



PIONEERING HEALTHCARE FACILITIES

GLOBAL EXPERTISE AND LOCAL INSIGHT, DELIVERING
OUTSTANDING SOLUTIONS

WWW.RAMBOLL.COM/HOSPITALS

ABOUT RAMBOLL

Our vision: Ramboll is committed to helping create inspirational and sustainable solutions that allow people and nature to flourish.

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Hillerød Hospital, Denmark

Envisioned as a pavilion set within the forest. Despite its large size, this hospital will have human scale.

Unwavering passion for design

We have an unwavering commitment to design and creativity. We marry exquisite design with a comprehensive appreciation of function, buildability and end-user needs. We trust in the power of design to create competitive edge, social betterment and problem mitigation. We combine human ingenuity and self-expression together with technological advancement to solve the most complex challenges and ensure our designs are insightful and supportive for efficient operations.

Strong trusted teams

We know what it takes to successfully work in integrated teams. We are continuously teaming up with many of the most well known and reputed architects, contractors and consultancies around. We are highly collegial, collaborative and innovative with a holistic approach. You will find us to be extremely approachable, completely engaged and fully committed. We know the importance of inquiring and listening. Our client satisfaction scores together with our level of repeat business.

Complete project focus

We always have a strong focus on delivering projects on time and on budget. We use our firm grip on commercial realities and whole life costs to ensure that what we plan and design is what gets realized. We have nothing short of complete focus on project success.

High ethical standards

Our founders instilled our strong moral and ethical principles. The strong ethical standards, responsibility towards society held by content employees are still key elements in Ramboll's approach to business.

“The essence is that you have to behave properly and decently as a person... This relates to individual customers, colleagues and society as a whole... It is about treating other people and society right in a longtime perspective,”

– B.J. Rambøll, co-founder of Ramboll, talking about Ramboll's philosophy.

We are a values driven business. Our values exist to guide our decisions in our daily work and define the attitude and culture of our business and how we conduct our relationships.

Our values are:

Insight & Excellence
Integrity & Empathy

ABOUT RAMBOLL

Ramboll is a leading engineering, design and consultancy company founded in Denmark in 1945.

The company employs 16,500 across 300 offices in 35 countries with experts in the Nordics, North America, the UK, Continental Europe, Middle East and India, supplemented by a significant representation in Asia, Australia, South America and Sub-Saharan Africa.

Ramboll works across the markets: Buildings, Transport, Water, Environment & Health, Energy and Management Consulting.

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HEALTHCARE CAPABILITIES

Our local presence in over 35 countries allows us to recognize how these trends are influencing individual countries, counties and cities.

OUR COMPETENCIES INCLUDE

- Complete building engineering design
- Civil and structural engineering
- Mechanical and electrical engineering
- Medical gas system
- Medical equipment
- Radiation
- Clean room facilities
- Fire and safety systems
- Acoustics
- Hospitals architecture
- Interior design
- Landscape design
- City planning
- Transport planning
- Sustainability and resilience strategies
- Needs analysis
- User involvement and dialogue processes
- Hospital master planning
- Hospital logistics
- Hospital conveyer systems
- Hospital automation
- Supply chain and logistics solutions
- Technical due diligence
- Process management
- Programming
- Project management
- Design management
- Change management
- Site management
- Client consultancy
- Economic Feasibility studies
- Facilities management strategies

Smart Hospitals

- IT-solutions
- IT-innovation
- System integration
- I O T
- Smart hospitals strategies

Our extensive multidisciplinary services coupled with our in-depth knowledge and holistic approach enable us to offer clients creative and innovative solutions. Through close collaboration, we meet the needs of local and national government departments, the private sector and building contractors. Our experience includes designing new and refurbishing existing healthcare facilities from major hospitals, community care facilities to specialist care centres.

We offer management and client consultancy that includes project management, strategies for operation, hospital planning, identification of automation potential and change management, communication policy, engineering, BIM (Building Information Modelling) Level 2 and procurement as well as IT solutions.

A healthcare sector facing a changing world population

The world's population is evolving through changes in climate, lifestyle, urbanisation, and an ageing population. All of these impact the delivery of healthcare facilities.

Our local presence in over 35 countries allows us to recognize how these trends are influencing individual demographics in countries and cities. We use this local understanding to integrate our healthcare expertise and experience from around the world into our solutions with a holistic and client centric focus.

Køge Super Hospital, Denmark

Optimised operational efficiency, simple navigation and connectivity were all key design drivers for this new hospital. Image: Rådgivergruppen USK

LOCAL PRESENCE GLOBAL KNOWLEDGE



THE VERY BEST CARE IN A DIVERSE ENVIRONMENT

“Collaboration across departments is crucial to (a hospital’s) success.”

– A quote from a hospital user process

The physical environment of a hospital and its surroundings have a huge impact on the outcome regarding patient recovery and wellbeing. We take great care in helping to deliver quality facilities and ensuring their efficiency and effectiveness, so that ensuring they have positive influences on both staff and patients.

Ramboll has extensive global expertise in delivering some of the world’s leading and pioneering hospitals and treatment facilities. This includes designing the UK’s first Proton Beam facility to engineering a new hospital for technologies and diseases that do not yet exist in Denmark. Furthermore, Ramboll has been part of the team designing the worldclass hospital New Karolinska that has been ranked number 10 in the world, proving our imagination and ambition results in outstanding solutions.

Sustainability

With many healthcare facilities having the benefit of scale, significant savings can be achieved in facility management and operations if carefully planned in the early stages of the project. Our multidisciplinary experts combine their skills in sustainable construction materials, evidence-based logistics, energy supply, conservation of natural resources, energy saving technologies, environmental impact and lifecycle assessment of the hospital operations. We do this to ensure that the solutions we design have minimal effect on the environment and maximum effect on wellbeing and economical factors over its life cycle.

THERE MUST BE ROOM FOR THINGS WE HAVE NOT INVENTED YET



DESIGNING FACILITIES FOR THE FUTURE

With healthcare budgets under constant strain, we pride ourselves on designing insightful solutions that deliver high quality care and improved efficiency.

“Automated guided vehicles that can deliver clean beds and linen within the last 50m of the room is one example of how technologies can be used to deliver efficiencies and improve infection control.”

– Steven Bentley, Project Director Ramboll.

With new hospital facilities taking anything up to 15 years from concept to completion, anticipating future needs is vital. For example, over the next 50 years, people over 60 years of age are forecasted to surpass those under the age of 14 creating a shift in priority from transferable to non-transferable diseases, including cancers, diabetes and heart disease as well as injuries.

Ramboll is involved with some of the world's cutting edge healthcare facilities. Through this experience and our knowledge base that spans technology sectors including science and laboratories and within developed and less developed countries, our teams deliver real insight into the solutions we design internationally.

Through our basic understanding of meeting tomorrow's needs, flexibility is built into the design to meet future adaptations and the need for resilience. We strive to make designs that can accommodate changes in the climate from flooding, to reconfiguration for technological advancement in plant or changes in patient needs. We work closely with clients to realise cutting edge facilities at the point of completion.

High quality patient centric care

Our experts understand that a patient centric care approach to the design can directly impact healthcare professional's ability to deliver patient centred care. One example is ensuring that the design supports proximity and line of sights from nurse's stations to the bays and wards.

With healthcare budgets under constant strain, we pride ourselves on designing insightful solutions that deliver high quality care that improves efficiencies and focuses on health and well-being for both staff and patients.

OUR PORTFOLIO

UNIVERSITY HOSPITALS



NEW KAROLINSKA HOSPITAL

Acute and university hospital in Sweden with world class research

This massive €1.8bn scheme was planned to be a world class treatment, teaching and research hospital. It has been operational since 2018.

The hospital has 9,000 rooms including:

- 36 operating theatres
- 700 hospital beds
- 100 bed day care centre
- Research laboratories
- 1,200 space car park

Ramboll has worked with significant structural challenges including a future underground line and station; double rooftop helipad and stringent vibration limits. New Karolinska Hospital is housing a 40 ton gamma knife on the 3rd floor and a 126 ton hyperbaric chamber.

Certified as an LEED Gold green building, the building services engineering scope has consisted of conceptual and detailed design for the oncology treatment and ward building.

The building services systems include coordination of medical gases and fire protection systems.

The 19,000m² oncology building spans 10 floors and contains radiation protected facilities for eight linear accelerators, three brachy therapy rooms, a MR, a DT and 80 single patient ward rooms, six of which are radiation protected.

This is the first major PPP building in Sweden. Ramboll UK is assisting Ramboll Sweden in the design of the building structure and also sharing their PPT/PPP experience. Ramboll Finland has significantly input into elements of the design. The 10 storey structure plus two storey basement, is formed in precast concrete with steel beams.

Location: Solna, Stockholm, Sweden

Value: €1.8bn

Client: Skanska Healthcare

Services: Structural engineering, civil engineering, building services design.



AARHUS UNIVERSITY HOSPITAL, DNU

New University Hospital

The New University Hospital in Aarhus will become one of the largest hospital complexes in Northern Europe with a total of 460,000m² divided into 300,000m² new buildings and 160,000m² rebuilding of the existing hospital facilities.

The new hospital will cover 797 single bed wards, 43 dialysis beds and 80 hotel beds. The hospital will become the workplace for 8,000-10,000 employees.

The design of the hospital will support new treatment methods, ways of working and the use of new technologies.

Location: Skejby, Aarhus, Denmark

Client: Region Midtjylland

Value: €1bn

Architect: C F Møller

Services: Engineering design, project management, environmental

The focus has been to obtain increased quality both in terms of the patient and relatives perspectives and in regard to the working environment conditions for employees.

The building project is based on requirements for high flexibility and generic applicability - therefore the overall architectural layout, structural design and technical installation principles are prepared for easy adaption to future needs and requirements.

All building units are organized in a rational modular system and the entire building structure is characterized by a high degree of standardized design solutions.

The project was completed in 2019.



KING SAUD UNIVERSITY MEDICAL CITY EXTENSION

An ambitious scheme to extend the King Saud University

A multidisciplinary, international team worked together on this important healthcare project. The extension of the King Saud University Medical City comprises of several new buildings for the university with an approximate area of 350,000sqm. The first stage includes a new National Diabetic Centre "King Khalid Medical City - National Diabetic Centre", a new Dental college and an expansion of the medical college.

Location: Saudi-Arabia

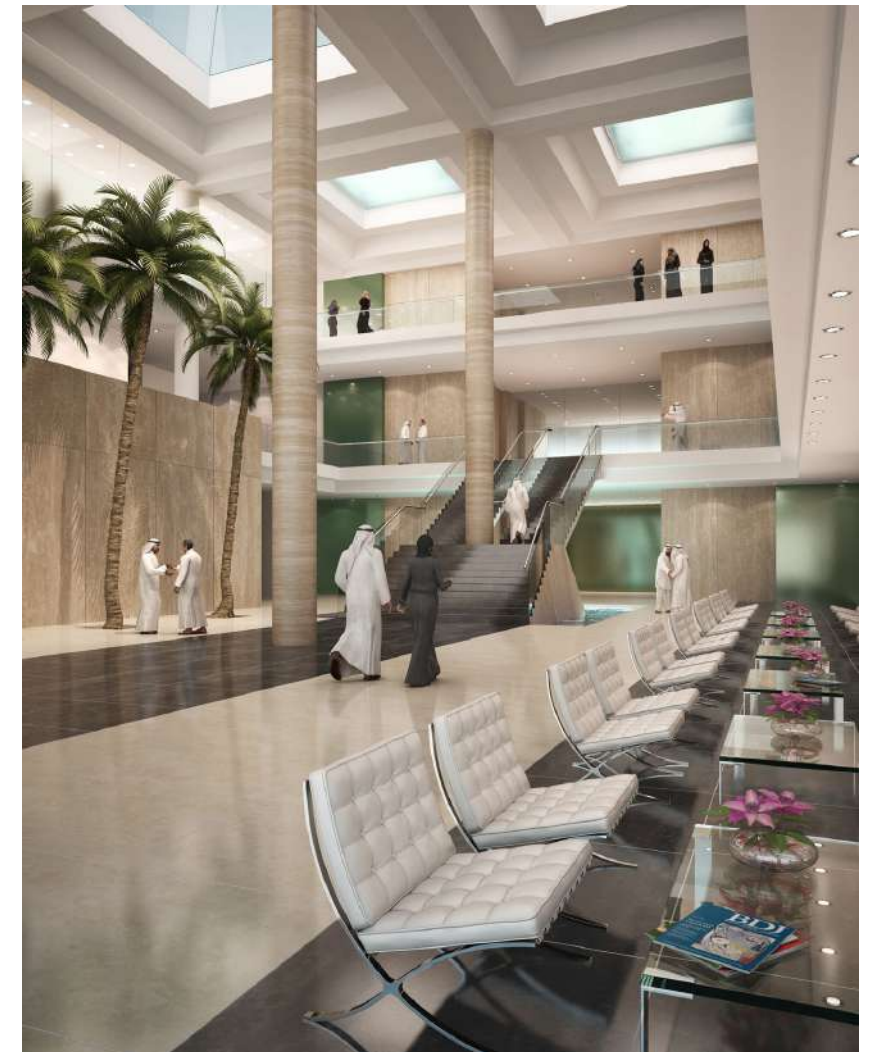
Value: €50m

Client: King Saud University

Services: Electrical and mechanical engineering, fire and safety and acoustic consultancy.

The medical college extension includes teaching facilities, lecture halls, public spaces, a full scale skills lab, mosques and a spectacular main auditorium with an audience capacity of 1,400. The National Diabetes Centre will be a national institution for diabetes, containing research and central functions, as well as treatment for complicated cases. It will in effect be a miniature hospital, with outpatient facilities, radiology, a large polyclinics department, bed wards, and counselling and education.

The administration of King Saud University was also committed to equipping the college with state-of-the-art facilities to advance dental education. These state-of-the-art facilities and technologies included oral surgery operating theaters, a sterilization facility and almost 500 dental units (a world record at that time) in the same building. Ramboll delivered the building services and fire safety design for the three buildings in this project. Around 80 dedicated competences were involved across the Ramboll Group.



HAUKELAND UNIVERSITY HOSPITAL - PHASE 1

New Children and Youth Hospital (BUS-Hospital)

Helse Bergen held a design competition for a new children and youth hospital attached to the Haukeland University Hospital.

The aim was the provision of a comprehensive modern centre of the highest international standard, while at the same time finding a holistic and functional solution adapted to the specific site conditions, surroundings and climate. The new hospital facility should provide for an inspiring and functional framework for patients, families, staff and students. The architecture should evoke a feeling of trust and confidence, quality and openness.

The competition jury unanimously declared the architecture consortium of KHR Arkitekter, Per Knudsen Arkitektkontor and Studio 4 Arkitekter as (now a part of Ramboll) the winner of six entries.

The concept consists of '(piano) keys' resting on a heavy stone clad base, spanning across the terrain in an east-west direction. Between the 'keys' lie green stretches of terraces, gardens or play areas. This serves to break down the building's mass into smaller and friendlier elements. The wards are elevated for light, air and view. The heavier functions are located in and across the 'base' to bind the facility together.

Phase 1 consists of physical rehabilitation facilities, the children's energy centre with swimming hall and heated pool, gym, treatment room, laboratories and education facilities, which are located in the base of the building. Above are the laboratories and ECT treatment. In the middle of the facility lies a central access point where patients, staff or visitors can easily orientate themselves.

The centre is further tied together by suspended cross circulation on the upper floors to ensure easy movement by staff and patients. The new hospital is to be built in two stages, with the above mentioned in the first phase and the general sections in the second phase. The first phase will have a gross area of 29,000m². Phase 1 opened in may 2017 and won the city of Bergens price for architectural and urban development.

Location: Bergen, Norway

Value: €107m

Client: Helse Bergen

Architect: Rambøll Architects, pka and KHR

Services: Architecture, interior and landscape design.



HAUKELAND UNIVERSITY HOSPITAL - PHASE 2

New Children and Youth Hospital (BUS-Hospital)

Phase 2 of BUS builds on phase 1 of the competition entry and contains the general medicine section of the children's and youth hospital as well as the maternity and childbirth section of the Women's Clinic. The building will provide a fully-fledged hospital with all functions, wards, outpatient clinics, operating theaters, postoperative areas, radiology, delivery rooms, reception, laboratory, office and research spaces, etc. When finishing phase 2 we will have a complete hospital for children and youth.

Phase 2 also includes wards for gynecological treatment. The general architectural concept for the child and adolescent hospital is rooted in the unique location on a green hillside north of 'Sentralblokken'

at Haukeland Hospital. The focus has been on breaking up the building mass into smaller and comprehensible elements and using scale, light, greenery and materials to create a child-friendly and welcoming feel in addition to lessening the impact of its institutional nature.

The reduction in the height of the Children and Youth hospital eases the transition between the larger 'Sentralblokken' and the lower residential buildings to the north. Despite the intensive utilization of site coverage in the revised concept for BUS 2 and a rationalization of the façade modulations, the new hospital as a whole takes on an increasing openness and transparency, which merges with the green landscape. Phase 2 will open in 2022-2023.

Location: Bergen, Norway

Value: €3.75m

Client: Helse Bergen

Architect: Rambøll Architects, pka and KHR

Services: Architecture, interior and landscape design and implementing art in the project.



UNIVERSITY HOSPITAL HAMBURG-EPPENDORF

The hospital Hamburg-Eppendorf is among Europe's most modern clinics. In 2010 a seven-floor building together with a Heliport on the rooftop was built. This hospital has 400 rooms and each ward contains 28 beds, the intensive care unit alone has 60 beds. It took three years to complete the new hospital and the cost of the construction amounted to 188 million euros.

For the new building an Automated Guided Vehicle (AGV) system and a Pneumatic Tube System (PTS) with 150 stations and 4 centrals was desired. 34 transmitting and receiving stations, 250 roll containers, an automatic container washing system, two automated storage systems and automated lift systems for transporting containers were realized.

Today the total University Hospital Hamburg Eppendorf consists of more than 80 clinics, polyclinics and institutes distributed amongst 14

centers. With 1736 beds, including 242 beds in the University Heart Center Hamburg (UHZ) and 58 beds in the Martini-Klinik.

The University Hospital Hamburg Eppendorf is still undergoing restructuring measures. They are looking to add new buildings, Martini-Klinik with a PTS and an AGV system. The research building "Campus Forschung" (Campus Research) and a new Heart center will also be provided with an AGV system. Further infrastructure measures as the tunnel construction between the new buildings with an AGV system and a pneumatic tube system are on their way with the "Zukunftsplan 2050" (Future Plan 2050). (AGV) system and a PTS with 150 stations and 4 centrals was desired. The AGV includes 33 vehicle

Location: Hamburg, Germany

Value: €188m

Client: Universitätsklinikum Hamburg-Eppendorf

Services: conveyor systems (AGV, PTS, elevators, logistics,)



UNIVERSITY OF LEICESTER CENTRE FOR MEDICINE

The University of Leicester's new George Davies Centre is the UK's largest Passivhaus building and brings together academics, researchers, clinicians and students.

The £42m centre is part of the University of Leicester's strategy to improve and upgrade the facilities used by the School of Medicine.

The George Davies Centre is an exemplar project in terms of low energy design, it is expected that the new teaching and research facility will reduce the energy bill by up to six times with the target total energy consumption at just 80kWh/m2, compared to the previous building's 500kWh/m2.

Location: Norwich, UK

Value: £81.6m

Client: Biotechnology and Biological Sciences Research Council

Services: Civil & structural engineering, geotechnical engineering, environmental management.

rooms, offices, dry lab research facilities and support spaces to over 2,350 staff and students.

Designing a sustainable building

The ambition for the George Davies Centre was to deliver a sustainable building that minimises the energy demand for space heating and cooling, whilst also creating excellent indoor comfort levels. This is primarily achieved by adopting the Passivhaus (fabric first) approach to the design.

The Passivhaus philosophy aims to achieve extremely low energy buildings through the implementation of passive design measures, focussing on outstanding levels of thermal insulation and air-tightness.

Ramboll delivered structural engineering, geotechnical engineering, below ground drainage design, and fire engineering services for the 12,836m2 centre, which consists of lecture theatres, teaching

The sustainability credentials of the Centre were confirmed when it won 'Project of the Year' at the 2018 CIBSE awards.



Image © Builtvision

MALMÖ UNIVERSITY HOSPITAL

Commissioned by Region Skåne to manage multiple parts of the multi-billion project

Since the amalgamation in 2010 of the two university hospitals in Malmö and Lund in southern Sweden, they now represent one of the largest university hospitals in the country. In order to meet future health care demands the Malmö hospital area will be expanded with a new healthcare facility of approximately 65,000m², and other new buildings of 30,000m². Alongside the renovation and demolition of existing buildings, construction of new building services and transportation culverts will be needed.

Location: Malmö, Sweden

Value: €1.2bn

Client: Region Skåne

Services: Project planning, construction management, electrical engineering, security and IT system design.

The healthcare facility will consist of several separate buildings bound together by a common basement, culverts and passageways. Ramboll is planning and designing the building's electrical and telecommunication installations. We are also part of the organisation that oversees planning and control of finances and deadlines

for the entire project. Planning and designing in flexibility is a critical element of this project to ensure the future needs of the hospital can be accommodated.

This large and complex project is to be delivered in parallel with the hospital's ongoing business operation and will affect the entire hospital area. "It is very satisfying to be able to contribute to developing the hospital area to future healthcare demands" explains Joakim Westerlund, Head of Department, Project Management.

Ramboll has provided project planning, construction management and design of electrical services, which include power supply, lighting design as well as security and IT Systems.

This entire project is due for completion in 2022.



UNN TROMSØ UNIVERSITY HOSPITAL

University Hospital northern Norway - New A Wing

The new A wing adds new and necessary treatment facilities to UNN Tromsø and catalyzes a new strategy for the development of a framework for UNN Tromsø as an effective regional and university hospital.

The project for the new A wing has added new treatment facilities that will advance the provision of specialist health services at UNN Tromsø. In addition, it addresses the development of a longer term strategy for the whole facility.

Priority has been given to particular areas for outpatient surgery and day and outpatient treatment, together with laboratory facilities, ER and surgery. This will ensure a sound physical framework for the

planned organisational restructuring of hospital operations, with more emphasis on outpatients and outpatient treatment.

This project sets out a long term strategy for the development of a framework for UNN Tromsø to become an effective regional and university hospital. Based on an overall assessment of the existing facilities and future needs and the close collaboration with the university of Tromsø, this framework will ensure the continued development of relevant competencies.

Location: Tromsø Municipality

Value: €120m

Client: Helse Nord

Area: 20,000m²

Architect: Rambøll Architects, pka og KHR

Services: Architecture and interior design.





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NORTH ZEALAND HOSPITAL HILLERØD

New Hospital envisioned as a pavilion set within the forest

The new North Zealand hospital will be the result of consolidating the three existing hospitals across the region and is part of Denmark's healthcare consolidation programme, which includes the redevelopment of seven hospitals. The 128,000m² hospital is the 3rd major healthcare building to be awarded to Ramboll as part of this consolidation programme.

Envisioned as a pavilion set within the forest, the design brings together all the hospital's necessary functions within one clover-shaped structure. The low-rise building reaches horizontally into the landscape, surrounded by trees and native plantation. The upper level bed wards will open onto the roof garden, or provide views out over the surrounding trees, providing an opportunity for patient rehabilitation.

The hospital's innovative design forms are flexible enough to accommodate

technology yet to be invented and handle epidemics yet to be unleashed.

The bed wards will be constructed from lightweight prefabricated modules made from either metal or wood, reducing on-site waste and embracing modern methods of construction. The demountable walls and regular span floor plates will also ensure straightforward construction processes.

The hospital will be equipped with cutting edge Logistics solutions including pneumatic tube system (PTS) and Automated Guided Vehicles (AGV) for transport of carts and beds, waste chutes and connected processes.

Teams from the UK, Management Consulting, Global Engineering and Denmark are working collaboratively to deliver this project.

Location: Hillerød, Denmark

Value: €320m

Client: Herzog & de Meuron/
Vilhelm Lauritzen Arkitekter

Services: Civil engineering, structural engineering, MEP engineering, sustainability, acoustics, logistics, fire engineering, vertical transport, façade engineering.



VIENNA NORTH HOSPITAL

The Vienna North Hospital is regarded as one of Europe's most modern hospitals and one of Austria's largest construction projects. Nearly € 1.2 billion euros has been invested in the greenfield developing. The hospital of the Vienna Association of Hospitals (Wiener Krankenanstaltenverbund, KAV) is located on the left side of the Danube.

The former industrial area is being transformed into a high-quality healthcare area. The building itself has been designed as a high-tech hospital with making the most of the natural with its light-flooded atriums.

In the future the facility is planned to there are supposed to be approximately 40,000 inpatient

treatments, 250,000 ambulant treatments and about 16,000 surgical interventions each year.

After 9 years of planning and installation all conveyor systems are ready: an Automated Guided Vehicle (AGV) system, a pneumatic tube system (PTS), logistics, canteen kitchen, container washing machines, elevators, roll containers and the food distribution systems. Currently the construction of the Vienna North Hospital is a concrete step towards the implementation of the program of the Vienna Hospital Association for the reorganization and further development of the Viennese hospital plan (Wiener Spitallandschaft) that is expected to be fully implemented by 2030

Location: Vienna North Hospital, Austria

Value: € 1.2bn

Service: conveyor systems, AGV, PTS, logistics, container washing machines, canteen kitchen, roll containers, elevators, food distribution systems, maintenance.



HYVINKÄÄ HOSPITAL, BUILDING H

Hyvinkään Sairaalanmäki's new hospital building and car park

The City of Hyvinkää and HUS' joint real estate company have built a new hospital building and car park for Hyvinkää Hospital. The building is intended for HUS' specialised medical services and the City of Hyvinkää's basic healthcare services.

The project was implemented in two phases. In the first phase, a 4,000m² two-level car park was constructed with 237 spaces for customers. For the following phase, a new five-storey hospital building which includes a basement level with shelters, tunnels, and a mechanical ventilation machine room. The total area of the new hospital building is 23,000m².

The hospital building's premises will include a children's unit, neonatal intensive care units, children's outpatient clinics, and a day hospital, as well as adolescent psychiatry, general hospital psychiatry, mental

health and substance abuse services, rehabilitation services, and wards.

Particular consideration during the project was given to the flexibility of the premises, accessibility, the economic efficiency of the building's lifespan, and spatial constraints. A cast-in-place cement pillar framework was chosen for the hospital's structural solution. The car park's framework is entirely cast-in-place and the structure is retrofitted. The mechanical ventilation machine room's framework and the cold attic spaces on the roof are structures with steel. The outer wall structure of the hospital building consists mainly of inner shell elements and insulation plastering.

The client's objectives for improving energy efficiency were taken into account in the design. The project was carried out in a divided contract form.

The site was planned by data modelling from all key design areas. The whole reservation cycle between the different design areas was implemented entirely by data modelling.

Reinforcement designs were also implemented partially by data modelling. Building information modelling (BIM) was also used at the work site to assist, for example, in demonstrating structures, work site planning, and the installation and lifting work for elements. Data models were used between the design fields to coordinate structures and plans, and in collision studies and building management system route checks. Modelling also easily allowed for checking the relative heights between subterranean structures and the surface level and assistance in making calculations.

Location: Hyvinkää, Finland

Value: €64m

Client: Hyvinkään Sairaalanmäki

Services: Building design, element design.

Schedule: Completed in 2018



NEW CONSTRUCTION OF VAASA CENTRAL HOSPITAL'S BUILDING H

The first alliance project in Ostrobothnia

Vaasa Central Hospital's Building H will combine regional and private services for basic healthcare, specialised healthcare, and social services. Through digitalisation and remote connections, services will be equally within reach for customers regardless of place of residence.

The project is being implemented but he Bothnia High 5 project alliance which includes the Vaasa Hospital District, YIT, Granlund Pohjanmaa, Ramboll Finland, Raami Architects, and Kontukoski Architects. This is the first alliance project being undertaken in Ostrobothnia.

Location: Vaasa, Finland

Value: €143m

Client: Vaasa Hospital District

Services: Building design, element design, geotechnical planning, data modelling, road and traffic planning, housekeeping management, moisture control.

The new building is designed to be adaptable and multi-purpose with healthy spaces and a safe environment for customers and staff. Once completed, Building H will be a smart hospital with modern and high quality premises and a cost-effective lifespan equipped to take advantage of the technology for the future.

The construction of the new Building H is the largest construction project in Vaasa Central Hospital's history. The project will cover a total of 37,000m². The implementation phase started in 2019 and Building H will be put into use in 2022.



1902 BUILDING ST. OLAVS HOSPITAL

The original 1902 building conserved and upgraded to meet current standards

The building that dates back to 1902 houses the hospital's rehabilitation management and lighter clinical facilities. Careful and sympathetic attention was given to restoring the significant aspects of the building's original character, with its distinctive high ceilings and old stairways - which were preserved to the greatest extent possible.

The same approach applied to roofs, floors and the brick façade. At the same time, the building had to provide for high quality, modern work spaces, adapted to today's standards. Much emphasis was placed on the integration of technology and the architecture so that the new technical facilities would not compromise the quality of the historic building.

The use of natural materials, wood, parquet and stone, was an important factor in achieving a refined interplay between the old building practices and the modern architectural interventions.

The architects and interior designers were responsible for the coordination of the artistic installations. The interior designers designed the furniture in the auditorium.

Building of the Year Award 2008 Comment from the Jury:

"This year's winner is characterised by an interplay of enthusiasm and creativity, and a result that satisfies all measurable requirements for a pioneering project. Requirements

for energy, environment and universal design are addressed. As a transformation project, the winner will have great transfer value".

"The nominated buildings for the Building of the Year are characterized by high quality of planning, implementation, and not least, in the finishing of the buildings. Each in their own way, projects have been carried out with great professionalism and the ability to integrate inputs of all professionals and the client. It is therefore no coincidence that the jury has witnesses strong evidence that the buildings more than serve their purpose".

Location: Trondheim, Norway
Value: €10m
Area: 7,000m²
Client: Helsebygg Midt-Norge
Architect: Rambøll Architects, pka and KHR
Services: Architecture and interior design.



1930 BUILDING ST. OLAVS HOSPITAL

Office and administration building. Sketch design, design development and construction documentation

The '1930-Bygget' (building) was a rehabilitation project. The building was to be converted to office and administration space and used in conjunction with the adjacent '1902-Bygget'. The top management of the university hospital and management of the faculty of medicine were to be located here to facilitate closer cooperation and better integration.

The project presented a challenge to architects and consultants, as it involved substantial changes to the exterior of a listed heritage building.

Our aim was to highlight the original characteristics of the old building while at the same time creating a

well- functioning building adapted to the new brief. Sight lines, daylight, materials and use of colour were used as means to achieve this end.

We used the principles developed in the rehabilitation of the '1902-Bygget', but adapted them to the current time and design.

The main entrances to the two buildings are directly linked, maintaining a clear line of sight through the building. The ground floor is used for presentations and contains a large meeting room, in addition to other related functions. The floors above are designated for office use.

Location: Trondheim, Norway

Value: €10m

Area: 1200m²

Client: Helse Midt-Norge RFH/ Helsebygg Midt-Norge

Architect: Rambøll- Architects and pka

Services: Civil, electrical, fire, heating, ventilation and building physics engineering, acoustics consultancy, architecture and interior design.



MÄLAR HOSPITAL, ESKILSTUNA

The upgrading of healthcare facilities in Sörmland, Sweden includes the refurbishment and extensions of hospitals in three cities.

Requirements for healthcare facilities are evolving quickly, driven by the development of new medical equipment, changing healthcare patterns and medical breakthroughs.

In the region of Sörmland, southwest of Stockholm, Ramboll is modernising three local hospitals in the cities of Eskilstuna, Nyköping and Katrineholm.

The existing buildings were originally constructed between the 1920's and 1970's and cannot cater for the delivery of modern healthcare services. The new facilities will provide many benefits and make it possible to introduce state-of-the-art medical equipment and minimise contamination risks.

Comprehensive project

In total, the project (across the three hospitals) consists of four new buildings of approximately 70,000 m² and involves approximately 30,000 m² of refurbishments. In addition, around 25,000 m² of the existing buildings will be demolished - without disturbing the daily routine of the hospital.

The new facilities include 22 operating theatres, 3 MRIs, 2 sterilization departments, 2 emergency care units, 2 intensive care units and 2 delivery departments as well as many other specialist departments. There will also will be 280 examination and ward rooms, most of them with single bed capacity.

Location: Cities of Eskilstuna, Nyköping and Katrineholm, in the region of Sörmland, Sweden

Value: €150m

Client: NCC Building Sweden & Landstinget Sörmland (region of Sörmland)

Services: Multidisciplinary engineering services



TUNBRIDGE WELLS HOSPITAL

The first hospital in the UK made up entirely of single room wards

The Tunbridge Wells Hospital in Pembury, Kent is the first acute all single bed ward NHS District General Hospital in the UK; with 513 bedrooms this redevelopment consolidates Pembury Hospital and Kent & Sussex Hospital into one new, modern facility.

The hospital was designed to take advantage of the difficult natural sloping site by having three floors to the North and six/seven floors to the South. The majority of the single rooms are arranged to take advantage of the magnificent views across the surrounding woodland areas that are listed as areas of outstanding natural beauty and Sites of Special Scientific Interest.

The design also incorporates features for patient safety and effective infection control. In total the new development has 1,200 car parking spaces and includes a helipad to

cater for air ambulances on the upper part of the site.

With a total floor area of approximately 66,000m², the main hospital building consists of an in situ concrete frame on reinforced concrete pad foundations with post tensioned floor slabs and traditional in situ concrete columns and retaining walls. The structure is braced by concrete shear walls to the stair/lift cores, while its height is squeezed between the rock line and a maximum planning restriction level.

The site is set in an environmentally sensitive area, bordered by designated sites, and was developed whilst keeping the existing facilities operational; as a result phasing issues were critical, involving complex species translocation programmes throughout construction.

Location: Tunbridge Wells, UK

Value: €230m

Client: Maidstone & Tunbridge Wells NHS Trust and Laing O'Rourke

Architect: Anshen + Allen

Services: Structural, geotechnical, highways and civil engineering, environmental services, surveying, transport planning, public health drainage, vibration analysis.



HOSPITAL KLAGENFURT WÖRTHERSEE

The Hospital Klagenfurt Wörthersee is the third largest hospital in Austria with about 1,200 beds, 62,000 inpatients and 527,000 outpatient treatments each year.

It's located in the center of Klagenfurt and was ready for use in 2010. Approximately 327 million euros were spent on the 95,000 m. The landscaping was rearranged to create a park around the hospital and a river was relocated to create space for the building. The overall structure of LKH Klagenfurt consists basically of two units, a Surgical Medical Center (CMZ) and the Supply and Disposal Center

(VEZ). In the Supply and Disposal Center (VEZ) a large kitchen and a fully automatic laundry are situated. Further technical innovations are the Automated Guided Vehicles (AGV) system and a pneumatic tube system (PTS).

The Hospital Klagenfurt management is very keen on exploring innovative solutions and state of the art medical technology, optimized and multi-site use of the facilities and rooms (operating theaters, examination and treatment rooms, nursing stations and logistics areas) has given this hospital pioneering status throughout Europe.

Location: Klinikum Klagenfurt am Wörthersee, Austria

Value: €327m

Services: conveyor systems, AGV, PTS, logistics, canteen kitchen, container washing machines, elevators, roll containers, food distribution systems, maintenance.



ALTA HOSPITAL

The project is an extension of the existing Alta Health Care Center in form of a new wing and reconstruction of the existing center. The extension is about 4,000 sqm BTA, on 4 floors.

Remodeling is about 1,000 sqm of existing buildings. The project will include somatic and psychiatric beds, operations facilities, image diagnostics, dialysis and maternity ward.

The existing eastern wings are extended with the same building width and bearing direction in the

new wing. This provides maximum flexibility in both existing and new areas and provides robustness in relation to co-operation and possibly future expansion of the hospital to the east.

Today's hospital has a variety of different colors, materials and surfaces, and a strong character. The new wing will be given facades in massive wood with a treatment like the old wooden houses in Norway. This color will correspond nicely to the existing brick walls. The project will open in summer 2019.

Location: Alta, Norway

Value: €42m

Client: Finnmarksykehuset HF

Services: Complete engineering and architecture design



VIVANTES HOSPITALS

Vivantes – Netzwerk für Gesundheit GmbH (Network for Health GmbH) is a hospital operator in Berlin. Vivantes runs nine hospitals with over 100 clinics and institutions, with a total of 5,329 beds. The Vivantes Humboldt Hospital and the Vivantes Hospital Neukölln are part of these hospitals.

Location: Vivantes Humboldt Hospital/ Vivantes Hospital Neukölln, Berlin, Germany

Client: Vivantes Service GmbH

Services: conveyor systems, AGV, PTS, logisitcs, container washing machines, elevators and maintenance)

The Vivantes Humboldt Hospital and the Vivantes Hospital Neukölln are continuously undergoing site developments regarding enhancements, reconstruction and modernization. The Humboldt Hospital has connected all building with a small conveyor system that

transports clinical goods throughout the whole campus. The introduction of new buildings means that the current supply system needs to be extended which has led to a complete overhaul of the logistics system for clinical goods and the integration into the existing building automation.

The same development is seen at the Hospital Neukölln. The logistics system for clinical goods will be extended and reconstructed. The solution has been replace the existing small conveyor system with a pneumatic tube system and a logistics system for clinical goods .



HOSPITAL NOVA OF CENTRAL FINLAND

Design to support care that meets the patient's needs

A new hospital Nova, planned to be operational in 2020, will be built in Central Finland in Kukumäki, Jyväskylä.

The basis of the hospital design is to support care that meets the patient's needs. The new hospital is designed and constructed according to the Healthy House criteria to ensure a clean and safe environment for all people using the hospital. The hospital is functionally divided into four elements: hot hospital, office, hotel and support.

The hot hospital houses operating theatres, the emergency room, the

intensive care unit and diagnostics.

The office features reception rooms and staff facilities. The beds are in the hotel and the laboratories, equipment maintenance, pharmacy and logistics are in the support facilities.

The goal of the project is to change structural and logistical solutions to enhance the efficiency of healthcare, and to integrate basic healthcare, special health care and social services.

Location: Jyväskylä, Finland

Value: €411m

Gross area: 107,000 m2

Client: Central Finland Hospital District

Services : Project management, site supervision, structural and electrical engineering



OUR PORTFOLIO

SPECIALIST HEALTHCARE PROJECTS

Northumbria Specialist
Emergency Care Hospital



NORTHUMBRIA HOSPITAL

With senior consultants in all medical disciplines on duty 24 hrs a day, this is the first dedicated specialist emergency hospital in the UK

Located on the edge of Cramlington to the north of Newcastle in the UK, this new build facility provides a uniquely comprehensive range of emergency care to patients in Northumbria. Specialist consultants and senior doctors are available at all times to deliver expert emergency diagnostics and treatment to A&E patients. Our structural, geotechnical and civil engineers, along with our environmental consultants, worked on the concept design.

The clinicians' ambition was to create a pioneering facility that focussed on patient pathways, adjacencies, nursing efficiency and sight lines. Through close collaboration the design team from Ramboll and architect Keppie Design worked alongside clinicians to ensure this vision was realised and achieved a column layout that would enable direct lines of travel between wards and central functions therefore maximising efficiency in staff travel. In addition a radial layout, which

allows clear sightlines into each patient room from a central nursing station evolved from direct input by clinical staff during the design process.

At the centre of the development is a three-storey hub, housing laboratories, radiology and operating theatres. The hub is flanked by a series of 'cogs' that house wards on one side, and the entrance and ambulance podiums on the other. A concrete frame solution was specified. The floor slabs vary between 275mm - 350mm in depth, depending on the vibration criteria in specific rooms, with the theatres, MRI and scanner rooms being the most vibration sensitive.

Our work on this project is wide-ranging, and includes intensive ground investigations and the design of a sustainable drainage system. We also contributed to the design of a mounted helicopter pad.

Location: Cramlington, Newcastle, UK

Value: €90m

Client: Northumbria Health NHS Trust

Services: Structural, civil and geotechnical engineering and environmental consulting.



KING KHALID MEDICAL CITY—NATIONAL DIABETIC CENTRE

A state of the art diabetic facility

The new National Diabetic Centre in Riyadh is a state of the art building for diagnosis and treatment of severe diabetic diseases. Designed by C.F.Møller Architects in Oslo, this ultra-modern smart structure, houses general and flexible facilities with state-of-the-art technology. It houses examination facilities and bed wards in addition to laboratories, lecture rooms, auditory and communication centre.

At approximately 15,600m², the building spans across four floors on top of the basement and a ground floor that partially sits below ground level. Ramboll was responsible for conceptual design of all technical installations in the building.

Location: Saudi-Arabia

Client: Samark AB, Malmö

Services: Multidisciplinary engineering services, including: technical supplies and connections, electrical design incl. telecommunications, fire alarm, access control, automation, audio, video, BMS system, generator-sets, UPS and elevators, mechanical design incl. sprinkler system.



NEW CHILDREN'S HOSPITAL

A hospital designed with children for children

The new Children's Hospital in Helsinki, Finland, which was completed in 2018, spans 48,000 m². The hospital's structure has been developed through the meticulous collection of user information including opinions of children and research into the special needs – physical and mental – of hospitalised children and their relatives.

Massive structures were designed to keep noise level down, as children in particular are sensitive to noise. To accommodate children's sensory needs, all visible surfaces are designed to be interesting to look at and feel with your hands, safe to use and easy to clean. Floor heating installed in areas where children are

likely to sit down and play will also create a comforting environment. The building is designed according to the Healthy House principle. The construction project has significantly emphasised humidity and hygiene management in order to ensure that the hospital is safe and healthy for paediatric patients and the staff throughout its life cycle. These key elements were addressed during the design and construction phases through consultation, instructions, material selection, construction monitoring (including the drying of concrete casting) and dust management on the site.

Building Information Modelling (BIM) was incorporated into the

design, enabling employees to view their future workplace virtually and enabling the site to be viewed from child's perspective, creating a hospital that feels as safe and relaxed as possible.

Location: Helsinki, Finland

Value: €183m

Client: Foundation for New Children's Hospital

Services: Structural, mechanical, geotechnical engineering, fire seal design, building physics



ALDER HEY CHILDRENS HOSPITAL

One of the largest specialist children's hospitals in Europe

Alder Hey, situated in the City of Liverpool in the UK, is one of the largest specialist children's hospitals in Europe serving a total catchment population of 7.6m. The hospital is one of only a few with a University Institute of Child Health and one of only two Trust's in the North West of England to be a formally designated provider of children's specialised services. The hospital delivers a wide range of children and young adult services including over 30 sub-specialities configured across 50 departments.

The new hospital cares for more than 275,000 children each year and is the first NHS health park for children in the UK. With a floor area of 51,000 square metres it provides 270 beds, including 48 critical care beds for patients in ICU, HDU and burns, together with 16 digitally enhanced operating theatres. The majority of patients have private, en-suite rooms and within the building's striking atrium there is an indoor tree house

that provides a play and relaxation space for the children.

Designed in consultation with patients and their families, the Prince's Foundation and National Arts for Health, the hospital is the UK's first integrated children's health park and it provides a pleasant healing environment for children, young people, their families and staff. The hospital is within Springfield Park and the majority of bedrooms have natural views and easy access to the park; wards also have access to play decks so that children who cannot leave the ward can benefit from outdoor space.

During the opening event, in 2015, Louise Shepherd, chief executive of Alder Hey, said: "From the beginning we've strived to create a world-class healing environment that will benefit children and young people from across the UK and throughout the world."

Location: Liverpool, UK

Value: €190m

Client: Alder Key Children's NHS Foundation Trust

Services: Structural and civil engineering, technical advisor to the Trust.



HUS BRIDGE HOSPITAL

Bridge hospital, Trauma and Cancer Centre
in Meilahti Hospital Area, Helsinki

The new Bridge Hospital will entirely replace Töölö Hospital's current functions and a part of the current Department of Oncology's facilities as well. The building will be linked both functionally and physically to the existing Meilahti Tower Hospital, the Meilahti Triangle Hospital under construction, and to the sections of the Department of Oncology which will remain in operation. The Meilahti Hospitals will become a combined Tower, Triangle and Bridge Hospital entity.

Location: Helsinki, Finland

Value: €295m

Client: HUS Kiinteistöt Oy

Services: Consortium with Granlund Oy: The design of the HVAC and building automation system, sprinkler system, electricity, data network and security systems, and the design of fixed hospital equipment.

The Bridge Hospital is the largest construction project in HUS' history. The total area of the new building will be 70,000m² with a usable floor area of 36,200m². Laboratory facilities will comprise a total of approximately 210m² of the building. Construction work is scheduled for 2018-2022 and the building will be put into use in 2023.

The implementation method is a collaborative project management project with a target budget, which has assigned the main implementer with qualitative goals and schedule and cost targets. The schedule for the Bridge Hospital has been set based on the chosen method for implementation enabling simultaneous planning and construction. Additionally, construction will occur in sections which will allow for equipment and furnishing to be installed before the completion of the entire building.

The project is using the Big Room working method which brings together designers, clients, users, and contractors. Ramboll will create the project designs with Granlund as a consulting group.



USÖ, HÖGSPECIALITETSHUSET

H-House (building 40) at the University Hospital in Örebro, USÖ, is a strategic investment from the Region, Örebro County.

H-house stands for High specialized house. The project comprises new construction of about 33 000 m² and rebuilding of parts of the emergency unit and at connections to existing buildings. The building includes outpatient rooms, surgery wards including pre and postop and a ward for care such as eye clinic, ear-nose and throat clinic, plastic and maxillofacial surgery clinic, skin clinic and surgery and anaesthesia department.

The project also includes the redevelopment and expansion of emergency department with a completely new department for emergency X-ray.

Visitors/patients will be from the region but because it is a highly specialized care which will be

conducted will also many patients from neighboring counties/regions. Centres are structured with a view to possible future team work as well as the particular healthcare unit where the premises are designed to support the way patient care.

The building is designed for high environmental standards as well as low power consumption meeting Swedish Miljöbyggnad level Gold

Location: Örebro, Sweden

Value: €140m

Client: Region Örebro Län

Architect: SWECO

Services: Design of HVAC-/ cooling-/ tap water and sewage systems, medical gases, telecommunication systems and elevators



Image: White architects



OXFORD PRECISION CANCER MEDICINE INSTITUTE

One of the first Proton Beam facilities to be delivered in the UK

The Oxford Precision Cancer Medicine Institute (PCMI) will be one of the first proton beam facilities in the UK. The UK's National Health Service is currently developing two proton beam centres for treatment of specific cancers. The PCMI will also be a state-of-the-art research facility for Oxford University, which will evaluate the benefits of proton beam therapy for other cancers under the guidance of leading clinicians. PCMI will be equipped with two 360 degree gantries and one fixed beam treatment room. The fixed beam room will be flexibly designed, allowing for the future conversion to a 360 degree gantry system.

The cyclotron, proton beam line and treatment rooms are to be contained within a 48x24m reinforced concrete bunker to contain radiation. The bunker around the treatment rooms is three stories tall to accommodate

the 360 degree gantry system. For radiation shielding, the bunker walls will be up to 4m thick, and in critical locations magnetite concrete (3800kg/m³) will be used to reduce the required shielding thickness. To minimize the footprint of the bunker the project will also use direct entry radiation shielded sliding doors rather than a traditional 'maze' type entry.

The proton beam process has a huge demand for power and water and it is envisaged that up to 12km of conduit and services will need to be embedded within the bunker walls. Rigorous coordination will be required involving the Radiation Protection Advisor (RPA), the equipment provider, the concrete frame contractor, the building services engineers and the structural engineers to achieve a viable solution. Outside of the bunker a four storey building will be constructed

following the Laing O'Rourke Design for Manufacture and Assembly (DfMA) approach to construction. We are also solving other significant structural challenges including the proton beam equipment's strict differential settlement criteria, which are approximately 10 times more onerous than those for a 'standard' building, the stringent vibration requirements for the laboratories on the upper floors of the building, and accommodating the cyclotron; a particle accelerator, at just 4.4m in diameter, weighing 220 tonnes.



Location: Oxford, UK
Value: €45m
Client: Laing O'Rourke
Architect: Stantec
Services: Structural, civil and geotechnical engineering, specialist vibration analysis, flood risk assessment, hydrogeological study, contaminated land assessment.



DANDERYD HOSPITAL

New building that houses surgery, intervention and radiology

Ramboll is responsible for delivering the structural and ground engineering solutions for this new hospital building covering 28,000sqm. The facility will carry out operation and interventions and spans over seven floors, including culvert and roof. In total, around 14 operating rooms, 5 rooms for interventional activity, a sterilization centre and radiology inclusive of 3 MRI scanners, is accommodated in the new hospital building. In addition, some parts of the neighboring existing facilities will be rebuilt. The hospital also includes an indoor AE department for 5 ambulances.

radiology, putting high demands on the structure, where we also have to consider freight capacity and the ability to handle vibrations and prevent contamination.

Ramboll's global experience of designing hospitals and research facilities brings extensive expertise when designing sensitive environments. We deliver solutions that are both robust and flexible, in order to meet future healthcare needs and technical innovations.

Location: Stockholm, Sweden

Value: €175m

Client: Locum AB

Services: Structural and ground engineering.

The Danderyd Hospital will house incredibly sensitive medical equipment for intervention and



GLOSTRUP HOSPITAL

New neuro rehabilitation building

Glostrup Hospital is the most specialized hospital of the Capital Region, in Denmark, within neuro rehabilitation treatment. The new neuro rehabilitation unit will form the unique setting of treating patients in a highly specialized and interdisciplinary level, in an environment that helps increase the quality of life of patients. The unit brings together for the first time, the treatment of patients with traumatic brain injuries, spinal cord injuries and severely injured patients with complex brain damage caused by stroke, hypoxia, poisoning and encephalitis.

The vision for the new neuro rehabilitation building is for the clinical unit to become one of the world leading units within neuro-rehabilitation therapy. The new building and surrounding outdoor facilities will as such not only frame the daily rehabilitation purpose but also facilitate research and development in a highly specialized and international context. This will support

innovative therapy development, making use of new technologies and exploring new ways of working across the healthcare sectors.

The new building will include 125 single patient rooms and close integrated training facilities supported by advanced rehabilitation technologies. The building will include a hot water swimming pool, gymnasium as well as exterior garden facilities for training and recreation. The hospital unit will also include outpatient and research facilities, as well as offices, logistic and service functions.

Location: Glostrup, Denmark

Value: €56m

Sub consultants: Friis & Moltke, Bruunsgaard & Laursen

Design team: AART Architects A/S and Nordic Office of Architecture

Services: Client consultancy services.



KEY HEALTHCARE CONTACTS

DELIVERING INSIGHTFUL SOLUTIONS

We have an active healthcare network within Ramboll that fosters continual learning, best practice and innovation. We meet quarterly in different locations, where we carry out project site visits to enhance our learning experience. This approach ensures we continue to deliver insightful solutions for our clients.

Our healthcare experts are drawn from varied backgrounds, including buildings and business management, operation and change management, procurement, finance and project management, information technology, engineering, architecture, safety and risk management.

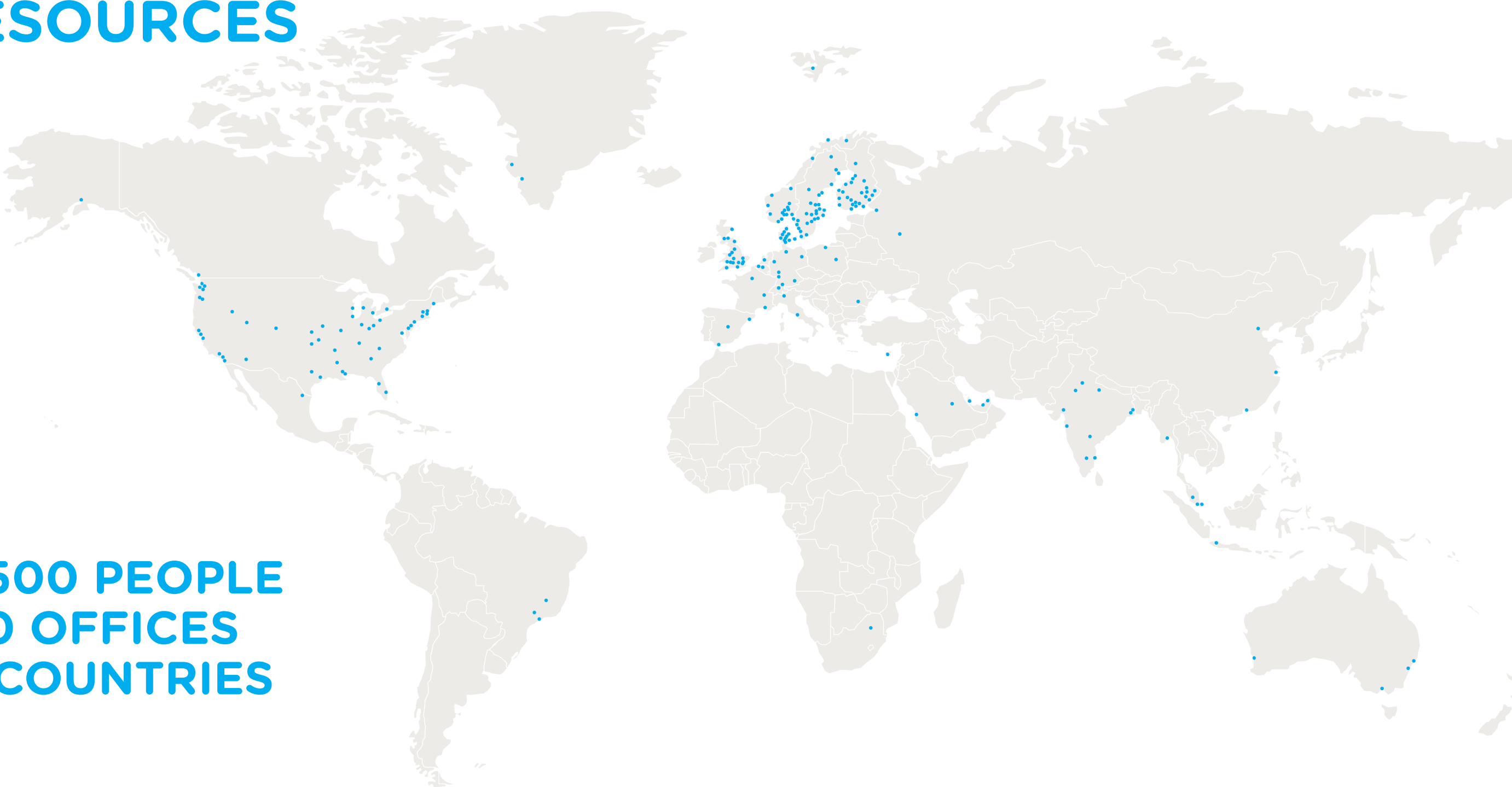
Their complementary skills, combined with the experience we have acquired over more than 40 years as healthcare consultants provides us with thorough technical knowledge as well as strong networks in the healthcare market.

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PEOPLE AND RESOURCES

16,500 PEOPLE
300 OFFICES
35 COUNTRIES



Ramboll has 16,500 experts across the Nordics, North America, the UK, Continental Europe, Middle East and India, supplemented by a significant representation in Asia, Australia, South America and Sub-Saharan Africa.

Ramboll provides consultancy in the areas of Buildings, Transport, Environment and Health, Water, Energy and Management Consulting. From this service platform we can draw on skills from each area to deliver the multidisciplinary approach and creative thinking that each client seeks.

Foundation ownership empowers long term perspective

Ramboll Group A/S is owned by the Ramboll Foundation. As well as being financially strong, our foundation ownership provides us with the freedom to employ a long term perspective. We always strive to provide the best advice for our clients and society at large.

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