

HERITAGE PROFILE



RAMBOLL

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ABOUT RAMBOLL

Ramboll is a leading engineering, design and consultancy company at the forefront of innovation. From across 200 offices we apply our engineering skills and passion to a wide range of projects around the world



Ramboll provides consultancy in the areas of Buildings, Transport, Environment, Energy, Oil & Gas 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.

The core values of Ramboll reflect a **strong commitment towards sustainable development**, always seeking to improve the working and living conditions of people with our design solutions.

Combined with **our drive for excellence**, we are in a strong position to deliver solutions which work for everyone.

Throughout its history Ramboll has **received many prestigious awards** which recognise the innovative and technical skills of our team.

Ramboll is long established and financially strong, structured for longevity through the Ramboll foundation ownership. Our team of **10,000 dedicated specialists share knowledge globally**, applying their expertise and enthusiasm on projects at a local level that benefit both people now and future communities.

"GONE ARE THE DAYS WHEN LISTED BUILDINGS WERE PUT IN A GLASS CASE. **OUR HERITAGE MUST BE ACCESSIBLE.** PEOPLE HAVE TO SMELL AND TOUCH IT TO **UNDERSTAND AND CONNECT.**"



HERITAGE

Ramboll has engineers and archaeologists that specialise in managing the historic environment

Working with historic buildings and environments requires **specialist knowledge and a sensitive approach**. Understanding the value of the fabric of historic assets is an important requirement for engineers dedicated to this field. **Offering the integrity upon which those who care for heritage structures and places depend**, our specialists have contributed significantly to the successful conservation, protection and adaptation of internationally important structures and landscapes.

Ramboll's engineers and archaeologists provide services that enable the successful protection and regeneration of historic environments. These include structural conservation engineering and specialist building services consultancy.

An understanding of current legislation and the principles of conservation best-practice are essential for the successful repair, alteration and adaptation of historic buildings and infrastructure.

Our heritage specialists tackle projects holistically, integrating expertise from various other in-house specialists in the investigation of the range of potential inherent risks.

Our engineering interventions in historic contexts – such as Chiswick House Gardens, the Household Cavalry Museum and the Tyntesfield estate in Somerset – combine elegance, honesty and subtlety.

We strive to integrate modern building services seamlessly and sensitively into building fabric, and we have provided energy strategies for some of the UK's most significant historic estates.

Our engineers include people who are Conservation Accredited, IHBC registered and active in recognised national and international heritage bodies such as ICOMOS and the Association for Studies in the Conservation of Historic Buildings.

'True conservation is a vocation: to work on a building and leave no mark is something learnt through commitment'

HOUSEHOLD
CAVALRY MUSEUM
Exterior of museum
- photography by
James Brittain

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CHRIST CHURCH
COLLEGE LIBRARY



UK PROJECTS

SOMERSET HOUSE

Ramboll has been involved in the reinterpretation of this 18th century London landmark for fifteen years

Project Description

Somerset House is one of London's most important eighteenth century buildings. Over the last fifteen years it has been transformed from an unloved records office to a major centre for arts, culture and education, operated through a number of stakeholders. Ramboll has been an integral part of this change.

In the late 1990's Ramboll undertook archaeological investigations and engineered the changes to the east and south wings, creating the Courtauld Galleries, housing the Gilbert Collection, strengthening floors to take exhibition space and re-servicing to replace the defunct building systems.

Through the 2000's the company helped create the Joint Education Centre and re-landscape the Great Courtyard with its celebrated fountains. In the 2010's it undertook the sensitive refurbishment of the east wing to provide flexible, modern education space fit for a new generation of students. At every stage circulation has been improved and impedances to disability overcome: elegant ramps cross the light wells, stone cantilever stairs were load-tested to prove escape routes. The company even designed the base for the courtyard's Christmas tree and the fixings for the Film 4 open air film screenings.

SOMERSET HOUSE
[View of courtyard](#)

LOCATION

London

CLIENT

Somerset House Trust,
Kings College London

ARCHITECT

NA

VALUE

£30m

COMPLETION DATE

2012

ENGINEERING SERVICES

Ground investigation,
structural engineering,
mechanical and electrical
services engineering,
archaeological assessment
and watching brief



WELLS CATHEDRAL

One of the finest Gothic cathedrals in England, Wells has undergone a major development programme to enhance its cultural and visitor facilities

Project Description

The project was delivered in four phases and staggered over three years. The new facilities include an intricate new restaurant and bookshop, choir practice rooms and education suite, a new boiler house and a substantial new works department to house the Clerk of Works and resident stonemasons. Two new openings through medieval walls now provide access to the Chapter House undercroft, where new exhibition space has been created under the existing medieval vaulting.

The engineering challenges involved were substantial:

- Most of the buildings are designed to raft over or accommodate the site

archaeology, including a large medieval culvert taking high flows from St Andrew's Well

- The restaurant building contained within the former Mary Mitchell Garden was spatially condensed in order to fit within a very tight site
- There is a seamless interplay between medieval and modern elements of fabric throughout the buildings, and this complex architecture evolved through considerable dialogue with the client and other specialists
- Magnificent new oak frames were developed for the buildings

WELLS CATHEDRAL

The cathedral and its new facilities

LOCATION

Wells, Somerset

CLIENT

The Dean and Chapter of Wells Cathedral

ARCHITECT

Purcell Miller Tritton

VALUE

£6m

COMPLETION DATE

2008

ENGINEERING SERVICES

Structural engineering, building services engineering, drainage design, thermal modelling



PALACE OF WESTMINSTER SETTLEMENT REMEDIATION

We acted as lead consultant for the investigation and repair of settlement damage to the steps and floor of historic Westminster Hall

Project Description

Westminster Hall in the Palace of Westminster was founded in 1097. The whole building is Grade I listed and forms part of the Westminster UNESCO World Heritage Site.

The Hall's grand southern steps and some areas of floor had suffered from considerable ongoing settlement and our specialists were appointed to investigate the causes, consider repair options and recommend remedial measures.

Non-destructive surveys, including the use of radar, preceded careful lifting of the floor's flagstones for geotechnical investigations.

The ground under the floor was strengthened using injections of a stiff cementitious grout at pressure locations.

Our approach was designed to permanently arrest settlement and ensure measurable and minimal impact on the historic fabric and the archaeology. We also developed an archaeological mitigation strategy that included two excavation trenches, six geo-archaeological cores and recording of historic fabric exposed during dismantling of the floor and steps. One of the excavations revealed pieces of Purbeck marble trestles from the long-lost King's Table.

WESTMINSTER HALL
Trench A: part dismantled step view

LOCATION

London

CLIENT

Parliamentary Works
Directorate

ARCHITECT

NA

VALUE

£1m

COMPLETION DATE

2006

ENGINEERING SERVICES

Lead consultant structural engineer, geotechnical engineering, heritage and archaeology



CROSSRAIL ARCHAEOLOGY WEST

Ramboll Cultural Heritage and Archaeology are delivering archaeological services through contract C254, as part of the construction of Crossrail, London's next underground railway

Project Description

In 2010 Ramboll, in partnership with Oxford Archaeology, were awarded the contract to provide archaeological services during the construction of Crossrail's underground section between Royal Oak in West London and Tottenham Court Road in the West End. We are also responsible for Old Oak Common in Acton, Ilford Depot on the Great Eastern Main Line and Wallasea Island in Essex. One of our most significant discoveries has been the fragmentary remains of bison and reindeer whose carcasses were washed downstream 75,000 years ago when the Westbourne was a treacherous fast-flowing river carrying icy meltwaters.

In keeping with the theme of railway construction we have also revealed the remains of Isambard Kingdom Brunel's and Sir Daniel Gooch's locomotive sheds and workshops at Westbourne Park. These were constructed in 1852 to serve the fast-growing GWR terminal at Paddington, and were replaced in 1906 by George Jackson Churchward's magnificent maintenance depot at Old Oak Common. We have now entered a phase of setting down our research and discoveries on paper for publication in book form by Crossrail in the near future.

**CROSSRAIL C254
ARCHAEOLOGY WEST**
On-site consultancy

LOCATION

London

CLIENT

Crossrail LTD

VALUE

Confidential

COMPLETION DATE

2016

ENGINEERING SERVICES

Archaeology consultancy



BISHOPS PARK AND FULHAM PALACE RESTORATION WORKS

Ongoing archaeological recording and restoration programme supervision of the structures and grounds in Grade II listed Bishops Park

The London Borough of Hammersmith and Fulham received a substantial grant from the Heritage Lottery Fund (HLF) to invest in Bishops Park and Fulham Palace. This has been used as part of an £8m improvement programme to revive the park. Our archaeological consultants were commissioned to develop the cultural heritage and archaeology elements of a Stage 2 HLF application, including design and implementation of the archaeological mitigation strategy based on an assessment of heritage constraints, risks and opportunities.



LONDON ARRAY MARINE ARCHAEOLOGY

London Array Limited Retained Archaeologist: works in the marine environment

The London Array, the world's largest offshore wind farm located in the outer Thames Estuary more than 20km off the Kent and Essex coasts, is now complete and operational. It incorporates 175 turbines over approximately 100km². Ramboll holds the post of Retained Archaeologist for the project. This role requires the provision of specialist consultancy services for the design and management of archaeological works, both onshore and offshore. This involves marine geophysics, geotechnical works, and advice on the design implications of the development in relation to marine sites and submerged archaeological landscapes as well as land-based archaeological sites.



STOKE QUAY, IPSWICH

Ramboll Cultural Heritage and Archaeology design and manage the archaeological mitigation phase of a major redevelopment

Part of the work was a major excavation which revealed two cemeteries. Whilst that of St Augustine's was expected, a group of 7th- and 8th-century graves beneath barrows was hitherto unknown. In total, over 1,000 burials were excavated.

Whilst Saxon burial grounds are not uncommon in Ipswich, their excavation has been largely confined to areas north of the river. Here, at the historically outlying Stoke, the dozen or so barrows were probably intended to be seen from the nascent town on the opposite bank of the Orwell.



YORK TRIANGLE INDUSTRIAL ARCHAEOLOGY

Reconciling substructure engineering with preservation of monuments to the steam age

Ramboll was appointed by BAM to provide consultancy services for the design and construction of a combined campus site for two Network Rail facilities known as the 'York Engineers' Triangle', adjacent to York Station.

A key achievement in delivering this complex project was to accommodate the preservation in situ of significant archaeological remains in the design. Ramboll's archaeologists undertook a proactive and detailed assessment of sub-surface survival of archaeological assets to enable effective management of planning risk.



THE IRON BRIDGE, SHROPSHIRE

The pioneering study of a pioneering structure

Project Description

The Iron Bridge was built in 1779 to a concept proposed by Thomas Pritchard, but was completed through the commitment of pioneer iron founder Abraham Darby III. It is the world's first iron bridge and lies in a UNESCO World Heritage site.

Ramboll was appointed in 2013 to undertake the modelling, analysis and assessment of the structure. The project was informed by a comprehensive laser scan undertaken a year earlier to specifications for which Ramboll had previously provided advice. The work included a comprehensive desk study of the history of structural defects and performance.

The study and engineering solid modelling were undertaken in parallel, and the results of the study used to inform the analysis that followed. Point cloud data from the scans was pivoted into a surface model, which represented the bridge components as unique members, each with different cross-sections and sizes, to match the variable castings. Detailed non-linear finite element analysis was conducted. The assessment was carried out after careful consideration of the material properties using, amongst other data, results from mechanical tests performed in the 1960's. The result is a pioneering study of one of the world's most iconic structures.

LOCATION

Shropshire

CLIENT

English Heritage

VALUE

£50k

ENGINEERING SERVICES

Conservation engineering, advanced engineering analysis



TEMPERATE HOUSE KEW GARDENS

Our client Royal Botanical Gardens, Kew, was faced with repair of the magnificent, but aging, assembly of glasshouses that form the Temperate House.

Project Description

Last restored in the late 1970's, the paint systems had failed widely, window mechanisms broken and the glass itself was etched with dirt and deposits. The Temperate House was built between 1860 & 1897. It is listed Grade I and is located within the UNESCO World Heritage site at Kew. Built of cast and wrought iron and early steel, it is a case study in the development of Victorian engineering structures.

Ramboll was appointed late in the project, in June 2013, taking on the work from at RIBA Stage C after the main team had been engaged for some time. The company has taken the role of both lead

consultant and structural engineer. At Ramboll's instigation, a major survey of ironwork was immediately undertaken to identify the extent of corrosion and decay, using one of the largest access platforms available in the UK, which itemized the defects and achieved a detailed diagnosis for repair. The survey reports were turned into an extensive series of drawings that defined the contract works. The project includes provision of an education Centre with flexible class areas. This is designed to help school numbers to increase by a remarkable 90,000 per year over the next 4 years, consolidating Kew's role as a world class educational establishment. The Centre is provided outside the main Temperate House.

LOCATION

London

CLIENT

Turner and Townsend

COMPLETION

2018

VALUE

£20m

ENGINEERING SERVICES

Lead Consultancy, Conservation Engineering, Façade Engineering, Drainage



LOWTHER CASTLE

The castle ruins and stables range have been conserved and repaired to allow public access to this impressive historic site

Project Description

The present castle and the associated buildings were designed by Sir Robert Smirke and built in 1806 for the Fifth Earl of Lonsdale. It was abandoned in 1936 and although listed Grade II*, had deteriorated to the point where it was on the English Heritage at Risk list.

The two-storey stable courtyard has now been converted into a visitor centre, café, offices and holiday apartments. The first phase of the castle ruins has been conserved and stabilised. Repair and fitting out of the sculpture gallery continues together with the second phase of castle ruins, while the gardens are an ongoing project.

No safe access was available until the project was on site, when detailed surveys of the buildings confirmed the extent of deterioration.

In the stables, a range of timber repairs was developed. Some areas required strengthening for new uses, and new staircases and lifts were inserted within the historic fabric.

In the castle itself the requirement was for structural support to be concealed, leaving the stark silhouette of the ruins. Ramboll worked closely with the masons to develop bespoke solutions utilising non-ferrous anchors, stitching and supports.

LOWTHER CASTLE

Aerial photo during phase 1, courtesy of Lowther Castle and Gardens Trust

LOCATION

Penrith, Cumbria

CLIENT

Lowther Castle and Gardens Trust

ARCHITECT

Fielden Clegg Bradley Studios

VALUE

£6m building works

COMPLETION DATE

Phase 1: 2012; Phase 2: 2013

ENGINEERING SERVICES

Structural and conservation engineering, below ground drainage, environmental engineering



ASTON HALL

The objectives of the project were to preserve the buildings and their surroundings and to improve their display, interpretation and accessibility to the visiting public

Aston Hall is a Grade I listed Jacobean building constructed between 1618 and 1635. It is set in 43 acres of Grade II listed parkland and located approximately two miles north of Birmingham city centre. Appointed by Birmingham City Council as structural, mechanical and electrical consultant, Ramboll formed part of the design team which developed a phased programme of improvements to the hall, stables range and surrounding parkland.



CHESTER CITY WALLS COLLAPSE

Ramboll has contributed to the preservation of Chester City Walls for over 20 years

In 1990 we were appointed to carry out an investigation of certain parts of the walls which had been moving. A repair contract for the unstable areas, undertaken in conjunction with the city archaeologists, led to the publication of a definitive archaeological report on the walls.

Commissioned to lead investigations into a recent collapse of part of the east wall, Ramboll's role involved the design of repairs and supervision of dismantling. Our brief also includes a risk assessment of the whole walls circuit, which has identified a number of other areas requiring immediate attention.



DEAN'S EYE ROSE WINDOW, LINCOLN CATHEDRAL

Our structural and conservation engineers assisted the cathedral's own works department in reconstructing this window to a very high standard

The Dean's Eye Rose Window was built in 1220 with a daring structural concept and unfortunately, but not surprisingly, started to fail not long thereafter. The tracery was beyond repair by the late 20th century and a replacement was required. Crucially the fabulous 13th century glass was still intact.

As investigations progressed other difficulties such as instability of the north transept only added to the complexity of the task. The final solution treated the window as three separate elements working together.

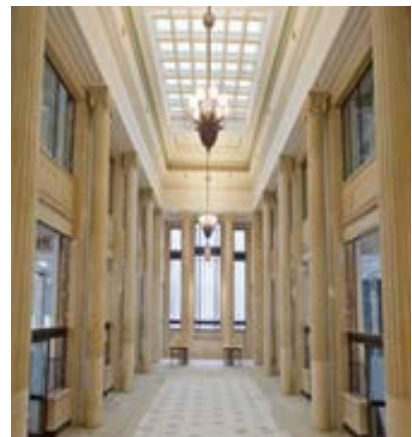


14 CORNHILL

Two new floors suspended from transfer structure roof level

Engineering the redevelopment of the old Lloyds TSB headquarters required both sensitivity and courage. The building is Grade II listed and to create a viable modern office, our client required a significant increase in usable space.

Two new floors were added to the top of the six-storey building. To achieve this without damage to the panelled meeting rooms, we carefully inserted six huge columns that support a steel truss at roof level and the new floors are suspended from it. Floor area was further increased by filling in the lightwell above the banking hall. Elaborate temporary works supported the upper floors throughout the duration of the site works.



CHISWICK HOUSE GARDENS

The restoration of a garden of international significance and the design of a stunning new café

Project Description

The gardens of Chiswick House were designed by William Kent and are hailed as the birthplace of the English Landscape Movement. In a two-year project supported by the Heritage Lottery Fund, the Grade I listed landscape was restored and key focal points returned to their mid-18th century appearance including the Classic Bridge attributed to James Wyatt and the conservatory.

The bridge was in poor condition after long exposure to weather pollution and a lack of maintenance. A minimal approach was adopted in the work to prevent further fabric decay, consolidate the integrity of the structure and revitalise its appearance.

A new café was also built. The stunning façade of the cafe is both white concrete and Portland stone, which forms a colonnade for external covered seating. The café is built over the footings of a Tudor mansion and to minimise its impact, a concrete raft supports the new structure.

Awards

- Landscape Institute Award 2010
- ICE Historic Bridges and Infrastructure Award 2010
- RIBA London Bridge of the Year 2011

CHISWICK HOUSE GARDENS
Photography by James Brittain

LOCATION

West London

CLIENT

English Heritage

ARCHITECT

Dannatt, Johnson Architects,
Caruso St John

VALUE

£12m

COMPLETION DATE

2009

ENGINEERING SERVICES

Structural and conservation engineering, archaeology, below ground drainage



TYNTESFIELD RESTORATION WORKS

Award-winning building services and sustainability solutions for the restoration of a Grade I listed house and estate near Bristol

Project Description

Grade I listed Tyntesfield is a Gothic Revival house with an estate which was acquired by the National Trust in 2002. The house was designed by John Norton, a close friend of Augustus Pugin, and dates from 1863. The original interiors have survived virtually intact and the installation of new services has been carried out sympathetically within the original building fabric, with discrete routing planned in advance of all works and minimal impact on existing finishes. The electrical services for the whole house have been replaced, and environmental heating and monitoring for control of the relative humidity in the principal rooms introduced.

The original installations have been retained for the historic record - those that are still relevant have been restored to working order and more recent unsympathetic ones tidied up. Separate biomass energy centres serve the house and Home Farm. At Home Farm, solar thermal water heating, photovoltaic panels and daylight-linked lighting controls have also been installed, and a building constructed using straw bales.

Awards

- Green Apple Environment Award 2011
- ACE Engineering Excellence Award 2011

TYNTESFIELD RESTORATION WORKS

Finished building

LOCATION

Wraxall, North Somerset

CLIENT

National Trust

ARCHITECT

Rodney Melville + Partners

VALUE

£23m

COMPLETION DATE

2011

ENGINEERING SERVICES

Building services, sustainability



KENSINGTON PALACE

Fulfilling our client's desire to make Kensington Palace "a place to be; somewhere people come to relax, to learn and discover the stories of the fascinating people who lived here"

Project Description

Ramboll has been appointed as part of the team which is delivering a £12m capital project "Welcome to Kensington: a palace for everyone" on behalf of conservation charity Historic Royal Palaces.

The aims of this scheme are to reconnect Kensington Palace's gardens to the surrounding parkland, allow greater physical and intellectual access to the palace and its collections, and reveal and present some of the stories of how monarchs and people have shaped society in Britain over four centuries. The project includes:

- a new visitor hub, free of charge to enter
- a new café and shop facility
- opening up of visitor routes
- addition of a roof over White Court
- landscaping

In conjunction with the careful integration of services into the historic fabric, our commission also involves the provision of appropriate sustainable technologies.

KENSINGTON PALACE
View of the palace

LOCATION

London

CLIENT

Historic Royal Palaces

ARCHITECT

John Simpson & Partners

VALUE

£12m

COMPLETION DATE

2013

ENGINEERING SERVICES

Mechanical and electrical engineering, building sustainability



HOUSEHOLD CAVALRY MUSEUM

A project involving the creation of a modern museum telling the history of the Household Cavalry and allowing public access for the first time

Project Description

Designed by architect William Kent, and built after his death in 1748, The Horse Guards building is the headquarters of The Household Cavalry.

The vaults, internal walls and chimneys above are supported off a grid of six cruciform stone columns and external walls.

In the 1920s, a concrete filler joist slab was inserted, creating a mezzanine floor slab that successfully retained the vaults from spreading. This was removed during the works.

Sloping steel flats restraining points of the vaults were tied back to trusses in the plane of

the first floor that provided a stiff diaphragm.

The timber joints were of particular interest so, in close consultation with English Heritage, each one of these was recorded.

Once the strengthening work was installed, the concrete floor was carefully sawn out in sections.

Our conservation work was acknowledged with a commendation in the Heritage Award for Buildings category at the Institution of Structural Engineers Annual Awards.

HOUSEHOLD CAVALRY MUSEUM
Photography by James Brittain

LOCATION

Whitehall, London, UK

CLIENT

Household Cavalry Museum

ARCHITECT

Hampshire County Council Architects

VALUE

£3.5m

COMPLETION DATE

2007

ENGINEERING SERVICES

Structural engineering, measured surveys, site investigations, structural monitoring design



LIGHTHOUSE BUILDING

This building is undergoing substantial renovation and conversion to offices and retail units as part of the wider regeneration work being undertaken in and around the King's Cross area

Project Description

Situated within a conservation area, the Lighthouse Building was constructed around 1875. Part of it, including the lighthouse structure itself, is Grade II listed. The majority of its footprint sits directly above two live underground tunnels and the site is located at a busy traffic intersection. Ramboll is providing an integrated service to solve the numerous challenges of this site so that this iconic building, currently under the Heritage at Risk Register, can be saved.

The scheme involves façade retention to all elevations. Heavy masonry cross walls and existing timber floors are being removed to install a new steel frame, with composite

concrete and profiled metal floors providing modern commercial accommodation. An additional floor will be added under a contemporary mansard roof.

To assist the client's successful planning application our buildings archaeologist carried out a historic building survey and produced a Heritage Impact Assessment. Studies on air quality and bat surveys have also been undertaken. Complex discrete finite element analysis was undertaken at an early stage to understand the loads on the tunnels and to give the client confidence in the viability of the scheme.

LIGHTHOUSE BUILDING RENDER
Laser Aided Modelling image

LOCATION

King's Cross, London

CLIENT

UK Real Estate

ARCHITECT

Latitude Architects

VALUE

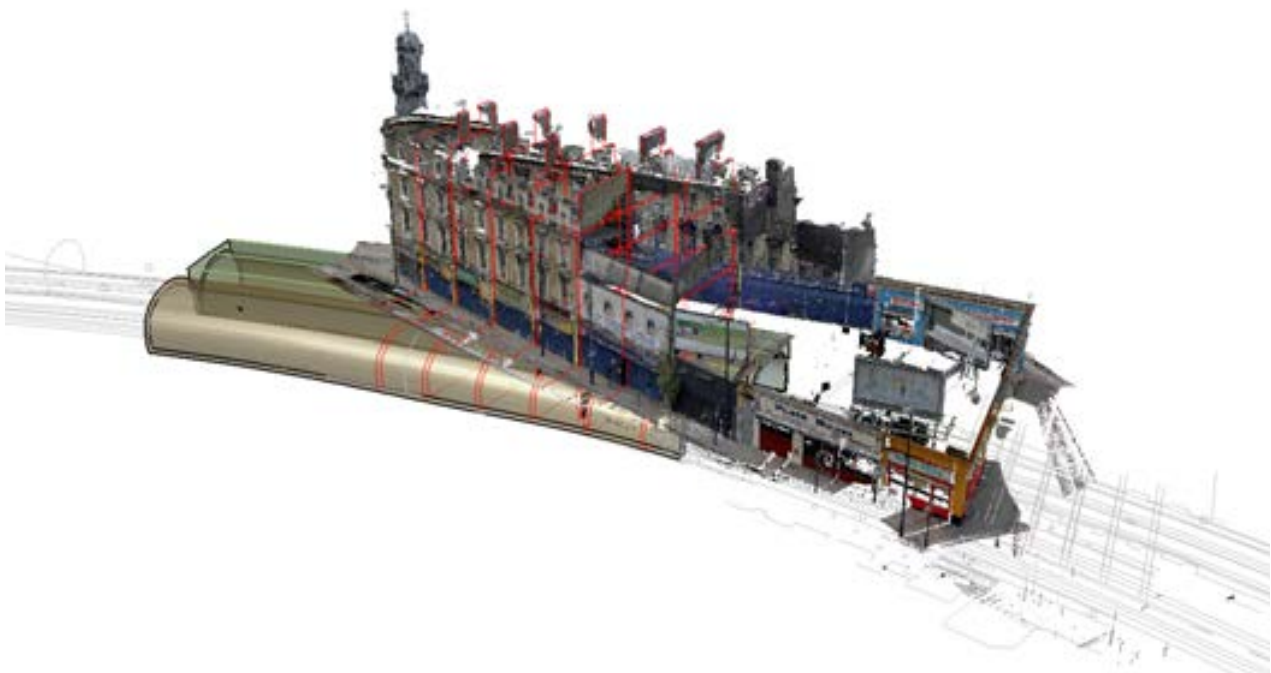
£14m

COMPLETION DATE

2015

ENGINEERING SERVICES

Structural engineering, building services, cultural heritage, transportation, ecology, air quality



COALPORT BRIDGE

Ramboll was appointed to develop a scheme to safeguard the future of the bridge and to strengthen it

Coalport Bridge carries an unclassified road over the River Severn between the villages of Broseley and Coalport in Shropshire, about five miles south of Telford. The bridge was constructed circa 1799-1800 and subsequently widened in 1818. Believed to be the oldest cast iron road bridge in the country still open to vehicular traffic, it is situated in the Ironbridge Gorge World Heritage Site and is itself a Scheduled Ancient Monument. Prior to strengthening the bridge was weight restricted to 2T and could only carry a single lane of traffic. In 2005, following strengthening, the project won an award at the Historic Bridge and Infrastructure Awards.



HASTINGS PIER

Regeneration of the pier including repair to the substructure and design of new buildings

Opened in 1872, Hastings Pier is a Grade II listed structure designed by Eugenius Birch. In 2006, Hastings Borough Council (HBC) served an improvement notice on the owners over concerns for public safety. Our engineers were then appointed to undertake a full structural inspection and condition assessment of the cast/wrought iron pier, in parallel with a heritage evaluation. Following a fire in 2010, which destroyed 95% of the superstructure, we updated our assessment. Ramboll has also advised Hastings Pier Trust in the preparation of a Heritage Lottery Fund application for regeneration of the pier and prepared a Conservation Management Plan.



CHRIST CHURCH COLLEGE LIBRARY

Comprehensive restoration programme for this magnificent Grade I listed college building

Oxford's Christ Church College Library was constructed over a 50 year period from 1717 in the new classical style. The fabric and systems had become tired and outdated and the client asked the design team to implement a comprehensive restoration programme. The building has been re-roofed, stone repairs undertaken across the pedimented façades, building services systems renewed throughout and the libraries fully redecorated. Within the library the environment is held at a constant humidity level using a conservation heating strategy. Original elements to the heating system were refurbished and re-used to maintain the overall original character.



RUDOLF STEINER HOUSE CAFÉ

Creation of a new café in a Grade II listed Germanic expressionist building

Ramboll acted as structural engineer for the major refurbishment and extension of the building – a project involving formation of a new café, re-routing of external fire escapes and remodelling of internal spaces.

The architect produced sketch designs which were translated by Ramboll into working drawings. Our 3D computer models also aided visualisation during the design process and fabrication. The café's structure consists of suspended in situ RC slab on its split level and a timber mezzanine level or 'snug'. The café's timber roof is a geometrically complex glulam 'lily leaf'.



FORT NELSON

In just under a year this Victorian fort underwent major redevelopment to create a museum fit for the 21st century

Project Description

Fort Nelson was built in the 1860s as part of a chain of fortifications protecting the great naval harbour and Royal Dockyard of Portsmouth in Hampshire from a feared French invasion. It is home to one of the finest collections of historic artillery in the world, which is owned by the Royal Armouries, and is a Grade I listed building and a Scheduled Monument.

This exciting project, supported by the Heritage Lottery Fund, has enabled Fort Nelson to accommodate its constantly increasing number of visitors and improve their experience by providing a new admissions building and extending the gallery spaces.

The building works comprised:

- A new admissions complex: a circular concrete, earth buried building
- The new glass-sided Voice of the Guns gallery, showcasing some of the Royal Armouries' most famous exhibits including two sections of the infamous Iraqi Super Gun, two anti-aircraft guns used to defend the South Coast, and the 1464 Great Turkish Bombard
- Remodelling of some gallery spaces and creation of the "Classroom of the Future" within the Redan building
- New external car parking

FORT NELSON
Voice of the Guns gallery

LOCATION

Portsmouth, Hampshire

CLIENT

Royal Armouries

ARCHITECT

Pringle Richards Sharratt Architects

VALUE

£4m

COMPLETION DATE

2011

ENGINEERING SERVICES

Structural and conservation engineering, conservation management plan and archaeology, mechanical and electrical services, ecology, transportation and highways, geotechnical engineering, drainage



ROYAL CLARENCE YARD AND ST GEORGE BARRACKS NORTH

Regeneration of a key waterfront site within Portsmouth Harbour

Project Description

Royal Clarence Yard and St George Barracks North lie at a key location fronting onto the western side of Portsmouth Harbour. The site is one of the last two surviving Victualling Yards in Britain. It contains a number of listed buildings and scheduled monuments.

The project to regenerate the site involved the restoration of buildings in combination with the erection of retail, commercial and residential property and the creation of a new public realm, marina and flood defences. Ramboll was commissioned to undertake engineering investigation, strategic planning and detailed design together with the environmental assessment and statement.

Detailed historical research by our archaeologists informed the design process.

The scale of the project, together with the proximity to the adjacent SSSI necessitated an Environmental Impact Assessment.

Marine works included stabilisation of the historic masonry quay wall, tidal flood risk assessment and construction of a new tidal flood defence wall.

ROYAL CLARENCE YARD
View of the development

LOCATION

Gosport, Hampshire

CLIENT

Berkeley Homes

ARCHITECT

John Thompson & Partners

VALUE

£100m

COMPLETION DATE

2005

ENGINEERING SERVICES

Archaeology, historic structures, geotechnics, highways and infrastructure, Environmental Impact Assessment, marine engineering



CARLTON HOUSE TERRACE

The sensitive adaption of a Grade I listed building to accommodate the modern needs of residents

Project Description

The Grade I listed Carlton House Terrace is a six-storey stucco rendered building in central London. The freehold belongs to the Crown Estate. Classical in style, it dates from 1827-32 and was designed by celebrated architect John Nash.

In line with the guidelines set out by the Crown Estate and English Heritage, we worked with four international designers to create a series of modern residential apartments within this historic setting.

We formulated a conservation package that included the replacement of shattered cast iron beams. Masonry floors were strengthened to take the weight of sound equipment,

marble bathrooms and comfort heating. Roof timbers have been replaced but the period structure maintained.

Spatial modelling enabled services to be integrated into the existing fabric with minimal disruption. The ventilation is hidden in the roof structure and is invisible to neighbouring tall buildings. The ductwork has been set behind existing architecture. VESTA smoke alarms, which have no visible smoke detectors, have been installed. The basement houses the new swimming pool, with a floor that rises up to create a ballroom. Mechanical plant has been fitted into the void under the pool at the shallow end to minimise excavation.

CARLTON HOUSE TERRACE
[External view](#)

LOCATION

London

CLIENT

Villina Trading, AMAS
 Investment & Project Services

ARCHITECT

Weldon Walshe

VALUE

Confidential

COMPLETION DATE

2010

ENGINEERING SERVICES

Structural engineering,
 building services,
 infrastructure, fire and safety,
 geotechnical



KING'S GATE BRIDGE, CAERNARFON CASTLE

A Ramboll designed, smooth-flowing S-shaped footbridge across the moat at a historic castle in Wales

Project Description

World-famous as the setting for the 1969 investiture of HRH Prince Charles as Prince of Wales, Caernarfon Castle is Wales' most culturally significant national monument.

Caernarfon's new footbridge opens a new, accessible route to a major World Heritage Site. Suitable for wheelchair use, the bridge unlocks a profoundly emotive cultural experience to visitors who were previously excluded due to disability.

Crucial to the brief was delivering a non-invasive structural schematic that did not apply extra vertical loading to the existing masonry, the capacity of which was unknown.

We succeeded in producing a geometrically complex bridge that required no additional vertical loading support from the castle and whose primary structure was lifted into place in a single day.

Economically designed, the new footbridge wastes nothing in construction. With no applied finishes – corten steel was chosen for its rich, brickred lustre to contrast with the castle's smoke-grey masonry – it requires almost no maintenance.

The result is a thoroughly indigenous structure that enhances and extends the life of Wales' most significant heritage site.

CAERNARFON CASTLE FOOTBRIDGE
View of bridge from castle tower

LOCATION

Gwynedd, North Wales

CLIENT

Cadw

ARCHITECT

NA

VALUE

£500,000

COMPLETION DATE

2008

ENGINEERING SERVICES

Structural engineering



BRITISH MUSEUM

Redevelopment of the north east buildings to provide a new gallery, conservation and science centre, collections management hub and storage

Working directly with Rogers Stirk Harbour + Partners, we helped coordinate the brief and design for the 18,000 sq m purpose-built facility. To minimise impact, a significant proportion (about 60%) of the new building is located underground and its structural line steps back from adjacent properties. Surcharge loads were verified and stringent criteria employed in the sequencing of works to minimise vibration and avoid damage to the fabric, foundations or contents of neighbouring structures.

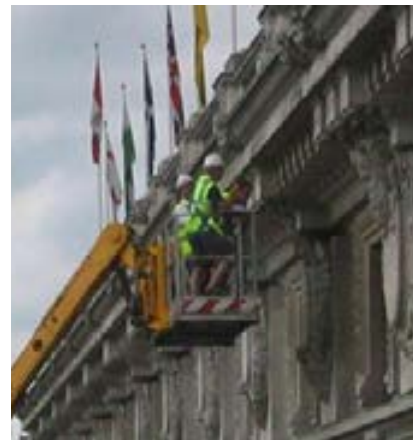


SELFRIDGES FAÇADE SURVEY

Façades survey work categorised remedial work according to priority and timescale

We performed a detailed façades survey on this historic 1930s department store and on the 1960s hotel at the rear. Sensitivity was required as the store remained operational throughout.

Selfridges had recently undergone a façade refurbishment and was in good repair, though its cathodic protection system was not operational. On the roof, several two storey timber frame structures were in need of repair. We advised our client on the preparation of a maintenance regime and were able to deliver survey results to a tight deadline, with our final report categorising remedial work according to priority and timescale.



LONDON BUSINESS SCHOOL REDEVELOPMENT

London Business School is redeveloping its Sussex Place campus to provide world-class facilities

The masterplan delivers a new auditorium, a teaching block and a forum centre integrated with existing structures, which are to be refurbished, improving circulation and access. We provided geotechnical, infrastructure and structural services to develop the complex design to Stage D.

Our work involved the retention and underpinning of a Grade II listed Walter Nash façade while constructing a new building behind. A four storey building with double height lecture theatres and skylinks is to be constructed between the two buildings which currently house the main teaching spaces for the school.



SPIRE OF HOPE, ST ANNE'S CATHEDRAL

Tapering vertical brushed steel spire 50m tip to tip with maximum diameter of just over 1m

Originally marked by a square tower built in the 1890s, the crossing at St Anne's Cathedral has been crowned with a new spire. The architects envisaged a tapering silvery rod that rises high above the church, guiding the eye heavenwards.

The spire measures 50m from tip to pointed tip, rising 40m above the cathedral roof and suspended to 10m below. It is supported at its widest point, which is a little over 1m in diameter. Ensuring sufficient rigidity was thus an important factor in our design.



INTERNATIONAL PROJECTS



AL-HAYLA WATCHTOWER

Our restoration work at the watchtower was undertaken with great sensitivity

Project Description

Ramboll was appointed through architect Donald Insall to the Abu Dhabi Association for Cultural Heritage for conservation work on historic buildings and standing remains. The commission relies on Ramboll's local presence as well as its international reputation. Both UK-based conservation engineers and company staff operating through our Abu Dhabi office were involved in inspections and specification of works.

Surveys concentrated on the stone fabric of the Al-Hayla Watchtower, walls at Umm Hesen and buildings on Delma Island 25 miles offshore in the Gulf. The Old Airport Building in Abu Dhabi awaits further conservation work.

Restoration work at Al-Hayla involved temporary bracing, consolidation of the fragile stonework and the sensitive insertion of stainless steel containment.

LOCATION

Abu Dhabi

CLIENT

Abu Dhabi Association for Cultural Heritage

ARCHITECT

Donald Insall Architects

VALUE

Confidential

COMPLETION DATE

2010

ENGINEERING SERVICES

Historic specialist advice, structural engineering



AL-HAYLA WATCHTOWER
Watchtower during works

PRESIDENT'S HOUSE, PORT OF SPAIN

We were commissioned to survey this colonial style building following a seismic event

Project Description

The President's House was constructed in 1874. It is a fine colonial style building, well constructed on two and three floors in thick, dense blue limestone with substantial timber floors, the ground floor lifted slightly above the surrounding plain.

The building had suffered from moisture ingress and in May 2010 a relatively minor seismic event resulted in collapse of part of the ballroom wing. Ramboll was asked to inspect the building and provide a comprehensive survey on the state of the fabric, assessing the likely mechanism of failure and commenting on the possibility of retrofitting the fabric to achieve resistance against

further earthquakes.

The survey involved inspections at all levels, including basements and roofscape, the latter using a large access platform. Recommendations were made on possible means of stabilising the standing walls, and discussions held with the contractor from the UK during site clearance to clarify and assist works.

PRESIDENT'S HOUSE
One of the less damaged elevations

LOCATION

Port of Spain, Republic of Trinidad and Tobago

CLIENT

Ministry of Transport and Works

ARCHITECT

Bernard Mackay Architects

VALUE

Confidential

COMPLETION DATE

2011

ENGINEERING SERVICES

Historic specialist advice, structural engineering, advanced seismic engineering analysis



WISCONSIN AVENUE BRIDGE

Ramboll has been engaged in commissions to assess and specify strengthening of historic masonry bridges in North America for the last 10 years

Project Description

Wisconsin Avenue Bridge is a single span stone masonry arch bridge that carries Wisconsin Avenue over the Chesapeake and Ohio (C&O) Canal in Georgetown, District of Columbia. The bridge was built in 1831 and was formerly known as High Street Bridge. It is the oldest bridge in the District of Columbia. The bridge is located within the Georgetown Historic District, and is listed on the National Register.

Ramboll carried out a detailed geometrical survey and inspection of the structure, structural analysis and assessment of the load carrying capacity and design of an Archtec strengthening system to upgrade the load

carrying capacity of the structure to a HS25 loading.

The Archtec strengthening system method involves the accurate placement of stainless steel anchors in the masonry arch barrel. The analysis and design consists of a numerical simulation using the finite/discrete element (DE) technique which is used exclusively by Ramboll for the Archtec joint venture with Cintec America Inc.

Over 400 bridges worldwide have been strengthened by using Ramboll's innovative and pioneering approach to masonry analysis.

WISCONSIN AVENUE BRIDGE
View of bridge from canal

LOCATION

Georgetown, District of Columbia, USA

CLIENT

District of Columbia Department of Transportation/National Park Service

ARCHITECT

NA

VALUE

Confidential

COMPLETION DATE

2004

ENGINEERING SERVICES

Geometrical survey, structural analysis



FREDERIK VIII'S PALACE

Interior restoration of Frederik VIII's Palace

Project Description

Amalienborg is the centerpiece of the Frederiksstaden district built in 1744 – 1748, and is now the winter home of the Danish royal family. The residence consists of 4 identical palaces built around an octagonal square. These mid-18th century buildings are considered to represent some of the finest in Northern European rococo architecture. One of the palaces - Frederik VIII's Palace - was renovated to house the Crown Prince, the Crown Princess and their staff.

The 4,500m² palace was subject to an extensive interior renovation. The roof, windows and facades were repaired and conserved.

Ramboll worked as a subconsultant to the architects Arkitema and Erik Einar Holms Tegnesteue.

The interior restoration comprised:

- New heating, ventilation, piping and electrical building services
- Changes to the building's structures in order to accommodate a new internal lift and floor break-throughs and the new installations, stairs, etc.
- Provision of new safety installations and fire alarm system

FREDERIK VIII'S PALACE
Courtesy of Roberto Fortuna

LOCATION

Copenhagen

CLIENT

Arkitema KS

VALUE

Confidential

COMPLETION DATE

2010

ENGINEERING SERVICES

Renovation and reconstruction



THE NATIONAL LIBRARY OF SWEDEN

Enhancement of the library's internal environment whilst protecting and preserving the nation's heritage

Project Description

Dating from 1878, the national library building is Sweden's main copyright archive, with one copy of every book, booklet and paper printed in the country stored there. The imposing masonry façade encloses the magnificent library and study spaces, with high ceilings and slender cast iron columns.

Previous restoration work involving the internal services between 1990 and 1995 had become outdated. The Swedish National Property Board appointed Ramboll to design and implement changes to enhance the climatic conditions and interior area. The Property Board seeks to protect and preserve the nation's heritage in the best

possible way, and work is being undertaken with great sensitivity to conserve the library's appearance whilst enhancing its internal environment.

The national document archive is now housed separately underground and at carefully controlled temperatures and humidity. All work has been undertaken in consultation with the National Heritage Board.

THE NATIONAL LIBRARY OF SWEDEN
Library's masonry façade

LOCATION

Stockholm, Sweden

CLIENT

Swedish National Property Board

ARCHITECT

NA

VALUE

Confidential

COMPLETION DATE

2013

ENGINEERING SERVICES

Building services engineering



LUTHERAN CATHEDRAL OF HELSINKI

Restoration and modernisation of this distinctive neoclassical building which attracts over 350,000 visitors each year

Project Description

The cathedral was built between 1830 and 1854 as a tribute to Nicholas I, Tsar of Russia, in the distinctive neoclassical design, with a Greek cross plan of equally sized nave, chancel and transepts. It attracts over 350,000 visitors annually.

Work was undertaken by Ramboll in association with the Cathedral Architect Professor Vilhelm Helander, with the primary aim of repairing and restoring the building for everyday use. However, the opportunity to enhance the

acoustic environment and building services was also taken whilst this was happening. After careful consultation with the regulatory bodies, the lighting was substantially improved and acoustic performance was enhanced.

The cathedral's modernised technical systems and enhanced facilities mean that it is now able to serve the public more efficiently and broadcast concerts and religious services internationally.

LOCATION

Helsinki, Finland

CLIENT

The Federation of Parishes, Helsinki

ARCHITECT

Vilhelm Helander

VALUE

Confidential

COMPLETION DATE

2011

ENGINEERING SERVICES

Building services design and acoustic consultancy



LUTHERAN CATHEDRAL OF HELSINKI

NATIONAL MUSEUM, HELSINKI, FINLAND

Enhanced visitor circulation and a new café for local and international visitors

The national museum is a famous landmark on Helsinki's skyline. Ramboll was engaged in restoration and conversion work that ended in 2000, which involved demanding rock excavation below ground, careful roof repairs at high level, stone cleaning and repointing and substantial changes to the building systems. An old staircase was brought back into use and new entrance opened from the Mannerheimintie open space beside the building.



NATIONAL THEATRE, OSLO, NORWAY

Renewal and restoration programme of the theatre services

The Norwegian National Theatre was opened in 1899 and is an auditorium in the finest tradition of the age. As part of a major renewal and restoration programme between 2005 and 2008, Ramboll provided consultancy services for acoustics, building physics, electrical engineering, fire and safety, heating, ventilation, air conditioning and drainage sanitation. The initial commission was to undertake comprehensive surveys of the existing systems, from which the brief was developed fully. As part of the fire strategy, and to maintain the openness of the original concept, a sprinkler system was designed for the stage area.



NIDAROS CATHEDRAL, TRONDHEIM, NORWAY

Ramboll oversees the conclusion of a century of cathedral restoration

Nidaros Cathedral is a magnificent example of Scandinavian transitional Gothic architecture. Work on the cathedral started in 1070 and was finished circa 1300, spanning great changes in style. The cathedral has been badly damaged by fires and neglect throughout its life. Conservation and restoration began in 1869 and has continued to this day. The most major recent phase was concentrated between 2002 and 2006, when Ramboll undertook a wide range of consultancy services to achieve quality restoration: overall project management, sound systems, geotechnical engineering, heating installation, building management systems and environmental controls.



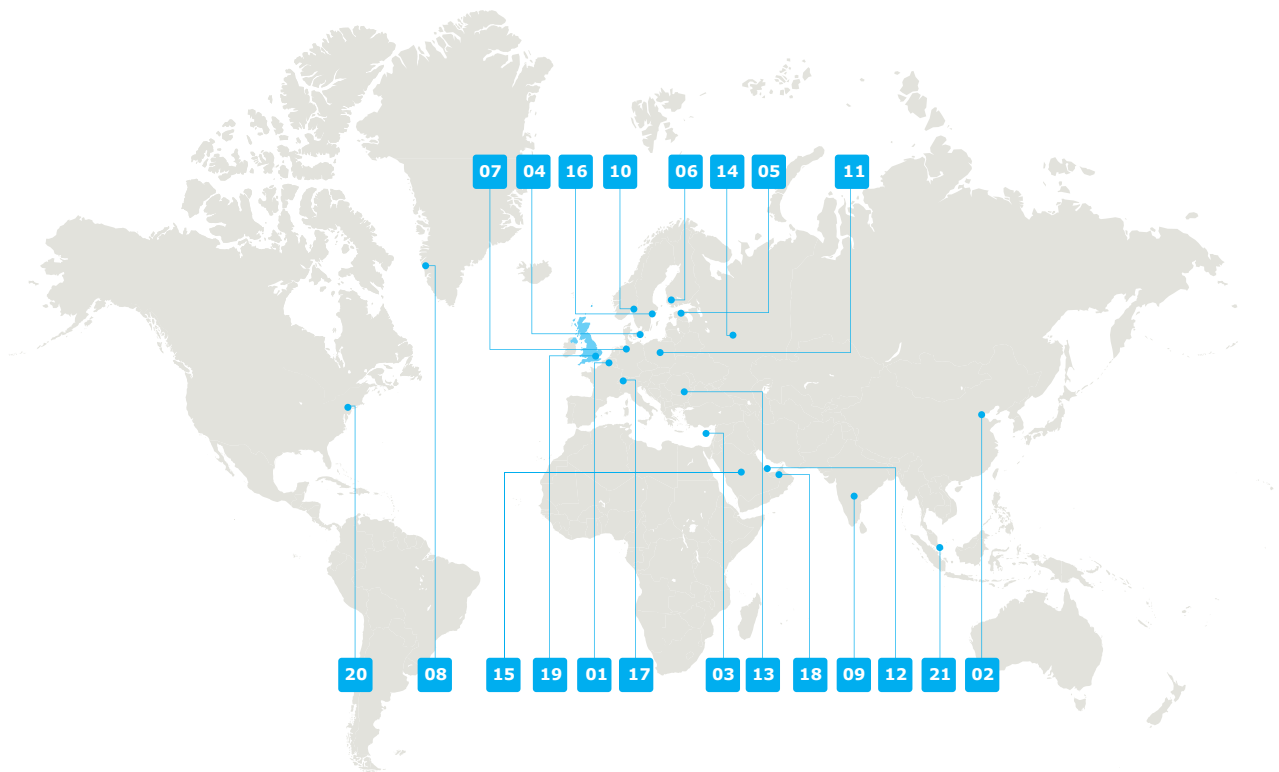
BORGHOLM CASTLE, SWEDEN

Preservation of structural elements

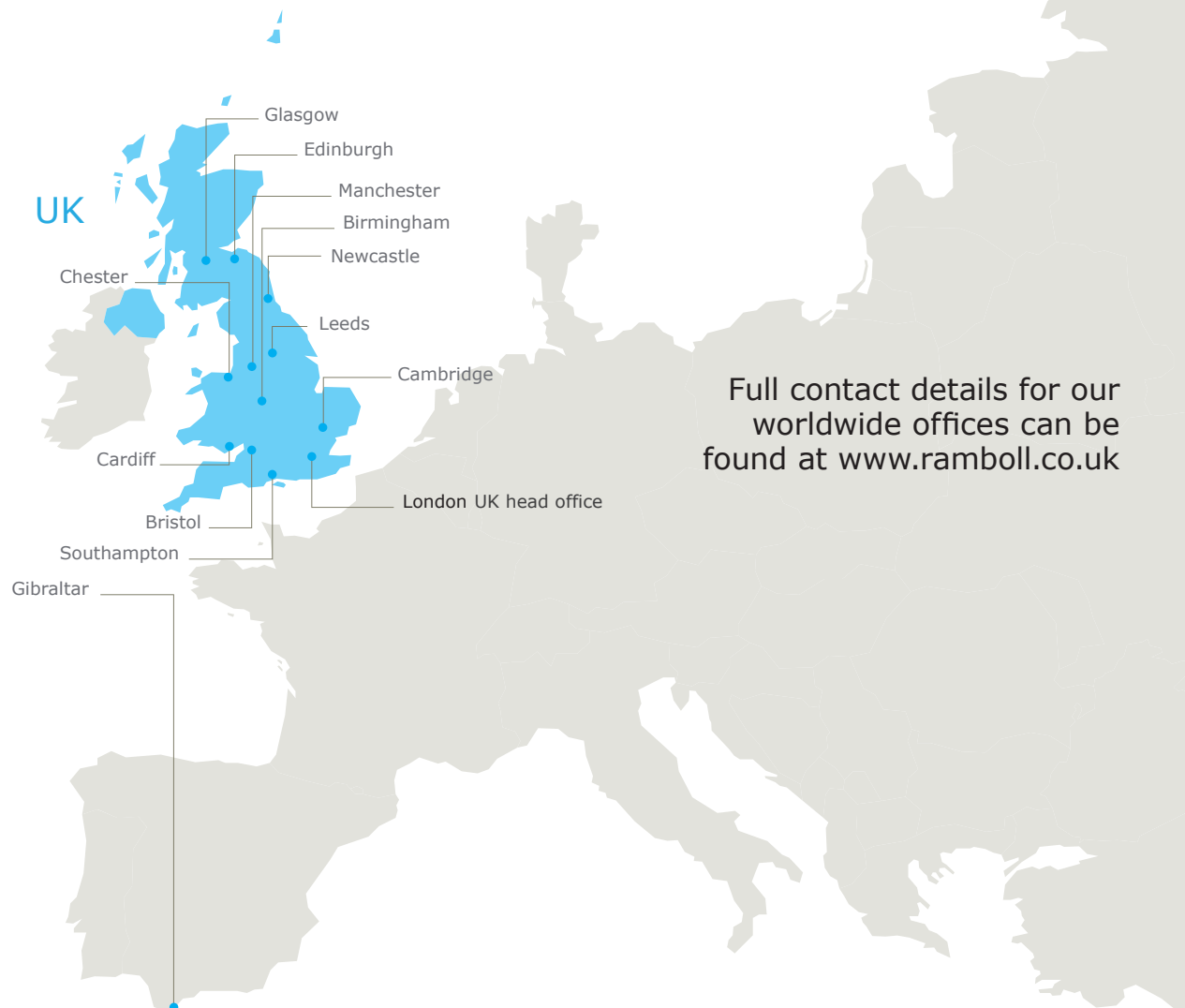
The owner, Statens FastighetsVerk, has been working on the management, maintenance and development of this fine historic building to dramatically improve the experience of the 100,000 visitors who come to see it each year. The client implemented a number of projects in which Ramboll participated as a partner, providing services as overall project manager, project engineer and construction manager. We also carefully coordinated the various installations to ensure a high-quality result, with sensitive detailing and specialist structural repairs. A new entrance, parking, catering and accessibility facilities have been provided, along with new services throughout the building.



OFFICE LOCATIONS



01 BELGIUM, Brussels. 02 CHINA, Beijing. 03 CYPRUS, Episkopi. 04 DENMARK, Copenhagen. 05 ESTONIA, Tallinn. 06 FINLAND, Helsinki. 07 GERMANY, Hamburg. 08 GREENLAND, Nuuk. 09 INDIA, Hyderabad. 10 NORWAY, Oslo. 11 POLAND, Warsaw. 12 QATAR, Doha. 13 ROMANIA, Bucharest. 14 RUSSIA, Moscow. 15 SAUDI ARABIA, Riyadh. 16 SWEDEN, Stockholm. 17 SWITZERLAND, Zurich. 18 UAE, Dubai. 19 UK, London. 20 USA, Houston. 21 SINGAPORE.



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