Cancer care and research

Designing
for a better future

wsp

Designing world-class cancer facilities

Demand for specialist cancer care is predicted to double between 2015 and 2030. An ageing global population means an increased incidence of the disease, while significant advances in diagnosis and treatment give new hope to cancer sufferers, improving mortality rates but also creating a new group of survivors who will require ongoing care and support. Cancer care providers must keep up: growing their capacity, offering the latest screening techniques and therapies, and adapting their services to patients with more complex needs.

At WSP, we understand the unique challenges that this rapidly evolving field presents, and the constant innovation that it requires from design teams – to accommodate state-of-the-art technologies alongside complementary therapies, for example, or create places that meet the highest clinical standards and infection control requirements while offering a warm, supportive welcome to patients and their families.

Our global teams are proud to be working on projects that are among the world's most sophisticated buildings dedicated to cancer care and research – from one of only two NHS proton beam therapy centres in the UK, on five floors underneath central London, to a hospital that brings a range of imaging and surgical technologies together under one roof for the first time in Gothenburg. We made sure that North Texas' biggest outpatient cancer clinic is also one of its most sustainable, we combined lean design with shielding for sensitive equipment on a remote Canadian island, and we created a healthy indoor environment for a pioneering wellness centre in Victoria, Australia.

However demanding a brief may be, we thrive on the challenge. Our goal is always to find the most sustainable, efficient solutions so our clients can offer the best possible cancer care to their communities – today and for the future.

Cover image: Albury Wodonga Regional Cancer Centre

“Cancer treatments are constantly evolving, so it is vital that the facilities we create will be able to accommodate new equipment, technologies and care models. Flexible, adaptable, resilient and robust infrastructure must be incorporated into an environment that fosters healing and helps reduce stress for cancer patients and their families”

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

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What makes a world-class cancer facility?

Healing environments

We help clients to maximize the effectiveness of cancer treatments by designing healthcare and research settings that actively promote hygiene, infection control, security and wellbeing. Right from the start, we consider how our design and the latest smart technologies can minimize the spread of germs, support effective cleaning and maintenance, and create a healthy healing and working environment. Our specialist teams plan room layouts and staff facilities to cut the risk of cross-contamination, and ventilation systems to remove airborne pathogens and harmful chemicals while ensuring wards, clinics, laboratories and offices are well supplied with fresh air.

We design cancer hospitals where patients can feel secure and nurtured – giving them total confidence in the care they receive and the best chance of recovery. And we design research facilities where scientists can work effectively and safely, to give them the best chance of making tomorrow's breakthrough discoveries.

University of Hawaii Cancer Center, Hawaii, USA
Photo: Andrea Brizzi

Positive experiences

Modern cancer care is not just about treating a disease; it's about supporting the whole person. We never lose sight of the importance of that patient journey. We understand that minor frustrations can quickly become major obstacles or sources of anxiety for cancer patients, so we strive to create a hassle-free environment, making our buildings as accessible, user-friendly and comfortable as possible for people at all stages of treatment. We take an empathetic, holistic approach, working closely with healthcare staff, so that even when we are refining the smallest details, we don't forget the vital difference they can make to patients and their families – from inspiring structures that lift the spirits or offer unimpeded views of nature, to ergonomic room design and lighting that never feels artificial.

Operational excellence

Meeting demands for cancer treatments – and the aspirations of patients, healthcare staff and scientists – means making the most effective use of limited resources. Reducing carbon emissions to net zero will also influence the way that facilities are designed and maintained. We endeavour to create robust, flexible buildings that are cost-effective to operate, and that use energy and water as efficiently as possible, while meeting the most exacting technical standards.

We know that skilled manpower is an equally scarce resource, so we collaborate closely with hospital and research staff to create workplaces that can meet their current needs while remaining adaptable for the future. Our floor plans and room layouts mirror clinical workflows to minimize walking distances and maximize opportunities for patient visibility and contact, while laboratories must be precisely tailored to different kinds of research with high-performance, smart services that can be readily upgraded or altered to meet the demands of a fast-moving field.

"Our biggest engineering design focus is developing facilities that are energy and water efficient, and resilient enough to operate in the most challenging environments. This way, we can not only reduce running costs but improve access to care"

Jabulile Nhlapo, healthcare lead,
WSP in Africa

Credit Valley Hospital

Innovative design

Cancer treatment and research are evolving rapidly, with new tools for diagnosis and treatment, a growing number of patients with increasingly complex needs, and higher expectations of what cancer hospitals should offer both for those receiving treatment and for the medical staff providing it.

Our teams create unique solutions that respond to the demands of 21st-century medicine. We incorporate proven innovations in building design, services and technology and the latest ideas on physical and psychological wellbeing to create cancer centres that are treasured by their communities and exemplars of world-class care.

For example, at Sahlgrenska University Hospital in Sweden, a new imaging and intervention centre makes it possible for specialists to use diagnostic techniques such as magnetic resonance imaging in the same spaces as surgery for the first time. Meanwhile, Victoria's Olivia Newton-John Cancer Wellness & Research Centre takes a pioneering approach to wellbeing by using 100% outside air for ventilation, and was the largest healthcare building at the time of certification to achieve Australia's Green Star sustainability benchmark.

Our specialists use some pretty advanced technologies themselves: 3D visualisations and walkthroughs enable medical staff to engage positively with the design process so that the finished building is exactly as they would like it to be. Computer modelling allows our experts to thoroughly test every aspect of a design long before the construction phase, while the use of factory-built components offers unrivalled speed and accuracy on site, so that our clients always get the facilities they need, on time and on budget.

"We measure excellence not only in terms of how environments improve the effectiveness of treatments and shorten recovery times, but how they facilitate meaningful engagement between patients and caregivers"

Nolan Rome, US healthcare director, WSP in the USA

Olivia Newton-John Cancer Wellness & Research Centre, Australia

Sahlgrenska University Hospital

Revolutionising procedures with leading-edge design

Location: Gothenburg, Sweden
Client: Region Västra Götaland
Architect: Tyréns AB
Services: Mechanical, electrical and plumbing, geotechnical and ground engineering, construction management
Project status: Completed in 2016–17

Sahlgrenska University Hospital, a world leader in research and education, was seeking an innovative approach to cancer care to streamline the imaging procedure and create new forms of collaboration between specialists. Thanks to the new Centre for Imaging and Intervention, a breakthrough in cancer care diagnosis and treatment has been achieved.

Traditionally, imaging and surgery were housed in separate locations within the building, but this new facility offers a unique system with both procedures undertaken in the same space, allowing several specialists to focus on the patient's needs at the same time. Something that was seemingly impossible has now been made possible thanks to this revolutionary design.

The facility provides X-ray, magnetic resonance imaging (MRI), ultrasound, computerized tomography (CT) and positron emission tomography (PET), as well as combinations of these technologies. Below ground level, a cyclotron will supply the hospital's PET scanners with radioactive isotopes.

The new operating rooms house advanced X-ray machines, a ceiling-mounted movable MRI, and other types of X-ray equipment that can perform diagnostics during the patient's operation. Images are displayed on monitors within the room, allowing specialist clinicians to be in different locations and monitor the operation in real time.

One of the biggest challenges was to make this facility adaptable to future medical advancements. Our teams designed robust and flexible solutions that will enable continuous changes in usability, such as incorporating removable sections into exterior walls to allow new technical equipment into theatres.

The building is made up of two parts, each with its own power supply. A fundamental aspect of our design was to ensure full redundancy: by using the connection capability of busbars on each floor, our engineers have established a back-up system where one part of the building can support the other if required.

To mitigate any start-up time for the diesel generator, we have installed a dynamic uninterruptible power supply (UPS) system, which gives the facility emergency back-up in the initial 20–30 seconds of a power failure.

A real success on this project was the coordination, planning, purchasing and installation of all medical equipment, which we started at the design phase and documented throughout. The installation process of key medical equipment was crucial to the construction schedule and we worked with our coordination team to prepare detailed instructions for this. This document describes the requirements for the equipment, the order in which the installation must be carried out and by whom. It is all-encompassing, from purchasing and delivery to assembly, installation and commissioning.

Working closely with our clients and the end users, we have developed cutting-edge, technical solutions to provide the hospital with the most advanced treatment methods and operating rooms in cancer care. Our design has optimized the available space, delivering both an effective workspace for clinicians and operational security for patients.

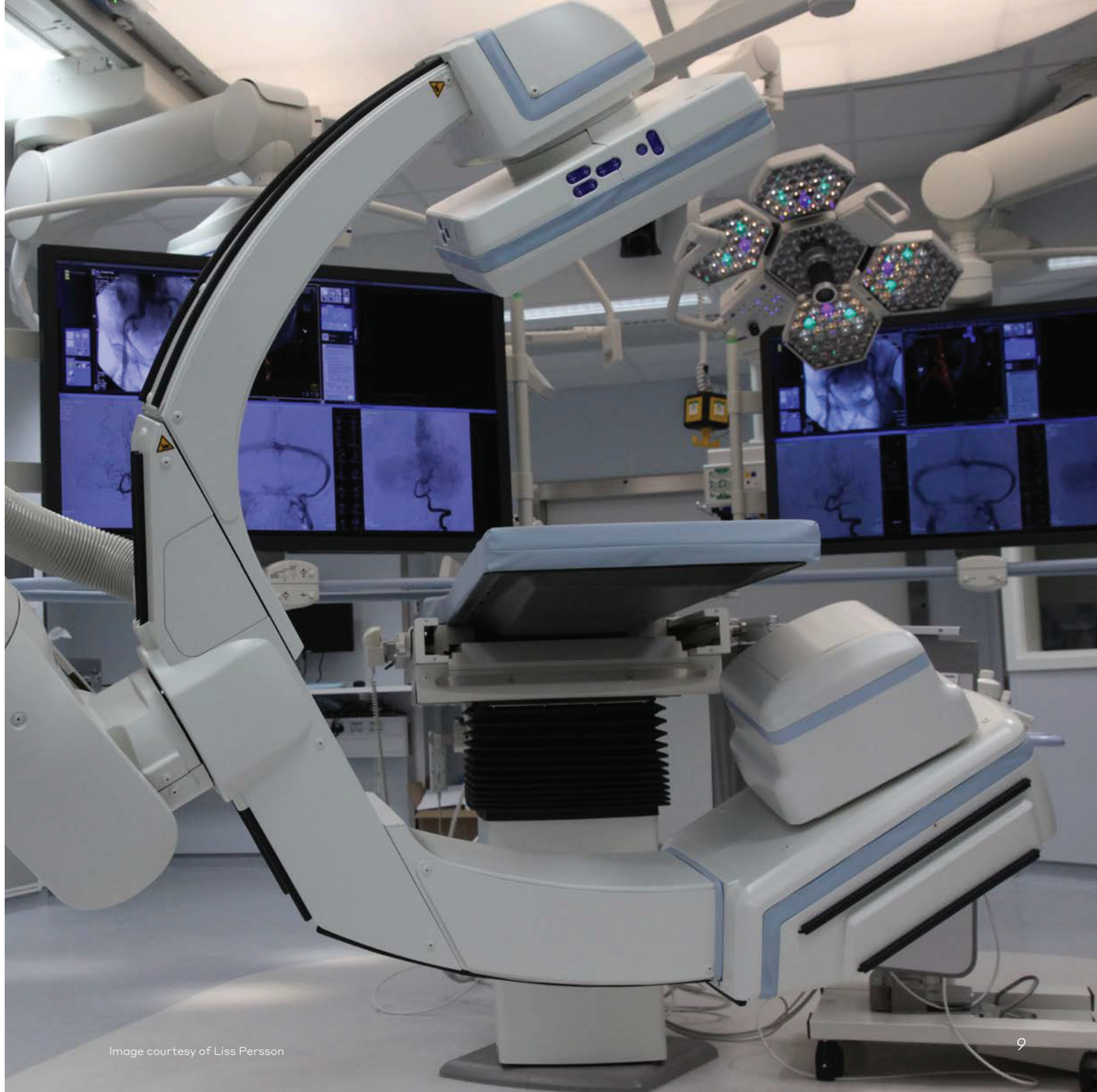

Image courtesy of Liss Persson

100% outside air

with heat recovery

Image courtesy of Dianna Snape

Olivia Newton-John Cancer Wellness & Research Centre

Holistic design based on sustainability and wellbeing

Location: Heidelberg, Victoria, Australia

Client: Austin Health, Department of Health

Architect: Jackson Architecture, McConnel Smith & Johnson Architects

Services: Mechanical, electrical and plumbing, security consulting, fire engineering, vertical transportation, green building design, hydraulics

Project status: Completed in 2013

Austin Health has a long history of pioneering cancer treatments. The Olivia Newton-John Cancer Wellness & Research Centre brings together the hospital's extensive cancer services and research facilities under one roof in a purpose-built facility, and offers new wellness and support programmes that deliver individualized care to treat the whole person, not just the cancer.

The actress and singer Olivia Newton-John believes that positive thinking and a supportive environment played an important role in her own recovery from cancer, so she wanted to create a wellness centre that stimulated all of the senses. In addition to high-quality medical care, the ONJ Centre offers a full range of complementary therapies to support people throughout their treatment.

As well as the wellness centre, the building includes radiotherapy bunkers, ambulatory oncology, inpatient wards, three floors of research laboratories, including a physical containment level 3 laboratory suite, high-acuity areas and negative and positive pressure isolation suites.

We provided all engineering building services, including environmentally sustainable design. Our team took a holistic approach, with a strong emphasis on improved wellness and indoor environment quality. The design includes chilled beam technology, no recirculation of air, rainwater collection, solar water heating and future capacity for cogeneration. The centre was the first building in Victoria, and the largest in Australia at the time of certification, to achieve the Green Star Healthcare sustainability accreditation.

Corner Brook Acute Care Hospital

Innovative lightweight design developed in response to a remote location

Location: Newfoundland and Labrador, Canada

Client: Western Health

Architects: B+H Architects, Parkin Architects

Services: Structural and civil engineering

Project status: Ongoing

The Corner Brook Acute Care Hospital in Newfoundland and Labrador brings together a number of disparate health facilities on the western side of the province. The new hub is a seven-storey, 164-bed facility that includes an expanded cancer care ward with radiation services.

WSP developed an innovative design that helped Corner Brook Acute Care Partnership win its bid to design, build, finance and maintain the hospital. Hospitals elsewhere in Canada often use concrete for their structure, but here steel made sense as it needed to be erected quickly to meet a tight schedule and the number of formwork contractors in the province is limited. Materials also had to be kept light for ease of shipping. To make the design as lean as possible, we used high-strength steel decks, thereby cutting down on the number of supporting beams.

Our design also needed to withstand snowy and windy conditions. As well as responding to local guidelines, we undertook a study to examine the loads that snowfall might place on the structure. Since these values turned out to be lower than had been assumed, this allowed us to make savings in materials and cost.

Vibration analysis was conducted on areas with sensitive equipment such as MRI and CT scanners, and these were reinforced with additional mass and thicker floors. The cancer care bunker needed specialist shielding to protect the wider site from radiation. We collaborated with a physicist to develop a bespoke system of large, thick steel plates embedded in the concrete wall.

We were also able to call on the knowledge of our materials expert in Vancouver to help the contractor resolve problems with the concrete – an example of our teams working together for the benefit of our clients.

"Constructing this major hospital on an island meant overcoming several technical challenges. Wind was the driving condition, the structural materials and erection needed to consider the logistical challenges with shipping, so our design had to be as efficient as possible"

Kathryn Edwards, senior director, structures, WSP in Canada

PCL/Marco, A Joint Venture

Efficiency and performance

We know our clients want to focus their resources on supporting patients and developing new treatments, not on the buildings themselves. So we focus ours on delivering flexible, robust structures and services that perform flawlessly now, and that will remain cost-effective to run and maintain even as environmental conditions become more challenging and the transition to net zero gathers pace.

As experts in sustainable design and smart buildings, we understand how to minimize energy and water use without compromising on patient safety, hygiene or the optimal conditions for scientific research. Our cancer facilities meet the most exacting clinical and laboratory conditions, as well as the highest local or global environmental standards – as at Corner Brook Hospital on the remote Canadian island of Newfoundland, where our expert team designed a high-tech new cancer hub to withstand heavy snow and wind while bringing the minimum amount of materials and labour from the mainland.

Within our projects, you'll find many firsts, big and small, from the first LEED v4 Gold-certified hospital in the USA, to the first use of material-efficient "Bubbledeck" slabs on a healthcare project in Australia, to one of Colombia's first XGSPON broadband installations. We help clients to harness proven advances in technology to meet their unique needs, whether that's ultra-efficient heating and cooling systems, district energy networks or the internet of things.

"For tomorrow's cancer treatment facilities, excellence means improving treatment outcomes while minimizing the impact of treatment on patients' lives"

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

Sarah Cannon Cancer Hospital

New tower at Medical City Plano is the first LEED v4 Gold hospital in the USA

Location: Plano, Texas, USA

Client: HCA

Architect: Perkins + Will

Services: Mechanical, electrical and plumbing, telecommunication, access control design, construction administration

Project status: Completed in 2019

Sarah Cannon Cancer Hospital not only delivers critical healthcare services to the people of Plano, Texas; it does so using groundbreaking sustainability features, designed to reduce energy use by 26% compared to building codes. This has been recognized with a milestone achievement: the four-storey building was the first US hospital to achieve LEED v4 Gold certification.

The $110m facility, located on the Medical City Plano campus, has 138,000ft² of space and 90 patient beds, with additional operating and recovery rooms. There are also 30 specially designed burn and trauma ICU rooms that can provide emergency treatment for multiple serious burn injuries in the event of a mass casualty.

The burns facilities presented a challenge to the MEP designers, as different areas need to maintain specific temperature and humidity levels. WSP installed radiant heat panels over the beds to control the climate around the patients, while also providing comfortable conditions throughout the room.

The MEP was also critical to the sustainability strategy. WSP designed the cooling and heating system to be 21% more efficient than the industry baseline. The chilled water system consists of magnetic bearing chillers, which consume less energy than a standard centrifugal chiller and can operate at lower condenser water temperatures. The team also introduced an innovation that uses a heat recovery chiller both to reduce the condenser water temperature below cooling tower limits and to carry the building's full heating load during the summer.

Meanwhile, landscaping, irrigation and plumbing systems have all been designed as efficiently as possible to save 678,000 gallons of water per year above standard water use for a facility of a similar size.

The client challenged the project team to reduce the overall budget and time of construction by 10%, and to use prefabricated elements as much as possible. Most MEP elements were pre-designed and manufactured offsite in a controlled environment before being transported to the building. This reduced the amount of on-site waste and avoided the risks associated with extreme weather events, as well as dramatically cutting assembly times and labour costs.

Since opening in 2019, the building has been analysed to verify that its sustainable design meets the LEED Gold v4 standard.

"Creating something that was not just state of the art but groundbreaking for sustainable medical building design took this project to a whole new level"

Amit Bhansali, lead mechanical engineer, WSP in the USA

Image courtesy of The Brand Companies

Image courtesy of Construcciones Planificadas S.A.

Cancer Treatment and Research Centre, Colombia

Advanced electrical and telecommunications design completed in just five months

Location: Bogotá, Colombia

Client: Construcciones Planificadas

Architect: Rafael De La Hoz

Services: Electrical and telecommunications engineering

Project status: Due to complete in 2022

In February 2019, the design for the Luis Carlos Sarmiento Angulo Cancer Treatment and Research Centre in Bogotá, Colombia, was subjected to an audit that revealed it did not comply with regulations. Our team in Bogotá were drafted in to fix the problem and engineer an advanced electrical and telecommunications system for this hospital in just five months.

It wasn't just the accelerated schedule that presented a challenge – the client wanted to employ the best available technology in Latin America, and to obtain LEED Gold certification for the building's environmental performance. To help fulfil these requirements, we proposed the installation of a high-bandwidth XGSPON passive optical network to provide the facility with broadband, one of the first uses of this technology in Colombia. This is a fibre-optic system that uses a single cable, which makes it more energy, material and cost-efficient. Coordinating the entire project using building information modelling (BIM) also enabled us to improve overall project schedule delivery, rapidly finding any interferences or conflicts between the different design systems, while also achieving a better understanding of the project.

Beyond simply equipping the hospital to function efficiently when it is complete, our design will also allow it to respond to future change. We ensured that the building can expand over time and adapt to technological developments using resilient equipment, such as a flywheel UPS in order to maintain power in the event of an outage – all of which was required for the project to receive certification as a Comprehensive Cancer Center from the healthcare accreditation body, the Joint Commission International.

The project is now at the final stages of construction, set to open to the public in 2022. Impressed by our performance on this scheme, the client has already invited us to work on other projects that it is developing in the healthcare sector.

State-of-the-art care

Cancer care is one of the most technologically advanced fields of medicine, encompassing a range of diverse and highly specialized equipment for diagnosis, treatment and research.

For facilities dedicated to cancer treatment, this means hosting sensitive, expensive machinery in close proximity to vulnerable patients and their families, and protecting people and equipment from each other. Isolating building structures and services, ensuring redundancy in power and communications systems, and developing robust security procedures are just some of the challenges that our building designers meet on our clients' behalf every day.

WSP is designing some of the world's most sophisticated buildings dedicated to cancer treatment and research, including one of only two NHS proton beam therapy centres in the UK, and we bring extensive in-house experience of designing facilities such as high-energy cyclotrons and synchrotrons. And because today's breakthroughs are tomorrow's essential treatments, we always design in flexibility so that spaces and systems for new technologies can be accommodated without extensive remodelling.

As for the people making those breakthroughs, we help our clients to support and inspire them with workspaces that encourage innovation and creativity. For example, laboratories and offices are ventilated with fresh air and flooded with natural light. We know that research scientists seek spaces that are not only functional and safe, but pleasant and comfortable – and that in a thriving life sciences sector, offering a good working environment is an essential part of attracting the brightest minds.

"The world is more connected than ever and people expect this connectivity to support their treatment. To enable this, we are seeking to embed systems that allow cancer patients to control their care and to connect with family and friends when they travel long distances for treatment, as well as enabling staff to deliver top-quality medical treatment"

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

6D

Asset Management

Image courtesy of STW Architects / Bouygues UK

UCLH Proton Beam Therapy Centre

Highly specialist services design delivers pioneering radiotherapy treatment to UK patients

Location: London, UK

Client: University College London Hospitals / Bouygues UK

Architect: STW Architects

Services: Mechanical, electrical and plumbing

Project status: Completed in 2019

Proton beam therapy (PBT) is an advanced form of radiotherapy that delivers highly targeted doses of radiation to reduce side-effects and damage to surrounding tissue. The Proton Beam Therapy Centre at University College Hospital is one of only two NHS sites in the UK to offer this, in a state-of-the-art building that also houses Europe's largest facility for the treatment of blood disorders.

Located in central London, the project included the construction of five floors below ground, to house the PBT equipment, and six floors (including plant) above, covering more than 25,000m² in total. Our team provided specialist mechanical and electrical services for the design and installation of the PBT systems, as well as building services for the above-ground support areas, including operating theatres, MRI and imaging areas.

Bouygues UK selected us alongside structural engineer Campbell Reith because of our experience of delivering similar facilities and our ability to work closely with other team members using the latest building information modelling (BIM) techniques. The implementation of Level 2 BIM, including 6D asset management, offers long-term benefits in providing a detailed design, cost and construction model. This will be used in the operations and maintenance of the building to facilitate its future use and flexibility.

The PBT facility also includes a cyclotron and related beam line serving three 360° gantry areas, plus capacity to install a fourth in the future. We brought extensive experience in the design of high-energy cyclotron equipment, and an understanding of its unique challenges, such as the routing of electrical conduits and interaction with the radiation shielding design. Our team provided HVAC, electrical controls, piping and device embeds for the cyclotron, proton beam line installation and proton treatment systems, including coordination of services with the radiation shielding. We had to meet the complex servicing requirements of the equipment vendor and oversee the interfaces with clinical services and the wider patient experience. Providing PBT equipment entry and egress was vitally important to minimize disruption not only to the site but to adjacent areas as well.

Inova Schar Cancer Institute

Radical overhaul transforms ageing office building into holistic treatment centre

Location: Falls Church, Virginia, USA

Client: Inova Fairfax Hospital

Architect: Wilmot Sanz Architects

Services: Mechanical, electrical and plumbing, construction administration

Project status: Completed in 2019

Fairfax Hospital in Falls Church, Virginia, received a large grant from a donor and decided to use it to build a centre for cancer research, genomics and personalized medicine in an eight-storey office building across the street, the former headquarters of oil company Exxon Mobil. The new facility is a major landmark in holistic cancer care – until now, the east coast of the USA has not had a facility dedicated to understanding, predicting and preventing the disease.

The challenge was to convert the Exxon building so that it was fit for medical care. Our work involved renovating the structure, including two circulation towers on either side, and adding a three-storey extension and two-storey entry pavilion, to bring the total space to 467,000ft². Inside, we installed five linear accelerator vaults, imagery and nuclear medical suites, facilities for chemotherapy, diagnostic radiology and proton beam therapy, and clinical space for oncology, including a breast cancer clinic. The centre also houses spaces for clinical trials and research, medical offices and a large pharmacy.

The client wanted to maintain the building's high ceilings, so instead of a conventional heating and ventilation system, we had to find a solution that would not use a lot of ceiling space, namely a dedicated outdoor air system, which ventilates the hospital more efficiently and maintains humidity levels. As part of this, we installed chilled water infrastructure for cooling the building. This is easier to reconfigure for different applications than refrigerant-based air conditioning, making the system highly adaptable for the hospital's future.

The new extension, meanwhile, contains an outpatient facility, which has hospital-grade plumbing, electrical and ventilation systems to ensure the highest levels of reliability and performance. The campus is still in transition – our project may have finished but it was just the start of a series of renovations that will continue to develop the hospital's scope and reputation.

"The challenge here was to take an old, eight-storey office building and turn it into a state-of-the-art cancer treatment facility"

Ray Tignall, senior commissioning agent, WSP in the USA

Image courtesy of Halkin/Mason Photography

Mount Elizabeth Novena Hospital

South-east Asia's first proton beam therapy centre, built in a fully operational hospital

Location: Singapore

Client: IHH Healthcare

Architect: CIAP Architects

Services: Mechanical, electrical and plumbing

Project status: Due to complete in 2022

Proton beam therapy (PBT) is a game-changer in the treatment of certain cancers, including complex brain tumours and cancers in children. By using a high-energy beam of protons, rather than the X-rays conventionally used in radiotherapy, diseased cells can be targeted very precisely, with minimal to no damage to surrounding tissue. At Mount Elizabeth Novena Hospital in Singapore, WSP has been involved in the construction of South-east Asia's first state-of-the-art PBT centre at a private hospital.

WSP, together with CIAP and consultants T.Y. Lin, was first employed by IHH Healthcare in 2017 to develop a feasibility study for the PBT centre. The study included finding a suitable location, assessing the impact on existing live services and reviewing prospective suppliers. This paved the way for the construction of a new, approximately 1,000m² PBT facility in a two-level basement structure directly adjacent to the existing hospital.

Building the PBT bunker below ground offered numerous advantages from both a safety and a structural point of view. The walls are approximately 1,600mm thick to shield the surrounding spaces from radiation, and the equipment itself amounts to a significant loading: the cyclotron alone weighs more than 50 tonnes. But the brownfield location brought challenges too: the project site is next to a rail tunnel, as well as the main infrastructure and utilities servicing a major public hospital. A top-down construction method was employed to minimize noise and disruption, while the logistics of delivering the equipment from the port to the hospital site had to be coordinated in consultation with the relevant public authorities due to its considerable size and weight. In case of fire in the basement bunker, an enhanced engineering smoke control system has been designed for the safe evacuation of patients in compliance with strict local fire and life safety code requirements.

The PBT facility has been constructed using the latest building information modelling (BIM) and virtual design and construction digital tools. These have increased the quality and accuracy of construction planning and management, and in turn have provided an integrated digital delivery for intelligent access of as-built information, asset management and control, and ease of operations and maintenance.

Fit for the future

With longer life expectancies and a greater incidence of the diseases of old age, there is a pressing need to increase the capacity of dedicated cancer centres, and to place facilities for prevention and early diagnosis at the heart of communities.

WSP works with healthcare providers to ensure that their cancer care buildings can meet this demand, efficiently and sustainably. As the world transitions towards net zero, healthcare buildings cannot be left behind. We design cancer centres that are flexible enough to expand or contract as the needs profile of an area changes, to offer new treatments as they become available, and to remain comfortable in a future climate that may be very different to the one we know today, or in which energy costs are much higher.

We have advised clients on many projects to optimize their current estates, such as the LEED Gold expansion and renovation of North Texas' only dedicated cancer hospital in downtown Dallas, or the Oncology Institute of Nîmes in southern France, where a major new development combines advanced treatments with specialist patient support and upgraded transport networks. We help cancer care providers to future-proof their investment and ensure the safety and comfort of their patients, equipping them to meet both today's highest standards of care and whatever tomorrow brings.

"Today's cancer treatment facilities have leveraged medical equipment technology to delivered improved care. In the future, the next leap forwards may come from new models such as precision or personalized medicine. So the environments that we design today will need to be adapted to offer dedicated pharmacy spaces, therapy rooms and advanced patient monitoring"

Nolan Rome, US healthcare director, WSP in the USA

Oncology Institute of Nîmes

A modern and flexible design, providing optimum conditions for patients and staff

Location: Nîmes, France

Client: Centre Hospitalier Universitaire de Nîmes

Architect: Agence Michel Beauvais

Services: Mechanical, electrical and plumbing, lighting design, project management, green building design, building information modelling

Project status: Completed in 2015

The Oncology Institute of Nîmes has continued its expansion to meet the growing needs of this region in southern France, providing patients with all stages of cancer screening, diagnosis, treatment and supportive care.

Bouygues Bâtiment Sud-Est was the contractor on this major 16,000m² development, which combines advanced research and new technologies with world-class care, comfort and wellbeing to aid every step of recovery. With 99 individual rooms, the centre focuses on patient experience, with highly specialized services and efficient processes reducing the average length of stay.

The well-organized flow of the rooms has improved staff efficiency and satisfaction, and enhanced links and relationships between facilities, specialists and physicians, all of which directly benefits the patient experience. Meanwhile, the upgraded transport networks designed by our team – including the provision of approximately 200 car parking spaces – ensure the oncology centre is easily accessible to patients and their families.

Our team provided the client with fire safety system coordination and electrical engineering, which allowed the production and distribution of high and low power currents. We also designed the lighting and provided sustainability consultancy, including dynamic thermal simulation, sunlight simulation, daylight factor assessments, climatic studies and environmental constraints management.

Image courtesy of Sergio Grazia. Copyright Michel Beauvais Associates

Image courtesy of Ian ten Seldam

Albury Wodonga Regional Cancer Centre

Low-carbon structural solution for rural community's consolidated treatment facility

Location: Albury, New South Wales, Australia

Client: Albury Wodonga Health and Victorian Department of Health and Human Services

Architect: Billard Leece Partnership

Services: Structural and civil engineering

Project status: Completed in 2018

The $52m Albury Wodonga Regional Cancer Centre was built to bring the best cancer treatment and care to the border of New South Wales and Victoria. Constructed on the grounds of an existing hospital, it consolidated disparate cancer services under one roof, creating a single destination for diagnosis, support, education, research and treatment – and eliminating the need for people to travel long distances for such facilities.

We provided structural and civil engineering services for the 7,700m² building, which comprises 30 inpatient beds set around two internal courtyards, a chemotherapy ward with space for 30 patients, two paediatric treatment chairs, three radiotherapy bunkers, a brachytherapy service, 17 medical and allied health consulting rooms, a pharmacy, and a wellness centre, as well as a bridge linking the new centre to the old hospital.

The most distinctive feature of the structural design is the use of "Bubbledeck" floor slabs – it was the first hospital in Australia to adopt this system. The patented technology reduces the amount of concrete in the building structure by 30%, replacing it with ball-shaped voids surrounded by recycled plastic. The slab remains flat and stiff, but less energy is used, and less carbon is emitted in its construction. It is also thinner and lighter than a concrete slab, creating more room for conduits and cooling fixtures – particularly crucial in a hospital that will be refurbished several times over its life cycle. Each slab is 340mm thick and spans up to 9m.

The innovative floor slabs were prefabricated off site, speeding up the construction process and eliminating the need for formwork. On-site activities simply involved installing the floor panels and the remaining 10% of reinforcement. Precast concrete elements were also used to build the radiotherapy bunkers, reducing the construction period by several months and removing the need for formwork and temporary works to support large-volume concrete pours.

We are now designing a $23m expansion to the emergency department of the hospital.

"Our precast construction method for the radiotherapy bunkers sped up construction by a number of months"

Barry Roben, principal director, WSP in Australia

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

What if we can?