas involved in the delivery of emergency care.

In addition to providing readily accessible acute care, the client wanted an efficient, high performance building that minimised its impact on the environment.

Our approach was to integrate sustainable initiatives into both the structure and finer details of the building. For example, energy efficiency gains are made with the use of combined cooling heat power (CCHP). Four layers of glazing provides enhanced insulation, and automated blinds provide protection from the sun.

New energy efficient backup generators are able to provide 100 percent backup power to the clinical facility, if required. Rainwater is harvested for use as ‘grey water’ and waste water from renal reverse osmosis dialysis plant water is recycled.

These measures have not only minimised the building’s carbon footprint, but reduced operational costs through reduced energy and water consumption. Importantly, the well ventilated facility means a comfortable environment for patients and staff, and helps to reduce the risk of hospital-acquired infections.

The new facility at Box Hill Hospital offers a significant extension to the original facilities. It has increased the hospital’s capacity by more than 200 beds to 621, added a larger, more efficient emergency department, as well as a new 18-bed intensive care unit (excluding 2 shells) and ten new operating theatres, with an 11th available for future expansion.
DELL SETON MEDICAL CENTER AT THE UNIVERSITY OF TEXAS

A future facing health district for Austin with a focus on the environment.

Dell Seton Medical Center is the flagship scheme of a wider development to create a new high-tech health district for downtown Austin based at the University of Texas. The new teaching hospital is being designed and built to minimise its impact on the environment, while maximising its capacity to house the medical technology of tomorrow.

Flanked by the newly built Dell Medical School, new research facilities and new office buildings, the 211-bed Dell Seton Medical Center will provide the medical hub with a Level 1 trauma facility. This is the US' highest rated category of trauma unit, providing total care for every aspect of injury. The centre will replace the region's trauma facilities that are currently housed in the University Medical Center Brackenridge. This facility ranks in the top 1% of all trauma centres in the US for best patient outcomes. Our client's aim is to continue to improve on Brackenridge's performance by entirely updating, and rehousing, the trauma unit.

Adaptability is the guiding principle of the new centre's design. The hospital's rooms and treatment facilities will be expandable and adaptable to meet the needs of new technology and evolving treatments. Our expert team of building services engineers has designed electrical and IT systems with future technological advances in mind to create a building infrastructure fit for the 21st century. Designed according to progressive and new ideas in health, the hospital will provide collaborative space to promote cross-departmental working and teaching, enhancing connectivity between different service areas.

The new 45,990m² teaching hospital is also being designed and built to meet exacting environmental standards. Provisions are being made to create readily accessible pedestrian routes and cycle ways around the hospital campus. By using these initiatives, the design team aims to achieve Leadership in Energy and Environmental Design (LEED) Silver in Healthcare Certification and attain Austin Energy Green Building Program Certification. Dell Seton Medical Center's impact on the environment will also be lessened due to its relatively small size – it covers significantly less space than the existing trauma unit at Brackenridge. This may seem counterintuitive for a facility serving a growing city but follows the client's philosophy of 'bringing the care to the patient not the patient to the care'. In other words, empowering patients to manage their care beyond the hospital's walls with the support of expert nursing teams. Importantly, operating rooms and other core clinical areas will be larger in the new unit compared to the facilities it replaces.

With construction well underway on site, Dell Seton Medical Center is expected to open its doors to patients in spring 2017.

LOCATION
Austin, Texas, USA

CLIENT
Ascension/Seton Healthcare Family

ARCHITECT
HKS, Inc.

SERVICES
Building services
IT systems
Low voltage systems

PROJECT STATUS
Completion due in 2017

LEVEL 1 trauma facility

RANKED IN TOP 1%

of trauma centres in the US for best patient outcomes

EXPANDABLE & ADAPTABLE
hospital rooms and treatment facilities

19 ACUTE HOSPITALS DESIGNED FOR CRITICAL CARE
Acute care brings together a vast array of medical specialties under one roof creating complex design challenges. Not least is the fact that each medical area is constantly advancing as research and technological advances deliver better treatments year by year. It is vital that hospitals can adapt to offer critical patients the best and latest of these.

WSP Parsons Brinckerhoff excels at creating hospitals capable of housing the most advanced treatments available, bringing new hope to patients and their families. Our building systems can cope with the needs of the most delicate and sensitive machines and equipment like those installed at George Washington University Hospital, which offers one of the most advanced acute heart care centres in the US.

We make full use of state-of-the-art techniques to design and implement our projects too. Through the latest Building Information Modelling (BIM) techniques we can bring ideas to life, analysing how buildings would perform in reality, finely tuning and optimising our designs and construction techniques.
ROYAL STOKE UNIVERSITY HOSPITAL

Safely delivering a new build facility within a live hospital site.

One of the UK’s largest acute teaching hospitals, the Royal Stoke University Hospital in Stoke on Trent serves a local populace of half a million people and provides specialist services to three million people across the wider region. It has a reputation for clinical excellence, particularly in the field of emergency medicine.

In 2002, the NHS implemented a ‘Fit for the Future’ project to reorganise the then University Hospital of North Staffordshire’s (UHNS) facilities, which were spread across three sites in Stoke on Trent. The NHS Trust wanted to streamline UHNS’s services to create an efficient healthcare centre capable of offering state-of-the-art clinical services.

The decision was made to house all the city’s clinical services in one new-build facility to be constructed within the existing City General Hospital site, now renamed Royal Stoke University Hospital. This new facility would include a new accident and emergency (A&E) department, maternity centre and oncology unit. Refurbishment work would also be carried out to the three existing sites, including the City General Hospital where some buildings were over a century old.

Our most complex challenge was to deliver the UHNS’s new facility while working in a live and congested hospital environment. The new unit had to be created in a phased programme of construction works with the new facilities completed before the old units could be demolished. Careful planning was required to organise the build schedule and we maintained a very close relationship with the NHS Trust, main contractor and design team to ensure minimal disruption to the hospital’s usual activities.

Meeting demanding energy targets was another key challenge. Our response was to use natural ventilation, as opposed to air conditioning, throughout the new hospital by exploiting the embodied mass of the building’s façade together with energy efficient plant systems.

Our engineers added significant value to the project by using a method of ‘hybrid’ (partial) off-site construction that reduced the need for on-site labour and saved time within the build schedule. This project represents one of the first times this technique has been used in hospital design and construction.

A key part of our approach to the new build facility was to involve the UHNS’s clinical teams during the design consultation phase. Through the use of Building Information Modelling (BIM), we were able to demonstrate how the hospital environment would work, creating clinical adjacencies and allowing for vertical and horizontal movement between different clinical zones.

The direct input from hospital staff resulted in the creation of a central hub within the new facility that co-located key diagnostic and treatment facilities. This design strategy led to economies of scale in the number of specialist facilities required and has helped to create a healthcare facility that is easily navigable, minimising patient transfer times.

In addition to being a value engineered and energy efficient building that is able to support advanced clinical strategies, the Royal Stoke University Hospitals new facility has met the client’s brief of being ‘Fit for the Future’. The buildings will be able to accommodate future expansion and allow for internal conversion for different use in the future in acknowledgement of ever-evolving patient treatments.

LOCATION
Stoke on Trent, UK

CLIENT
University Hospitals of North Midlands NHS Trust

CONTRACTOR
Laing O’Rourke

ARCHITECT
HKS, Inc. / Ryder Architecture

SERVICES
Civil and structural engineering
Building services
Fire protection
BIM

PROJECT STATUS
Works completed in phases from 2002-2014

One of the UK’s largest acute teaching hospitals, the Royal Stoke University Hospital in Stoke on Trent serves a local populace of half a million people and provides specialist services to three million people across the wider region. It has a reputation for clinical excellence, particularly in the field of emergency medicine.

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LOCATION
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CLIENT
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CONTRACTOR
Laing O’Rourke

ARCHITECT
HKS, Inc. / Ryder Architecture

SERVICES
Civil and structural engineering
Building services
Fire protection
BIM

PROJECT STATUS
Works completed in phases from 2002-2014
George Washington University Hospital (GWUH) is world renowned for the excellence of the emergency healthcare it provides to 75,000 patients a year, as well as its role in serving the president and congress when in session.

Providing 24-hour in-house acute care, the hospital receives the most critically injured patients from Washington DC and Northern Virginia, as well as transfers from the other nearby counties. GWUH is an American College of Surgeons (ACS) verified Level 1 Trauma Centre, which is the highest level a hospital can receive.

With a total of 371 beds, of which 52 are in the Emergency Department, the hospital moved to its present site in 2002. The $96m new build development allowed GWUH to expand its services and offer state-of-the-art facilities across a range of services including emergency medicine, cardiovascular surgery, neurological care, maternity care, oncology, laboratories and research centres.

As the lead mechanical and electrical engineering contractor for this successful scheme, we were appointed again by our client in 2011 when the decision was made to further update the hospital’s Heart Center, already a national centre of excellence in cardiovascular emergency surgery, treatment and research.

With limited space for expansion to existing facilities, the only way to upgrade the Heart Center was through a wholesale refurbishment of the 2002-built 2,500m² area, while the rest of the hospital continued to operate around the clock. We were part of the Integrated Project Team tasked to deliver this new facility within a build programme of just 12 months.

Facilities to be provided by the new Heart Center included an expanded operating theatre, improved recovery and endoscopy rooms, larger data centre and a new helipad for the admission of acute cases. The facilities needed to accommodate and enhance the Center’s advanced clinical techniques.

Our role was to streamline the overall build schedule to minimise the length of the project and undertake key mechanical and electrical engineering work. Importantly, we also needed to ensure that the rest of the hospital was not interrupted by the construction works. To achieve these aims we used LEAN project management techniques including a Choosing By Advantage (CBA) decision making system.

By using a methodical and value-focused approach to organising and delivering the build schedule, the Integrated Project Team was able to handover the project on time and within budget.

GWUH’s Heart Center continues to fulfill its mission of being one of the most advanced cardiovascular health centres in the US supported by a state-of-the-art acute care hospital.

LOCATION
Washington D.C., USA

CLIENT
Universal Health Services & George Washington University

ARCHITECT
SmithGroup JJR

SERVICES
Building services
Fire protection

PROJECT STATUS
New hospital completed in 2002
New Heart Center completed in 2012
As populations around the world age, the acute centres built today need to withstand the pressure on their services tomorrow. Each acute hospital project, whether an existing building in need of modernisation or a new build, represents a long term investment. Our designers and engineers future-proof every aspect of our buildings. Fit outs need to be easy to maintain and look good year after year; building services need to house emerging technology that will become tomorrow’s ‘norm’; building structures need to withstand the effects of climate change; and power systems need to work efficiently as energy costs continue to rise.

This constant reference to the future is especially important in long running projects. For example, our work to redevelop Hong Kong’s Kwong Wah Hospital will complete in 2025. By then a new generation of technology will be standard, while demand for acute services in this, one of the most populous places on earth, will have soared.

Through intelligent design that draws on sophisticated tools like Building Information Modelling (BIM) technology, we can bring forward acute hospitals that are fit for tomorrow whatever the future may bring.
On an average day, around 400 people attend Kwong Wah Hospital (KWH)’s Accident and Emergency (A&E) Department, while up to 2,000 patients are treated by its specialist, family and general out-patients clinic. Based in Kowloon, Hong Kong, one of the most densely populated areas in the world, KWH is renowned for its comprehensive range of acute services. But the majority of the hospital complex is over 50 years old and many buildings are no longer fit-for-purpose and require constant repair.

When the hospital’s stakeholders decided that a new development was required to replace KWH’s overstretched infrastructure, the vision was not only to meet the current needs of Kowloon’s residents but create a world-class clinical facility ready for tomorrow. KWH, the flagship of the Tung Wah Group of Hospitals (TWGHs), needed a building that would be ‘future proof’, accommodating technological advances and clinical methods that are only just emerging.

We were brought on board the redevelopment plan early in 2013 to fulfil two key contracts; firstly, engineering consultancy and secondly, civil, structural and geotechnical engineering services. These services are to be provided across the two phases of the 12-year redevelopment scheme, which is still in its first phase. The first phase covers surveys and preparations, the second will see the demolition of most of the existing hospitals and the creation of a new main building. This will result in a complex covering 270,000m² and providing 1,600 beds.

Central to the redevelopment is the expansion of KWH’s acute care services. The new building will offer an expanded A&E department of 5,000m², which includes a new emergency medicine ward to care for A&E admissions. KWH’s existing intensive care unit (ICU) will also be redeveloped. Enhanced isolation facilities, which are easily accessed from A&E and ICU, will be installed to reduce the risk of the spread of infection. Other features of the new building include 20 operating theatres, an ambulatory care centre, specialist out-patient department, new oncology unit and maternity centre.

Our approach is to embrace the opportunities offered by the almost total rebuild of KWH to weave future-proofing initiatives into the very fabric of the new hospital. This means comfortably accommodating current technologies such as computer tomography (CT) scans and creating flexible building engineering services that can, for example, support spaces for disaster contingency. Over 140 beds are fitted out with negative pressure control isolation facilities, to control the risks of infection. In addition, approximately 100 beds are convertible from “normal mode” to “isolation mode” in the case of an outbreak of infectious diseases.

Founded in 1911, KWH’s charitable origins and long commitment to providing traditional Chinese medicine all mean the hospital has a special place in the local community. Its iconic Tung Wah Museum, KWH’s original building, will remain the cultural focus of the new campus. But the critical zones that provide acute care, along with the rest of the new campus, will be entirely fit for the future.
Creating a future-fit hospital that cares for the community and the environment was the guiding vision behind Waxahachie’s new $175m medical facility. The Baylor Scott & White Medical Center provides a full range of health services, including an Emergency Department and intensive care units, from a building that exploits natural light and uses advanced systems to reduce its energy and water needs. The result is a facility that promotes the welfare of patients and staff, while minimising its impact on the environment.

With a capacity of 129 beds, the Baylor Scott & White Medical Center has more than doubled the size of the century-old facility it has replaced in Ellis County. Furthermore, it has shell space for 25 more beds to meet future patient demand. The main hospital building covers 25,640m², which includes a six-storey tower, along with a 1,490m² dedicated Cancer Care Center and a separate 27,870m² Central Utility Plant.

The acute care wards are located in the tower allowing for the immediate transfer of patients to these facilities from the Emergency Department below or the four operating theatres above. Designed to facilitate a healing environment, the 12 acute care suites are spacious enough to comfortably accommodate visitors so that patients can be near their loved ones. The suites are light and airy to engender a sense of positivity.

Designed in accordance with Leadership in Energy and Environmental Design (LEED) certification, efficiency is at the heart of the Baylor Scott & White Medical Center. Our client wanted to create a building that would perform over the long run as well as the short, with detailed attention given to all its energy requirements.

Our response was to design a heat recovery chiller system that has a projected net energy saving of around 342,000 KWH per year. This system works by harnessing the heat generated from the hospitals chilled water systems. We also installed a cooling coil condensate recovery system. In this case, cooling coil condensate from the air handling units is collected and pumped back to a central plant and then used as top-up water to the system’s cooling towers. The system has created an estimated potable water saving of over two million gallons per year.

Another key way to reduce the building’s consumption of resources was the use of a low voltage design for the hospital’s data centre on Floor 4 of the tower. Boosting efficiency in this part of the medical centre was important because of the high energy demands made on the data centre, which acts as the hospital’s nerve centre. It houses the hospital’s IT infrastructure, video surveillance equipment, nurse and doctor call systems and physiological monitoring systems.

Additional ‘green’ features include the hospital’s light coloured (‘cool’) roofing to reduce the Heat Island Effect and energy efficient (highly insulated) windows. The building itself makes use of sustainably harvested wood and the landscape strategy uses a range of native plants to reduce the need for irrigation and support the local ecology.

The Baylor Scott & White Medical Center has achieved LEED Silver certification making it one of the greenest healthcare facilities in Texas. Its energy efficiency and advanced infrastructure, along with its potential to meet future patient demand, mean the centre is a model of future-fit acute and general healthcare.
Guaranteeing the future of a historic institution.

Founded in 1824 as an alms house for the poor and sick, Klinikum Offenbach has grown into one of the largest health centres in the Frankfurt Rhein-Main area treating around 32,000 patients each year.

The centre has been subject to numerous redevelopments and extensions over its long history. In 2004, an ambitious scheme was launched to replace the entire complex with a new, state-of-the-art hospital with a full suite of acute facilities to serve ever growing demand for its services.

WSP Parsons Brinckerhoff was commissioned to provide a comprehensive project management service for the 60,000m² new build unit. The goal of the client was to create a facility that would meet both the present and future needs of the local 420,000-strong populace, offering advanced clinical services across a range of areas. The facilities also needed to support the teaching activities of the prestigious Goethe University Frankfurt. In addition to emergency and acute care, the new centre would also offer oncology; a children’s hospital; burns unit; maternity; stroke unit; laboratories and a range of other advanced clinical facilities.

One of the key challenges in delivering the scheme was the build schedule because the old facility needed to be demolished in phases as the replacement facilities became available. This required an advanced approach to site logistics. Our priority was to safeguard the working of all clinical services on site, keeping access routes to existing hospital units clear and minimise the project’s impact on patients and staff.

The four-year build programme concluded in 2010 and has delivered the largest, post-war health project in the region. Offenbach Klinikum is now an eight-storey, 724-bed hospital with 60 acute care beds and ten operating theatres along with all core medical areas sited in its main building. These areas are connected via a central hall, linked vertically by four lifts that are each capable of accommodating acute care beds. A tubular ‘post’ system runs throughout the entire complex allowing specimens to be transported quickly and efficiently. The helipad was moved from the ground onto the roof with direct access to the operating theatres meaning that emergency cases can be treated without delay.

Our role was to ensure the connectivity of all these areas and services, in addition to overseeing the overall construction schedule for the new build unit. Our expert teams organised and co-ordinated material qualities and quantities, costs and financing, deadlines and capacities.

Geometrical coloured patterns guide visitors to their destination. The system is based on a highly flexible concept that can be easily and quickly modified. The hospital building also supports the use of advanced clinical techniques such as cardiac catheterisation, shock rooms, stroke units, computerised tomography and magnetic resonance imaging techniques in a warm, welcoming environment that has the potential to adapt to future technologies.

LOCATION
Offenbach, near Frankfurt am Main, Germany

CLIENT
Klinikum Offenbach gGmbH

ARCHITECT
wörner traxler richter / Planungsgesellschaft mbH

SERVICES
Project management

PROJECT STATUS
Completed in 2010

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ABOUT WSP | PARSONS BRINCKERHOFF

WSP | Parsons Brinckerhoff is one of the world’s leading engineering professional services consulting firms. We bring together a unique pool of technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. The depth of our expertise and advice spans across the Property & Buildings, Transportation & Infrastructure, Environment, Industry, Resources (including Mining and Oil & Gas) and Power & Energy sectors as well as project delivery and strategic consulting services. With approximately 34,000 talented people in 500 offices across 40 countries, we are uniquely positioned to deliver successful and sustainable projects, wherever our clients need us.

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