CREATING LASTING CONNECTIONS THROUGH RAIL

WWW.RAMBOLL.CO.UK/RAIL
Ramboll is a leading engineering, design and consultancy company employing 13,000 experts. Our presence is global with a strong representation in the Nordics, UK, North America, Middle East and Asia-Pacific. We constantly strive to achieve inspiring and exacting solutions that make a genuine difference to our customers, end-users and society as a whole. www.ramboll.com

BUILDINGS
Buildings form a fundamental part of our lives by shaping our communities and daily activities.

For these reasons, Ramboll’s design philosophy is to always make room for the human experience. As one of Europe’s top 3 buildings designers with decades of experience in the global market, we create visionary, sustainable, and award-winning buildings that improve life for users and enhance the surrounding landscape. Read more at www.ramboll.com/buildings

TRANSPORT
Mobility fuels economic and social development and with 50% of the world’s population now living in urban areas, efficient and reliable transport systems are essential.

To meet this need, Ramboll has been working on some of the world’s largest, most innovative infrastructure projects and is the leading consultancy in the Nordic market. We create value for transport authorities, contractors and local authorities by providing multidisciplinary technical excellence and minimising resource usage. Read more at www.ramboll.com/transport

ENVIRONMENT
Industrial development, urbanisation, the extraction of natural resources and extreme weather events all call for sustainable and responsible environmental solutions.

As the leading environmental consultancy in Northern Europe and one of the top-20 globally, Ramboll’s environment experts help customers across the mining, water, buildings, transport, energy, and oil & gas markets to address these issues. We take a comprehensive view of each project to optimise every step of the process and deliver solutions that are technically resilient, environmentally sustainable, and valuable to society. Read more at www.ramboll.com/environment-and-health

ENERGY
Security of power supplies, climate change, energy efficiency and resource scarcity are top priorities on the global agenda.

Ramboll is at the forefront of addressing these issues as the global market leader in offshore wind, waste-to-energy and district heating consulting and the leader in Scandinavia for large-scale thermal power consulting. We also have a specialist competence in designing power transmission masts and offshore wind mat masts. Read more at www.ramboll.com/energy

WATER
Water is essential to life and one of our most precious resources. Working with municipalities, utilities, and industrial clients, Ramboll draws on proven multidisciplinary expertise to manage the most challenging water resources, wastewater, and storm water issues. We integrate treatment process selection and engineering, operational services, and regulatory management and planning to deliver innovative solutions that benefit both industries and society. Read more at www.ramboll.com/water

PLANNING & URBAN DESIGN
Ramboll’s holistic approach to urban development encompasses strategy, planning, and world class technical design services and is based on an integrated multidisciplinary skills base.

We have an extensive track record working with a number of the world’s largest cities to create liveable, sustainable, and implementable urban development solutions that are fully adapted to the local context. Read more at www.ramboll.com/planning-and-urban-design

OIL & GAS
To make it in today’s fast paced and competitive oil and gas market, companies depend on advanced technical solutions that combine economic efficiency with stringent health, safety and environmental (HSE) safeguards during the production and distribution processes.

These elements form an integral part of Ramboll’s independent and multidisciplinary consultancy service, which covers the entire project cycle. We excel in onshore consultancy and have designed offshore structures for industry giants such as Maersk Oil, DONG Energy and StatOil since the 1970s. Read more at www.ramboll.com/oil-gas

MANAGEMENT CONSULTING
National, regional and local authorities are responsible for issues that affect us all; from health care, education and day care to strategic planning of infrastructure and climate initiatives.

Drawing on 500 management experts, Ramboll acts as a trusted partner to public administrations, creating the insights needed to make informed strategic decisions that promote stronger societies.

With unprecedented levels of competition in the global economy, Ramboll focuses on empowering private sector customers with expertise and powerful management tools. Read more at www.ramboll.com/management-consulting

RAIL SERVICES
We provide design, consultancy and management services for a complete range of rail-based systems, from high-speed railways to urban transport systems, such as metro and light rail. Our technical expertise within the rail consultancy comprises civil engineering infrastructure including viaducts, bridges and tunnels, stations, depots, control centres, signalling, permanent way, electrification and telecoms; as well as traffic management and rolling stock.

13,000 PEOPLE
300 OFFICES
35 COUNTRIES

BUILDINGS
Transport
Environment
Energy
Water
Planning & Urban Design
Oil & Gas
Management Consulting
Rail Services
RAIL
ABOUT US

Ramboll designs excite clients, impress operators and contractors, inspire travellers and deliver value to all. With a long history in delivering innovative engineering solutions, we work across all phases of a project from inception through design, construction and into operation and maintenance stages.

Our expertise
We bring technical capabilities that encompass the design and delivery of major infrastructure. Our rail experts are drawn from varied backgrounds and have worked on numerous Early Contractor Involvement (ECI) and Design & Build (D&B) schemes as well as with railway authorities and operators. We have a full appreciation of the whole life cost, safety and buildability coupled with managing the different needs of all stakeholders and are leaders in bringing these together into insightful designs.

Our technical expertise within the rail consultancy comprises: civil engineering infrastructure including viaducts, bridges and tunnels; stations, depots, control centres; signalling, permanent way, electrification and telecoms; as well as traffic management and rolling stock.

Our portfolio
Our clients span all major stakeholders in the rail market and so we have acquired a unique understanding of the different needs, which gives us a valuable insight into finding solutions suitable for all. This is strongly reinforced by our long-term contractor relationships that has enabled buildable solutions to be delivered on time and budget.

Our impressive track record of delivering major projects includes: the Bermondsey Dive Under which is part of Network Rail’s ThamesLink Programme; key roles on HS2 for the Enabling Works on phase 1 and the civil engineering and environmental design development for phase 2b; new Crossrail stations at Paddington and Custom House for the interchange with Docklands Light Railway, and project management and technical support for Network Rail’s Digital Railway Programme as their delivery partner.
OUR SERVICES

GLOBAL KNOW-HOW WITH LOCAL INSIGHT

Our comprehensive multidisciplinary capability enables us to provide a wide range of specialist engineering services to the rail sector including planning, feasibility, design and construction management. By applying our vast experience of local, national and international projects, we are capable of delivering competitive and integrated holistic solutions that are tailored to local conditions and are fully compliant with necessary standards.

Major Infrastructure
We are an acknowledged leader in major infrastructure. Our designs draw on our practical experience gained from a variety of civil and structural engineering schemes that cover all stages in the project lifecycle. This coupled with our detailed knowledge of the technical issues related to the interfaces between major civil engineering infrastructure and rail systems enables us to provide the optimal customised solution to satisfy the requirements of each project.

Renewals and Enhancements
We have in-depth knowledge of renewal and enhancement projects, with a focus on improving the procurement process to secure maximum funding and applying engineering innovation throughout to maximise the value of any given project. Our experience means that we know how to design solutions that achieve all necessary approvals while also minimising changes during the execution phase.

Stations and Depots
We have extensive experience in the planning, design and construction of stations for heavy, light rail and metro. Our solutions draw on our expertise from both traditional engineering and specialist technical disciplines such as Design for Manufacture and Assembly (DfMA). These combined with our collaboration with specialist station architects provide innovative solutions for our clients.

Rail Signalling and ERTMS*
Ramboll has market leading expertise in ERTMS including the design and specification of the world’s first nationwide resignalling programme in Denmark.

In spring 2017 Ramboll was commissioned by Network Rail to provide project management and technical support for their Digital Railway Programme as their delivery partner for the next two years.

In April 2018 we welcomed signalling design consultancy, DEG Signal Ltd, into our team, further strengthening the depth of expertise we offer our clients.

CUSTOM HOUSE STATION
As the Contractor’s lead consultant, Ramboll led completion of the contractor’s design at Custom House, working closely with Crossrail to integrate the project’s complex needs into the detailed design. Image: Crossrail Ltd

*ERTMS - European Rail Traffic Management System
OUR SERVICES

High Speed Rail
We draw on the combined expertise of many different disciplines to provide holistic consultancy services for high speed rail from the very early phase studies through to the detailed design. In the UK we are pleased to have secured key roles on the Enabling Works for High Speed 2 (HS2) Phase 1 and on the prime lot for civil engineering and environmental design development on HS2 Phase 2b. Furthermore our track record in Denmark, Sweden and Norway demonstrates our ability to assist decision-makers in developing the right strategies, identifying the optimal route alignments and undertaking all assessments required to support their high speed rail programmes.

Light Rail
Working for clients such as Solent Local Enterprise Partnership (LEP) on the proposed Solent Metro, Ramboll has provided environmental and engineering expertise to support early stage development of strategic business cases. We have also worked across numerous cities on light rail projects covering all aspects of infrastructure, systems, rolling stock as well as operations and maintenance of a light rail system.

In 2014, we established the Light Rail Competence Centre in Karlsruhe, Germany that has supported projects in the UK, Netherlands and Scandinavia.

Tunnels, Portals and Shafts
Underground railways present significant engineering design issues regarding safety and compatibility. Our design experience has supported the development of major railway tunnels for structural, mechanical, electrical and public health services within the tunnels and intervention/escape shafts. We have worked to provide high and low voltage electrical distribution, ventilation for general and emergency use, electromagnetic compatibility control and coordination, earthing systems and safety of services installations.

Rail Safety
Safety on the railway is paramount. We ensure our solutions meet the safety demands of each project’s requirements and have advanced tools, specifically adapted for the rail safety approval process, which is an integral part of our project delivery. Our safety considerations are integrated into the Reliability, Availability, Maintainability and Safety (RAMS) framework and we are accredited CSM (Common Safety Method) assessors.

Rail Freight Planning
We have specialists in the field of rail freight logistical master planning. Our specialists provide advice on rail freight terminal specification, and on a number of factors that impact on the requirements of a terminal. Our assessment provides advice on gate capacity, internal roads, cargo handling tracks and shunting arrangements.

HOLMESTRAND
Holmestrand Station in Norway is the world’s first mountain station. Image: Katinka Hustad.
OUR APPROACH

UNWAVERING FOCUS ON SAFETY AND INNOVATION

We use our unwavering focus on safety, together with our collaborative nature and expertise in bringing innovative designs to deliver safe, sustainable and progressive rail solutions.

Delivering safe environments
Safety is fundamental to the way we work. It forms a natural part of our design process, with safety in buildability, usability and maintainability considered throughout. Our approach ensures we remove or minimise risk through design.

We are experienced in supporting clients in delivering on the safety requirements specified by rail authorities, such as the Common Safety Method (CSM) and the Technical Specifications for Interoperability (TSI’s) which form the basis of rail safety processes and documentation. We regularly help to align project processes and perform the independent assessment as required by the CSM regulations.

Our general commitment to safety together with our cooperation with authorities, assessors, Notified Bodies, operators and railway undertakers ensures we bring complete focus on delivering safe rail environments.

Innovation and Technology
Ramboll brings a strong focus on developing innovative approaches and exploring the use of the latest technology. We ensure our innovative solutions achieve project objectives and bring about programme benefits through designs that can be readily constructed. We enjoy combining our rail know-how with expertise in other fields to introduce new approaches that solve complex project demands.

We bring deep experience in the use of BIM to bring added value to our projects. We regularly work on multi-discipline projects involving multiple organisations and know how to deliver a coordinated scheme through collaborating in the BIM environment.

The digitisation of railways is high on the agenda for railway stakeholders. Working in collaboration with Network Rail to help shape the future plan for the Digital Railway, we have used innovative approaches to design two of the fourteen control centres, in Basingstoke and York.

We use our focus on innovation and technology to achieve value for our clients as well as improved outcomes for end-users and society as a whole.
Network Rail’s Bermondsey Dive Under is critical to the successful delivery of the Thameslink project, which will provide 24 trains per hour through the Thameslink core. The project involves the design of a new grade-separated junction at Bermondsey to minimise conflicting crossings on the eastern approach to London Bridge Station with a series of new structures constructed along the line of existing operational railway viaducts. Wherever possible, existing structures are being reused to reduce disruption and waste.

Ramboll’s key innovation on this project was to propose a pre-cast arch solution as an alternative to the reinforced in-situ concrete portals solution proposed in the outline design stage. The pre-cast arches are a novel approach that reduced the demolition, de-risked the blockade and reduced the number of piles required by about 50% to only 900 piles leading to significant cost savings and reduced embodied carbon. Following the success of this project a similar approach has been used elsewhere by the client.
01 BERMONDSEY DIVE-UNDER
The award winning Bermondsey Dive Under is a key component of the final stage of the Thameslink project to rebuild London Bridge station, one of the UK’s busiest stations that regularly suffers delays. The new section allows Thameslink lines to cross the Kent lines unimpeded on the eastern approach to London Bridge tackling the notoriously congested Bermondsey area. Ramboll along with our partners undertook the outline and detailed design, and implementation of the strengthening works to existing structures and design of the Bermondsey Dive Under. Already the project has won the ICE London, CEEQUAL and Ground Engineering awards. Image: Daniel Shearing.

02 RICHMOND STATION
DEG Signal, part of Ramboll, assessed options for the fitment of alternative train protection warning systems (TPWS) on the Richmond Branch for London Overground. The feasibility report informed the site survey requirements and then the signalling scheme plan. The associated documentation and ETE Form A were developed for Signalling, ETE and E&P assets.

03 PADDINGTON STATION
Crossrail is delivering a new railway which will be known as the Elizabeth line and will have the capacity to carry 200 million passengers a year once complete. As part of the new line, a new station is being built at Paddington, alongside Brunel’s original building, incorporating 250m long platforms and taking the form of an underground box (265m long x 25m wide x 25m deep). Ramboll are providing multidisciplinary services as part of the Contractors Design and Build contract including: civil, structural, geotechnical, urban realm and highway design, security (blasts) and façade engineering. Image: Crossrail Ltd.

04 CUSTOM HOUSE STATION
Custom House is located in East London, only one stop from Canary Wharf. As the Contractor’s lead consultant, Ramboll led completion of the contractor’s design at Custom House, detailing the novel concept of using an exposed precast concrete structural frame solution developed using Design for Manufacture and Assembly principles. Ramboll also provided multidisciplinary design services while working closely with Crossrail to integrate the complex project’s developing needs into the detailed design. Image: Crossrail Ltd.

We have an impressive track record on major projects from the Copenhagen Metro Circle Line – the largest ever rail project in Denmark, to High Speed rail and bringing global expertise in ERTMS to help shape the future of the UK railway.
### World Class Projects

05 **NEW UK HIGH SPEED ENTRY HS2**
Ramboll is delighted to be supporting several packages of works on High Speed 2. We are supporting the Enabling Works across the Northern and Southern sections for Phase 1 and are part of the team acting as the Engineering and Environmental Overview Consultant on Phase 2b, providing civil and environmental engineering services for the East Midlands to Leeds and York section of the high speed line, as well as delivering an Environmental Statement for the whole 270km route.

06 **BASINGSTOKE CAMPUS**
Network Rail’s Basingstoke Campus is one of 14 centres to be constructed in the UK to provide modern signal control of the rail network and replace more than 800 life expired signal boxes. Ramboll provided consultancy services across eight separate disciplines for the detailed design. Particular challenges were the long structural spans required to create an internal signalling training track and the resilient mechanical and electrical infrastructure necessary to support mission-critical activities, as well as a single span pedestrian bridge across the Southampton-Waterloo line.

07 **EUROPE’S LARGEST RE-SIGNALLING SCHEME**
Ramboll is heading the consortium designing and planning the national rollout of the European Rail Traffic Management System (ERTMS) in Denmark which is due for completion in 2021. The introduction of a common ERTMS throughout Europe aims at improving the connectivity between European cities and capitals and allow for seamless travel within the EU. Denmark will be the first country in Europe to upgrade its entire signaling system to ERTMS at once with its entire train network being maintained throughout the roll-out of the re-signalling scheme. Image: Stig Munck.

08 **DIGITAL RAILWAY PROGRAMME**
Ramboll secured a pivotal role on the Delivery Partner (Systems) team and will be working with Network Rail and its partners to help shape the Digital Railway programme ready for implementation. The team will be leading the development of the Digital Railway Toolkit and spearheading the creation and set-up of the Digital Railway Academy. We will bring our global expertise gained on the Danish re-signalling programme, Norwegian ERTMS programme and several other ERTMS schemes to bear in securing benefits in safety, punctuality, capacity and an enhanced customer experience.
09 TRONDHEIM HIGH SPEED RAIL LINE
Ramboll has been appointed to identify the best options for a possible future high-speed rail service between Oslo and Trondheim in Norway to support the Norwegian National Rail Administration application for a parliament decision to build a new rail line between the two major cities. Preliminary work has been carried out including assessing a range of alternative routes and analyzing their potential while considering risks, logistics, operational limitations, and construction.

10 HOLMESTRAND STATION
The recently opened Homestrand Station in Norway is the world’s first mountain station. The new fourteen-kilometre double track through the city of Holmestrand will greatly improve rail services on the Vestfold line. Ramboll was responsible for the design of seven kilometres of the line as well as Holmestrand Station. The entrance hall allows high-speed trains to pass at 250 km/hour, with special emphasis placed on safety, ventilation, noise, and wind speed.

11 CROSSRAIL INTERVENTION SHAFTS
Ramboll is working with Weston Williamson and Partners to undertake the detailed design of the mechanical, electrical, and public health services for three of the five intervention shafts being delivered by the Crossrail project in London, including Limmo Peninsula, Stepney Green and Fisher Street. Ramboll is responsible for the integration of the building services elements of the shafts, requiring regular interaction and coordination with designers for other disciplines and the specialist system-wide contractors. This complex process includes the management of individual space and access needs for the specialist equipment requirements within a constrained space, including for example, communications systems, bulk power, high-voltage switchgear, electrical distribution, and ventilation.

12 DOHA METRO GREEN LINE
Ramboll provided design verification services for the Doha Metro Green Line. The Qatar Railways joint venture appointed Ramboll as the Design Verification Engineer (DVE) for their works, which comprises six underground stations, two switch boxes, escape shafts, and 18.7 km of connecting bored tunnels. Ramboll has provided a core team locally representing each of the required disciplines, supported by specialists from other parts of the Ramboll Group.