The East Bridge spans the international navigational route between the Baltic and the North Sea. It is one of the longest suspension bridges in the world and a component in the Great Belt Link that links Eastern and Western Denmark.

**FACTS**
- Main span: 1,624 m
- Total length: 6,790 m
- Project period: 1986-1998
- Client: A/S Storebæltsforbindelsen

**SERVICES**
- Conceptual design
- Tender design
- Detailed design
- General supervision
- Operation and maintenance
Stonecutters Bridge spans the entrance to one of the busiest ports in the world, the Kwai Chung Container Terminal. It is one of the longest cable-stayed bridges in the world, linking Hong Kong International Airport and the Kowloon peninsula.

**FACTS**
- Main span: 1,018 m
- Total length: 1,596 m
- Project period: 1999-2010
- Client: Highways Department, Hong Kong

**SERVICES**
- Feasibility study of cable-stayed bridge
- Detailed design of main cable-stayed span
- Detailed design of main cable-stayed towers

*Photo: ©Arup*
MESSINA STRAIT BRIDGE, ITALY

As the world’s longest suspension bridge, the Messina Strait Bridge is the realization of an idea that dates back to Roman times. It connects Sicily and Calabria, creating favourable conditions for economic regeneration of the region.

FACTS
Main span: 3,300 m
Total length: 3,666 m
Project period: 2003-2011
Client: Eurolink, Italy

SERVICES
Bid design
Final design

By courtesy of ATI Impregilo S.p.A
In COWI, we take pride in our achievements. For more than 80 years, we have been at the forefront of bridge engineering, setting the standard for tomorrow’s best practices. Together with our clients, we have been involved in more than 3,000 bridges all over the world – from South America to the far corners of Russia.

WORLDWIDE REACH

AT ANY GIVEN TIME, WE ARE INVOLVED IN MORE THAN 200 BRIDGE PROJECTS WORLDWIDE
The West Gate Bridge is an iconic and notorious cable-stayed bridge in Melbourne that spans the Yarra River. Increased traffic has pushed the landmark structure to its limits and in need of upgrading to five lanes in each direction.

**FACTS**
- Main span: 336 m
- Total length: 2,582 m
- Project period: 2008-2011
- Client: VicRoads

**SERVICES**
- Structural assessment
- Design of strengthening works
- Supervision of works

*Photo: Christian Pearson, Misheye*
The Busan-Geoje Fixed Link is a major achievement that brought state-of-the-art bridge engineering to the Korean market. The two cable-stayed bridges and immersed tunnel reduce travel time between Busan and the island of Geoje with two hours.

**FACTS**

- **Main spans**: 475 m and 2 x 230 m
- **Total length**: 8,200 m
- **Project period**: 2003-2010
- **Client**: Daewoo E&C

**SERVICES**

- Basic design
- Detailed design
- Technical follow-up
The Lions’ Gate Bridge marks the entrance to Vancouver’s harbour, spanning the First Narrows of Burrard Inlet. As one of two crossings between Vancouver and the communities to the north, it is of vital importance to the local economy.

**FACTS**
- **Main span**: 472 m
- **Total length**: 1,517 m
- **Project period**: 1972-2002
- **Client**: BC Ministry of Transportation

**SERVICES**
- Owners engineer
- Detailed design of replacement of suspended deck
- Design of ship impact protection

Photo: Claus Knuth
OUR SERVICES

With our services, we cover the entire project lifecycle of a bridge from early ideas to the operation phase and rehabilitation – or decommissioning when the time comes.

We can handle the entire project, or we can step in at any given moment to provide your project with that extra expertise you need. The choice is yours.
Agility and expertise is the key to efficient bridge engineering. We bring both to the table to make sure we provide you with the exact service and expertise your project needs - regardless of where you are in the process.

**INDEPENDENT DESIGN CHECK AND VALUE ENGINEERING**
We provide assistance to clients of complex bridge projects assessing if the project is reliable, safe, durable, constructable and optimal.

**CONSTRUCTION ENGINEERING**
The right selection and combination of construction methods is of crucial importance to any bridge. We handle erection schemes, logistics, temporary structures as well as the erection engineering itself.

**OPERATION AND MANAGEMENT**
Our asset management is based on worldwide practical experience with planning, budgeting and handling of short and long-term operation, maintenance and rehabilitation works, as well as implementation of management concepts.

**SITE SUPERVISION**
We handle all disciplines relating to preconstruction and construction, project completion and subsequent defects liability phase. And we deliver full documentation of the quality of the project.

**RE-EVALUATION AND REHABILITATION**
We cover all phases and every step of the inspections to ensure that technical evaluations are coherent – from visual inspections to special studies of load capacity and safety of structures. We design rehabilitations at existing structure for increased capacity and for replacement of key structural elements.

**DECOMMISSIONING**
To facilitate the choice between removal options, we carry out quantitative comparative risk assessments of the various options and we take damaged structures, personnel and environmental risks into account.

**FEASIBILITY STUDIES**
We make all the competence to carry out feasibility studies – also for fixed links. And we take into account technical, environmental, social and economic aspects to establish the case for the right decisions.

**CONSTRUCTION MANAGEMENT**
We handle the contract, reporting progress of the project in all details as well as cost control and take care of risk management. We also handle stakeholders and authorities and perform technical follow-up.

**PROJECT IMPLEMENTATION**
We provide policy planning, advice and management consulting in relation to project decision and project implementation.

**DIFFERENT PHASES**
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IZMİT BAY BRIDGE, TURKEY

The Izmit Bay Bridge is located in one of the most seismically active areas in the world. It is located 50 km south of Istanbul, and crosses the Sea of Marmara with one of the longest spanning suspension bridges in the world.

FACTS

- Main span: 1,550 m
- Total length: 2,682 m
- Project period: 2010-2015
- Client: IHI, Japan

SERVICES

- Bid design
- Detailed design
- Technical follow-up

DISSING+WEITLING
Stockholm’s Årsta Bridge sweeps across Årstaviken Bay, complementing the existing 1929 bridge. At the same time, it significantly increases rail capacity with minimal impact on the surrounding landscape.

**FACTS**
- Total length: 815 m
- Project period: 1994-2004
- Client: Banverket, Stockholm

**SERVICES**
- Structural evaluations
- Tender design
- Detailed design
- Technical follow-up
- Operation and maintenance
Since we designed our first bridge in 1938, COWI has actively participated in the research and development of new techniques, the use of new materials and new technologies in the field of bridge engineering.

Today, our teams deliver cutting-edge know how within all aspects of bridge engineering. And we continue to push the boundaries to maximise value for our clients.
DIFFERENT ASSIGNMENTS
DIFFERENT COMPETENCIES

Our extensive pool of engineers and experts enable the project manager to set a team with the right competencies to match your project.

> IDEAS > HYDRAULIC MODELLING > SOIL STRUCTURE INTERACTION > CFD ANALYSES
> AERODYNAMICS > MAPPING > STAY CABLE VIBRATIONS > SERVICE LIFE DESIGN
> MATERIAL TECHNOLOGY > SEISMIC ANALYSES > FATIGUE ASSESSMENTS
> NON-LINEAR TIME-HISTORY ANALYSES > LIFE CYCLE COSTS > SUSTAINABLE ENGINEERING
> CABLE TECHNOLOGY > TUNED MASS DAMPER > OPERATIONAL RISK MANAGEMENT
> CONSTRUCTION RISK MANAGEMENT > DEHUMIDIFICATION SYSTEMS > CONSTRUCTION STAGE ANALYSIS > STRUCTURAL DYNAMICS > SHIP COLLISION RISK > STRUCTURAL MONITORING
> RELIABILITY CENTRED MAINTENANCE > COMFORT ANALYSES > MODEL TEST VERIFICATIONS
> SHIP IMPACT PROTECTION > CATHODIC PROTECTION > LANDSCAPING

THE CONSTRUCTION SPECIALIST
Our construction specialist works closely with the construction aspect to secure the balance between design and construction.

THE RISK EXPERT
Our risk expert is responsible for all risk aspects – including hazard analysis and operational risk analysis.

THE GEOTECHNICAL EXPERT
Our geotechnical expert will specify the geotechnical site investigations, analyse the results and establish a geotechnical design basis for the project.

THE WIND SPECIALIST
Our wind expert liaises with the wind tunnel facility and is responsible for analysing the aerodynamic stability and mitigating vibration of the bridge.

THE PROJECT MANAGER
Our project manager is responsible for managing the contract towards the client and to deliver the project on agreed time and budget.

THE SENIOR BRIDGE ENGINEER
Our senior bridge engineers are responsible for all basic engineering aspects of the project – drawings and verification and to ensure practical buildable structures.

THE DURABILITY EXPERT
Our durability expert is responsible for the requirements to the concrete that secures the durability of the structure.
The slender Hålogaland Bridge crosses the Romsdalen Fjord in the harsh environment of Northern Norway. As part of the European route E6, the bridge shortens the north-south highway in the country and opens up new development land.

**FACTS**
- Main span: 1,120 m
- Total length: 1,534 m
- Project period: 2007-
- Client: Norwegian Public Roads Administration

**SERVICES**
- Basic design
- Detailed design
- Tender documents
- Technical follow-up

DISSING+WEITLING
The Constantine Viaduct is the first cable-stayed bridge in the ‘City of Bridges’, as the Algerian city is known. The bridge spans the deep gorge above the river Rhummel to connect the ONU area and the Mansourah plateau.

**FACTS**
- Main span: 259 m
- Total length: 750 m
- Project period: 2008-2013
- Client: Andrade Gutierrez S.A.

**SERVICES**
- Bid design
- Detailed design
- Construction engineering
- Technical follow-up
OUR EXPERTISES

Every bridge project is unique. To meet the challenge, we have 600 world-class engineers and experts working together to create a seamless integration of all aspects of bridge engineering – from the bridge itself to traffic planning, geo mapping and environmental impact assessment.

And for every project from a small bridge to a major fixed link, we set a specific team to ensure that we deliver the perfect solution for you.
DIFFERENT CHALLENGES
DIFFERENT EXPERTISE

We combine our expertise and competencies to deliver the optimal solution to your challenge. Take a fixed link, for example, it is a major undertaking that spans the best of our range of expertise.

SITE INVESTIGATIONS
- Design basis development
- Traffic studies
- Geotechnical, wind and hydraulic investigations
- Operational risk and safety concepts

CONCEPT DEVELOPMENT
- Alignment
- Bridge components
- Tunnel components
- Embankments
- Marine structures
- Renderings and animations

IMPACT ASSESSMENT
- Environmental impact
- Hydraulic modelling
- Social impact
- Planning impact
- Traffic impact
- Cost impact

DESIGN
- Marine foundation design
- Main navigation bridge design
- Approach bridge / viaduct bridge design
- Traffic management systems
- Toll collection stations
- Electrical and mechanical design

PROCUREMENT
- Procurement strategies
- Tender documents
- Scheduling
- Contracting

LIFE CYCLE CONSIDERATIONS
- Operation and emergency planning
- Inspection and maintenance systems
- Low cycle cost optimization
- Sustainability

IMPLEMENTATION
- Construction management
- Site supervision
BRIDGES

ØRESUND BRIDGE, SWEDEN – DENMARK

The Øresund Bridge is one of the world’s longest cable-stayed bridges for combined motorway and railway traffic. It spans the international navigation route between Sweden and Denmark, a critical component for the high-growth Øresund Region.

FACTS

- Main span: 490 m
- Total length: 7,844 m
- Project period: 1994-2000
- Client: Sundlink HB

SERVICES

- Bid design
- Basic design
- Detailed design
- Endorsement of construction works
- Operation and maintenance

Photo: Claus Knuth
MADE BY COWI

XIHOU MEN BRIDGE, PR CHINA
Total length: 2,228 m
Main span: 1,650 m
Completed: 2009
Client: Zhoushan Mainland Link
SERVICES: Specialist assistance including aerodynamic analysis.

JOHN JAMES AUDUBON BRIDGE, LOUISIANA, USA
Total length: 975 m
Main span: 482 m
Completed: 2011
Client: Parsons Transportation Group
SERVICES: Bid design and detailed design of the cable-stayed portion of the bridge with the exception of its foundations (Buckland & Taylor).

SURAMADU BRIDGE, INDONESIA
Total length: 5,000 m
Main span: 434 m
Completed: 2009
Client: P.T. Virama Karya
SERVICES: Independent design check and consultancy for cable-stayed bridge and approach bridges. Construction supervision service.

2ND INCHEON SHIP IMPACT PROTECTION, KOREA
Total length: 12,343 m
Main span: 800 m
Completed: 2009
Client: Samsung Corporation
SERVICES: Preliminary design for developer (Buckland & Taylor). Basic and detailed design of ship impact protection structures (COWI).

SURAMADU BRIDGE, INDONESIA
Total length: 5,000 m
Main span: 434 m
Completed: 2009
Client: P.T. Virama Karya
SERVICES: Independent design check and consultancy for cable-stayed bridge and approach bridges. Construction supervision service.

AQUITAINE BRIDGE, FRANCE
Total length: 1,767 m
Main span: 400 m
Completed: 2003
Client: Direction Départementale de l’Equipement (DDE) de la Gironde, Bordeaux
SERVICES: Tender design for replacement of main cables, tender evaluation and technical supervision during the construction.

SUNGAI JOHOR, MALAYSIA
Total length: 1,708 m
Main span: 500 m
Completed: 2011
Client: Ranhill Bersekutu Sdn. Bhd.
SERVICES: Concept design, basic and detailed design of superstructure including pylons and bearings, construction engineering and construction follow-up.

LUSAIL MARINE BRIDGES, QATAR
Total length: 204 m
Main span: 129 m
Completed: 2014
Client: Qatari Diar Real Estate Investment Company
SERVICES: Basic and detailed design of marine bridges and geotechnical investigations. Supervision of marine works.

PONT DE NORMANDIE, FRANCE
Total length: 2,000 m
Main span: 856 m
Completed: 1995
Client: Monberg & Thorsen A/S
SERVICES: Review of tender design, general studies and detailed design of main span, girder and cables.

The construction of the Normandy Bridge marked a gigantic step forward in terms of span length for cable-stayed bridges. With a main span of 856 m it surpassed the world record by more than 60%.

The Normandy Bridge held the world record cable-stayed span for 4 years.

Situated about 15 km east of Le Havre, the bridge crosses the Seine and was inaugurated in 1995 allowing for a needed relief of the Tancarville suspension bridge from 1958.

With an effective width of 19.7 m, the bridge carries a two-lane dual motorway.
HARILAOS TRIKOUPI (IRON ANTIRION) BRIDGE, GREECE
Total length: 2,860 m
Main span: 3 x 560 m
Completed: 2004
Client: Gefyra S.A.
SERVICES: Independent design check (Buckland & Taylor).

SHEIKH ZAYED BRIDGE, ABU DHABI, UNITED ARAB EMIRATES
Total length: 842 m
Main span: 234 m
Completed: 2005
Client: Works Department, Emirate of Abu Dhabi
SERVICES: Independent design check (COWI). Erection engineering for Archirodon (Buckland & Taylor).

DANUBE CLEARANCE PROJECT, YUGOSLAVIA
COWI’s assignment involved removing the remains of 3 large cable-supported bridges across the Danube river, which were destroyed when NATO bombed Yugoslavia in 1999.
Completed: 2005
Client: EU commission
SERVICES: Planning, project engineering for Archie-rodon (Buckland & Taylor).

SECOND BRIDGE ACROSS THE PANAMA CANAL
Total length: 1,050 m
Main span: 420 m
Vertical clearance: 80 m
Completed: 2004
Client: Ministry of Public works (MOP), Panama
SERVICES: Independent design check. Project management and site supervision.

SUTONG BRIDGE, JIANGSU PROVINCE, PR CHINA
The SuTong Bridge is a major crossing of the Yangtze River in Jiangsu Province north of Shanghai. It carries a six lane highway with emergency lanes. The main bridge is a cable-stayed bridge with a world record breaking main span of 1,088 m.
Total length: 6,000 m
Main span: 1,088 m
Project period: 2003-2007
Client: Jiangsu Province Sutong Bridge Construction Commanding Department
SERVICES: Design assistance and design review of cable-stayed bridge and special fairway bridge, design of scour protection, aerodynamic investigations, consultancy during construction.
MADE BY COWI

TSING MA BRIDGE, HONG KONG
Total length: 2,088 km
Main span: 1,377 m
Client: Highways Department Hong Kong
SERVICES: Independent design check, construction engineering, development of WASHMS and specialist advice (Flint & Neill).

NAINI BRIDGE, INDIA
Total length: 1,600 m
Main span: 260 m
Completed: 2004
Client: The Ministry of Surface Transport (MOST), India and National Highways Authority of India (NHAI)
SERVICES: Feasibility study, detailed design, tender documents and construction supervision.

NELSON MANDELA BRIDGE, SOUTH AFRICA
Total length: 284 m
Main span: 176 m
Completed: 2003
Client: SANRAL (South African National Roads Agency Limited, department of transport)
SERVICES: Conceptual design, tender design, tender assistance, detailed design, technical assistance during construction.

ZÁRATE-BRAZO LARGO BRIDGES, ARGENTINA
Total length: 15,000 m
Main span: 330 m
Completed: 1977
Client: Dirección Nacional de Vialidad, Argentina
SERVICES: Inspection, testing and rehabilitation design.

GIBRALTAR STRAIT CROSSING, SPAIN – MOROCCO
Total length: 14 - 27 km
Main spans: 2 x 5,000 m or 3 x 3,500 m
Client: SECEGSA, Madrid, Spain and Société Nationale d’Etudes du Détroit, Rabat, Morocco
SERVICES: Pier concepts, ship protection systems, superstructure designs and preliminary design.

QATAR – BAHRAIN CAUSEWAY
Total length: 42,000 m
Main span: 250 m
Client: Ministry of Municipal Affairs and Agriculture, Qatar
SERVICES: Preliminary environmental and engineering investigations, incl. site investigations. Subsequent development of basic design for contractor for the 42 km long fixed link for road and railway.

FEHMARN BELT, DENMARK – GERMANY
Total length: 20 km
Main span: 724 m
Client: Danish and German Traffic Ministries
SERVICES: Feasibility study, concept design for the bridge solution. The services included comprehensive site studies, cost estimation, input to plan approval documents and scheduling.

HÖGA KUSTEN BRIDGE [HIGH COAST BRIDGE], SWEDEN
Total length: 1,800 m
Main span: 1,210 m
Client: The Swedish National Road Administration through Kjessler & Mannerstråle
SERVICES: Tender design, detailed design, technical follow-up during construction, dehumidification of main cables and operation and maintenance services.
MADE BY COWI

**BRIDGES**

**GREAT BELT LINK, WEST BRIDGE, DENMARK**
- Total length: 6,600 m
- Main spans: 110 m
- Completed: 1994
- Client: A/S Storebæltsforbindelsen
- Services: Conceptual and tender design, prequalification, tender evaluation assistance, design management, design check and technical services in connection with detailed design and construction.

**LUANGWA BRIDGE, ZAMBIA**
- Total length: 350 m
- Main span: 222 m
- Client: Danish Ministry of Foreign Affairs / Danida and Ministry of Works and Supply, Zambia
- Services: Inspection, testing, condition assessment, feasibility study, strengthening and rehabilitation design, tender documents, tender evaluation and construction supervision.

**NEW LITTLE BELT BRIDGE, DENMARK**
- Total length: 1,700 m
- Main span: 600 m
- Completed: 1970
- Client: Ministry of Public Works, the Road Directorate, Denmark
- Services: Conceptual design, site investigations, tender documents, Detailed design and construction supervision. General inspection and maintenance works.

**SHEIKH JABER AL AHMED AL SABAH CAUSEWAY, KUWAIT**
- Total length: 36 km
- Main span: 150 m
- Project period: 2002 - ongoing
- Client: Ministry of Public Works, Roads Administration, Kuwait
- Services: Feasibility studies and surveys, concept and tender design. Preparation tender documents, tendering and tender evaluation.

**HIGH-SPEED RAIL PROJECT, TAIWAN**
- Project period: 2000-2006
- Client, Lot C240: Hyundai - Chung Lin JV
- Client, Lot C250: Hochtief AG - Ballast Nedam - Pan Asia JV
- Services: Checking design of permanent works, checking design and construction of major temporary works, checking changes in design of permanent works, verification of geotechnical conditions on site during construction, analytical check including independent calculations.

**CHONGMING BRIDGE, PR CHINA**
- Total length: 9,600 m
- Main span: 730 m
- Completed: 2008
- Client: Shanghai Yangtze River Tunnel and Bridge Construction Development Co. Ltd.
- Services: Independent design check and consultancy during construction for cable-stayed bridge and approach bridge.

**RUSSKY ISLAND BRIDGE, RUSSIA**
- Total length: 1,886 m
- Main span: 1,104 m
- Project period: 2012
- Client: Mostovik
- Services: Wind tunnel tests, design review and specialist consulting during construction.

**YEMEN-DJIBOUTI FIXED LINK, MIDDLE EAST – AFRICA**
- The project comprises a fixed link between Yemen and Djibouti across the Bab El-Mandeb Strait which connects the Red Sea to the Arabian Gulf and the Gulf of Aden.
- The island of Perim divides the strait into an Eastern channel approx. 3.5 km wide (water depth approx. 20 m) and a Western channel approx. 21.5 km wide (water depth up to 300 m). The link is expected to include a highway and a railway. Given the water depth and the requirements to navigational clearance, it is expected that a single and very long multi-span suspension bridge with main spans of up to 3,000 m will be the solution.
- Services: Sketch design.

**PUENTE NIGALE, VENEZUELA**
- Total length: 11 km
- Main span: 460 m
- Project period: 2010 - ongoing
- Client: Odebrecht
- Services: Basic and detailed design of 11 km long fixed link for road and railway.

**SERVICES**:

- Basic and detailed design of 11 km long fixed link for road and railway.
- Conceptual and tender design, prequalification, tender evaluation assistance, design management, design check and technical services in connection with detailed design and construction.
- Inspection, testing, condition assessment, feasibility study, strengthening and rehabilitation design, tender documents, tender evaluation and construction supervision.
- Checking design of permanent works, checking design and construction of major temporary works, checking changes in design of permanent works, verification of geotechnical conditions on site during construction, analytical check including independent calculations.

**STUDIES**:

- Feasibility studies and surveys, concept and tender design. Preparation tender documents, tendering and tender evaluation.
- Sketch design.
COWI is a leading consulting group that creates value for customers, people and society through our 360° approach. We tackle challenges from many vantage points to create coherent solutions for our customers.