



WSP CIVILS SWEDEN

Creating good living environments for the future:
Ideas becoming reality

WSP SWEDEN

WSP Civils Sweden is part of WSP Sweden, a nationwide company with some 2,000 employees.

The business is divided into the following areas; WSP Analysis & Strategy, WSP Architecture, WSP Construction Design, WSP Environmental, WSP International, WSP Management, WSP Civils and WSP Systems.

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THE ADVANTAGES OF CHOOSING WSP

WSP Civils Sweden is the principal civil engineering division of WSP Group plc, one of the largest engineering consultancies in Europe and among the ten largest in the world.

The Group employs 6,500 people. It operates from more than 100 offices, in over 40 countries, across all five continents.

In its 30 year history, WSP Group has been the lead engineering consultant on many landmark projects. London's 'Shard of glass', the Freedom Tower in New York City and the City Line in Stockholm are amongst several high-profile current projects.

We are large for a simple reason: it enables us to offer clients several advantages. I would like to briefly set these out.

Large scale means we have experts in many diverse disciplines. We can therefore offer services to cover every phase of a project, from early pre-studies, inquiries and planning through to design, construction and management. In one organisation, we have engineers, landscape architects, planning architects, surveyors, geologists, urban planners and experts in many other disciplines. We can therefore form teams of people who have already successfully worked together many times before and achieved superb results. This saves time and money – efficiencies we pass on to clients enabling them to achieve more for less.

We not only have all this expertise in-house; we combine it with local knowledge through an extensive network of offices around the world. This allows us to manage diverse disciplines across different countries, cultures and industries.

WSP has built up a vast range of knowledge and experience from having completed some of the most challenging engineering projects of recent years. We bring these insights to every project, ensuring all our clients benefit from the latest innovations and technical advances. I have emphasised our size, but what of our approach? What is it like to work with WSP?

We are ethical so we take environmental concerns extremely seriously. We consider the impact of engineering projects on people's lives and place great importance on improving quality of life through good design.

One of the hardest things to convey is the excitement that comes from working with other disciplines and sharing ideas in pursuit of the best solution. Everyone's contribution is valued at WSP, regardless of whether you are a generalist or a specialist;

young or old. I believe that is why we consistently produce brilliant, original, and often very beautiful work.

We organise our services into five core areas: Roads and Highways; Railways; Traffic and Transport; Bridges and Tunnels; and Technical Support Systems. In addition, we provide clients with many other specialist services. This brochure describes these core areas and specialist services to give you a clearer picture of what WSP can do for you.

If you would like to discuss a project, or anything you see in this brochure, please get in touch. Our contact details are on the inside back cover.



Eskil Sellgren
Managing Director

WE WORK IN A NUMBER OF BROAD AREAS

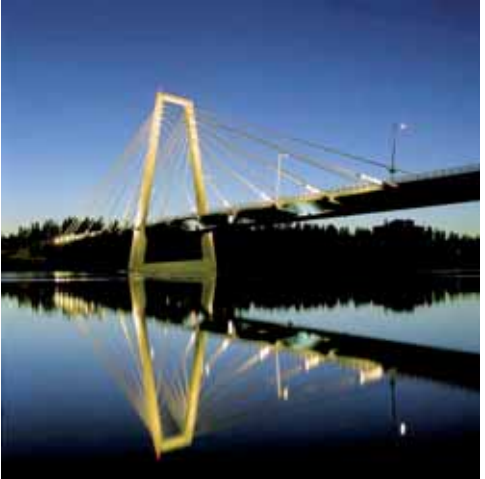
WSP Swedish Civils has not promoted itself much to date. We have preferred to focus on building our service offering and extending our geographical reach.

As a result, we are not well known outside the engineering community. Even there, we are often thought of as a specialist in certain types of work when in fact we have considerable experience across five core areas:

- 1. Roads and Highways
- 2. Railways
- 3. Traffic and Transport
- 4. Bridges and Tunnels
- 5. Technical Support Systems

In addition we provide many other **Specialist Services**, which can be called upon either individually or combined together, depending on what each project requires.

The following sections profile our work in each of these areas.



1. ROADS AND HIGHWAYS

Roads and highways are an important part of the community's infrastructure. We bring a wealth of experience to the process of planning, building and ongoing maintenance. We also offer comprehensive resources for handling the planning stages, from feasibility studies and preliminary design to the production of detailed design and construction documents including contracts and relation documents. Project management, construction

management and also the supervision and control of construction work are other important parts of the process where we can provide expertise. We carry out road audits to provide data so that measures to increase traffic safety can be developed. We conduct status surveys of roads and highways, and prepare operation and maintenance contracts.

The services we offer includes:

- Feasibility studies
- Route planning
- Junction design and assessment
- Highway design – outline and detailed
- Safety audit
- Supervision
- Inspections



1.1 The Southern Link, in Stockholm is the largest highway tunnel project ever in Sweden. WSP carried out the conceptual design as the detailed design and construction documents.

1.1 The Southern Link, Stockholm
The Southern Link connects the southern parts of Stockholm, relieving the pressure of local traffic in the city centre. The Link consists of over six kilometres of six-lane highway running through the southern suburbs and involves building 16.6km of rock tunnels making it the largest highway tunnel project ever in Sweden.

WSP's role has been extensive. We provided the feasibility study and detailed design for the eastern part, including highway design, landscaping, land surveying and mapping. We undertook the geotechnical and rock mechanical investigations and were responsible for project management and providing technical support to all project managers. WSP were also commissioned to lead the soil decontamination work and water treatment. We designed the traffic system and highway control system – both in the Southern Link and the surrounding areas.

1.2 Highway E6, Bohuslan
40km highway between Gothenburg and the Norwegian border. Detailed design and construction documents.



1.3 Oeresund Link, Malmoe
The Swedish landside of the huge connection between Sweden and Denmark. Preliminary detailed design and construction documents.

1.4 Road 226, Stockholm
One of the main roads from Stockholm to the south. Feasibility study and preliminary design.

1.5 Partihall Link, Gothenburg
The link connects the highways E45 with E20 and E6 including a tunnel under the Gotha river.

1.6 Beautiful Rattvik
A road project in the middle of Sweden. Preliminary design as detailed design and construction documents.

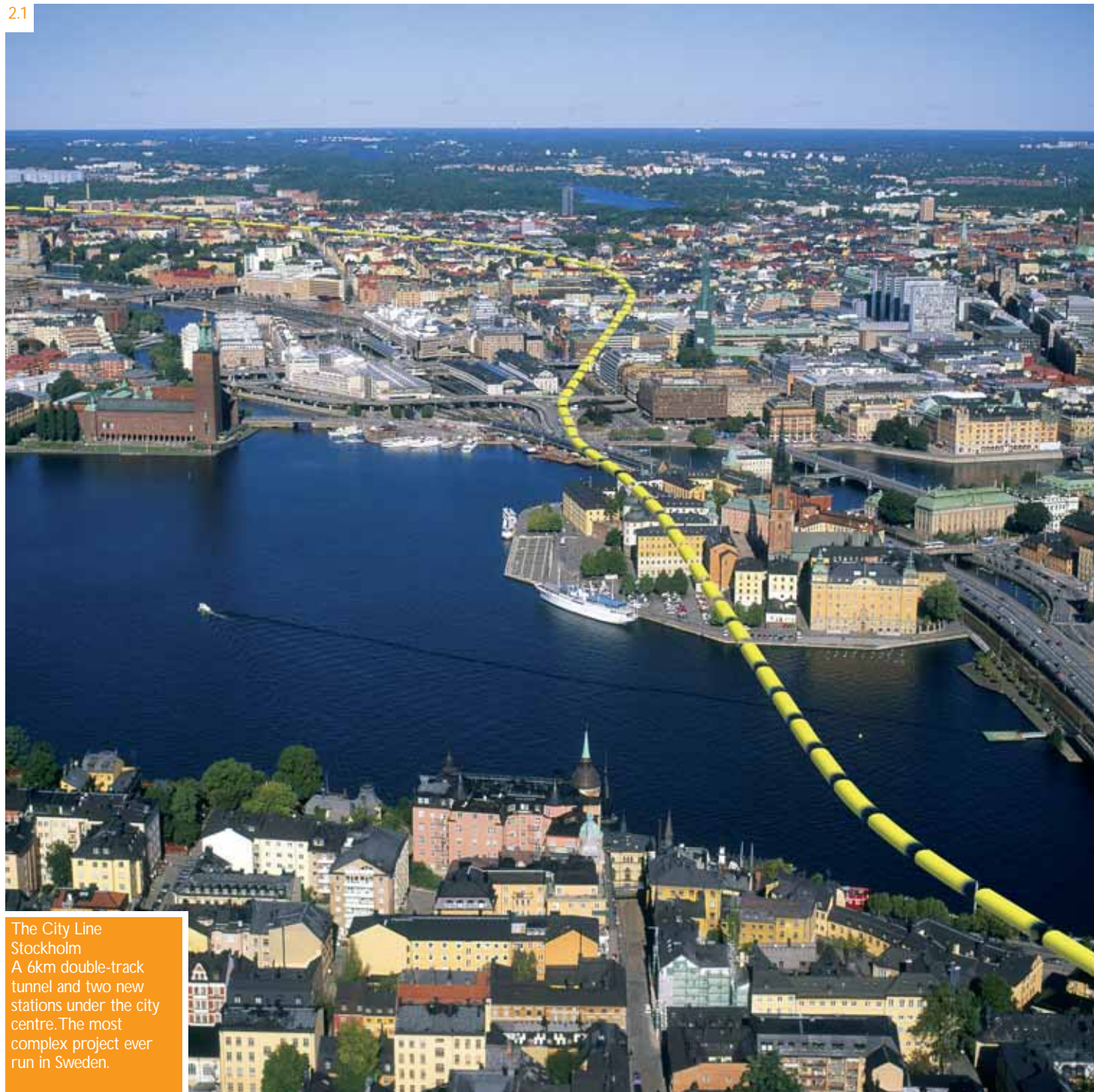
2. RAILWAYS

The railway section is a large and very significant part of WSP's business. By coordinating many different disciplines within WSP Rail and developing a broad and deep competence within all areas of the railway planning process, we have become a major supplier.

Permanent way engineers are involved in all phases of the planning and design process, undertaking modelling of track geometry, points, speeds, connections, rail lifting and platform design. Our specialists have in-depth experience of complex track geometry design and permanent way material issues, providing input to multidisciplinary teams working on major rail projects.

The services we offer includes:

- Permanent way engineering
- Track power supply
- Signalling and train control
- Telecommunications



2.1 The City Line Stockholm
A 6km double-track tunnel and two new stations under the city centre. The most complex project ever run in Sweden.



2.2 The West Link, Gothenburg
A railway tunnel for commuter train under the City of Gothenburg. Feasibility study and preliminary design.



2.3 Kallhall-Kungsängen, Stockholm
A 7km long railway line close to Stockholm. From feasibility study to detailed design and construction documents.



2.4

Building a new rail tunnel in a city centre between 10 and 40 metres below the surface is a very complex and high-risk undertaking – a huge challenge. In fact, the project's geotechnical models are the most complex ever run in Sweden. The new tunnel intersects the existing subway in two locations, so blasting necessitates the relocation of the subway track. WSP's proposals included the preparation of a new prefabricated bridge concept to carry traffic during the construction period.

The Swedish Rail Administration has appointed WSP to carry out conceptual design and project management for the track, water and waste-water installations for the entire length of the tunnel, as well as undertake rock geotechnical investigations and conceptual design for rock tunnels and concrete works.

2.1 The City Line, Stockholm
Stockholm is built on many islands. Water surrounding the city on all sides gives it great natural beauty but complicates city centre communications. In rail traffic terms, Stockholm is 'wasped', with only two tracks approaching from the south. These currently carry 500 trains a day, causing delays at peak times.

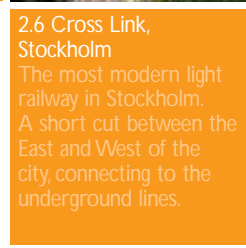
The City Line is a project to carry out a new 6km rail tunnel under central Stockholm between Tomtebodan, northwest of the city, and Stockholm South station. It will enable more traffic to be routed through the narrow approach to the city centre, easing congestion and increasing capacity by providing local commuter trains with their own dedicated section of track. City Line will also have two central underground stations to relieve city centre rail traffic, doubling capacity through the city from the current 24 trains per hour in each direction to 48.



2.5 Arlanda Express, Stockholm
The express railway line between Arlanda Airport and Stockholm city centre. Detailed design and construction documents.



2.6 Cross Link, Stockholm
The most modern light railway in Stockholm. A short cut between the East and West of the city connecting to the underground lines.



2.7 East Coast Line, Gavle
20km of new and refurbished/upgraded railway in eastern Sweden. Detailed design and construction documents.

2.4 Bothnia Line, Kramfors-Umea
The greatest railway project of modern times in Sweden. It is 190km long with 140 bridges and 25km of tunnels.

3. TRAFFIC AND TRANSPORT

Traffic and transport are key to the functioning of society and the way the traffic system is designed affects many people. Within WSP, we have experience in making transport more efficient, safer and better adapted to the environment. To achieve this requires the coordination of several related disciplines: community planning, computer modelling of current and future traffic levels, and urban planning. In our analysis, we consider the use of all kinds of vehicles and we take into consideration the needs of all types of transport users including pedestrians, cyclists, public transport, road and railway users.

The services we offer includes:

- Traffic planning and traffic solutions
- Traffic forecasts, traffic finance
- Traffic safety
- Traffic net analyses, line net analyses
- ITS, Intelligent Transport Systems
- Parking studies
- Terminals
- Access plans, child consequence analyses
- Impact analyses, noise and pollution analyses
- Mobility management
- Environment-friendly transportation
- Logistics

3.1 The Northern Link will reduce noise and carbon-dioxide emissions in Stockholm.



3.2 The city of Kalmar, Micro simulation of the traffic in a 3D model.



3.1 Northern Link, Stockholm
 Stockholm's new northern city link road will connect Sweden's major freight harbours and ferry terminals serving the Baltic states, Finland and Russia. Currently in the planning phase, the 13km Northern Link is mainly tunnels. It is intended to relieve the heavily congested city centre streets, whilst also benefiting city dwellers and road users through the introduction of environmental measures such as reduced noise and carbon-dioxide emissions. WSP is contracted to carry out many aspects of this project, including the design of all the link systems installations, including Variable Message Signs (VMS) and automatic shut-off devices.

In preparing for the technical specifications, we produced a number of market surveys that included interviews with both suppliers and users of stopped vehicle detection systems. As part of this survey, WSP UK assisted with a survey of possible methods for detecting vehicles. The purpose of this was to determine the function of the different systems on the market, their limitations and what demands were reasonable to put on the system. Other systems that were surveyed within the project were automatic barrier systems, VMS signs and energy absorbing barriers and nets. The end result is a function description and specification for the tunnel's traffic management system that fully utilises the potential of the latest technology.

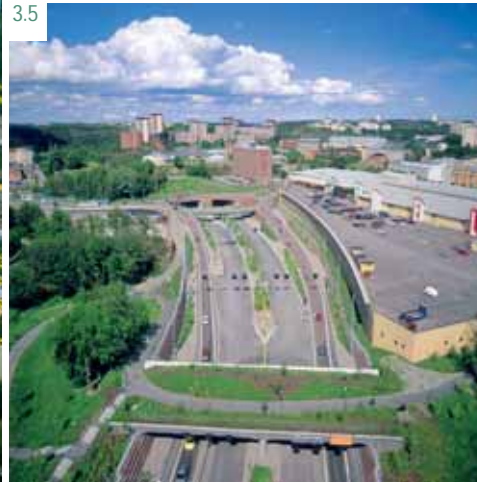


3.3 Kommunalvagen Huddinge
 Traffic safety improvements. Design process included 3D rendering.



3.4 DHL, Sweden
 Our work for DHL helped them save 600-1,200 hours per day.

3.5 The Southern Link, Stockholm
 MCS and VMS system.



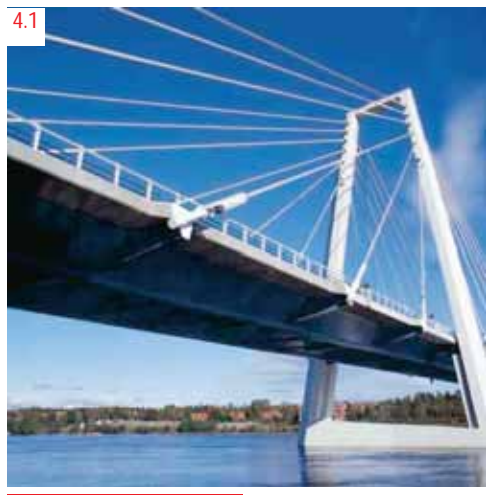
3.6 Artillerigatan, Gothenburg
 Improvement of traffic safety of the road and tram line.

4. BRIDGES AND TUNNELS

Bridge and tunnel engineering plays a large and important part in almost all of our road and railway related projects. By bringing together the required disciplines under one roof at WSP, we have become a world-leader in this area. Our specialists have a thorough knowledge of advanced planning and material technology issues, and experience of building complex structures where several technology disciplines come into play.

The services we offer includes:

- Planning and design
- Aesthetics
- Classification and bearing capacity determination
- Surveys and inspections
- Bridge and tunnel repairs
- Temperature crack analyses
- Guidance



4.1 The design of the Kolback Bridge in Umea won first prize in a competition open to invited architectural firms. Also provided the detailed design and construction documents.

4.1 Kolback Bridge, Umea
The Kolback Bridge is a cable-stayed bridge in Umea, in the north of Sweden. WSP's was commissioned by the Swedish National Road Administration, after its design won first prize in a competition open to invited architectural firms. The bridge aims to relieve the pressure of local traffic in the central part of Umea. It consists of three sections: a concrete bridge over the Lilla River, a cable-stayed bridge over the Ume River and a landside bridge. The cable-stayed bridge is 710 metres long and has a span of 130 metres. WSP provided the detailed design and construction documents.



4.2 The Gotha Tunnel, Gothenburg
Tough challenges through rock and extremely soft clay for a 1.6km long tunnel in the harbour area.

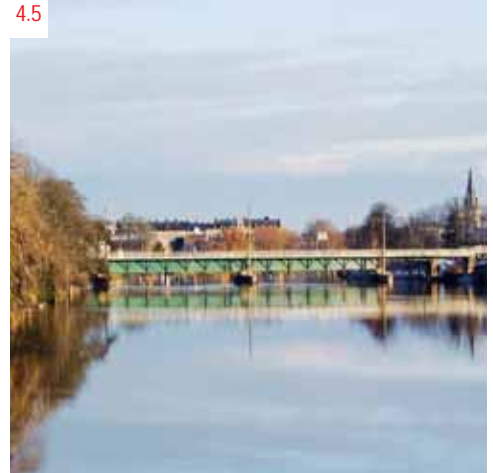
4.3 The Arsta Bridge, Stockholm
A challenge in bridge design and geotechnics both for the new and the old railway bridges. Bridge and geotechnical planning and detailed design.



4.4 Hagfors
Bridge maintenance management.



4.5 Bridge across the river, Karlstad
Detailed design and construction documents for a steel bridge across the river.



4.6 Arlanda landside, Stockholm
Detailed design and construction documents for the new terminal and the departure deck.

5. TECHNICAL SUPPORT SYSTEMS

The Technical Support Systems area has the multi-disciplinary skills to provide a range of different pipeline technologies involved in water supply and waste-water engineering, district heating and district cooling, and Natural Gas supply. We plan and design but also have expertise in handling the financial and legal issues. We are constantly innovating and have recently developed a hydraulic, real-time model – by advanced software – for both water network and district heating and cooling.

The services we offer includes:

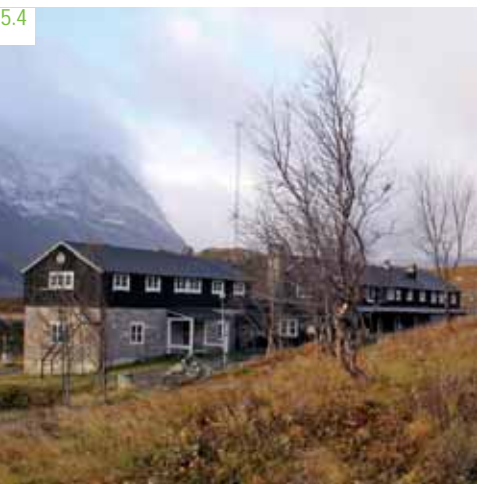
- Distribution network for water, waste-water and storm water
- Pipeline for district heating and cooling as natural gas
- Dewatering
- Installations in tunnels
- Wetlands
- Treatment of sludge and natural gas
- Optimisation of treatment plants
- Multi-disciplinary investigations
- Economy and law

5.1 Hammarby Sjostad, Stockholm
Collects and treats contaminated storm water, to supply 20,000 inhabitants.

5.2 Water Network, Kalmar
Real-time modelling and system maintenance by means of the AQUIS software.



5.1 Hammarby Sjostad, Stockholm
Hammarby Sjostad is a newly-developed and heavily populated area in the south of Stockholm which has 9,000 flats and 20,000 inhabitants. An important part of the city planning in Stockholm is to collect storm water in reservoirs so that public leisure facilities can be created. WSP have provided feasibility studies, conceptual design and detailed design as construction documents for a storm water dam and recreation facility combined with a plant for the treatment of contaminated traffic storm water. WSP have also been responsible for the design and co-ordination of all technical systems for the supply of water and sewerage, district heating, gas, storm water, power supply and telecoms to the new district.

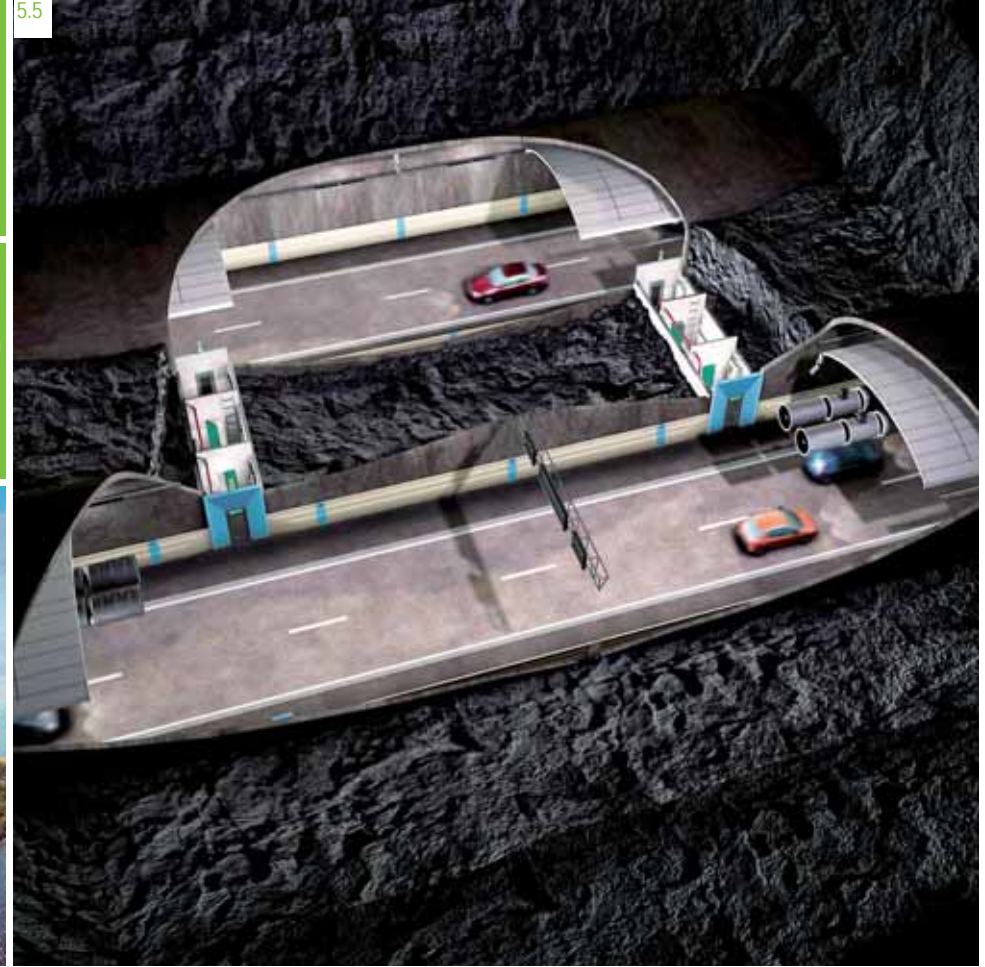


5.3 District Heating, Umea and Ornskoldsvik
Lead consultant on the design and feasibility studies of renewable energy supply in Northern Sweden.

5.4 Kebnekaise high mountains, North Sweden
Water and waste-water treatment on a remote mountain base.

5.5 Northern Link, Stockholm
Design of all the Link's systems installations of the 13km tunnel connecting Sweden's major ports and ferry terminals.

5.6 Gorvaln waste-water treatment plant, Stockholm
Managing the sludge from the waste-water plant by a 6.5km long sea pipe to the sewerage network.



OTHER SPECIALIST SERVICES

WSP is a multi-discipline civil engineering consultancy. In total, we offer a great number of areas of expertise. On this and the following pages, we describe the most prominent of these and give examples of projects where we played a key role.



6.1 Hydropower Station, Letsi
Design and model testing of the 1900m³/s water flow of the 85 metre high dam in the north of Sweden.

Hydropower and Dam Engineering
Our services cover everything from planning to construction including the safety issues for dams and hydroelectric power stations. We provide detailed dam safety evaluations and plan measures for achieving safety targets. We also consult on fire and evacuation safety in underground power stations.

Harbour Engineering
We carry out status surveys and planning for marine constructions, buildings and handling spaces and plan preventative maintenance, surveys and investment budgets. Amongst the services we offer are project management and procurement, securing planning permissions, risk analysis and certification according to ISO standards.

Strategic Planning
The planning process involves considering technical, environmental and social factors and their integration to create good environments for the future. Our planning assignments require us to take on everything from guidance and inquiry outlines to the responsibility for the entire planning process and drawing up all formal documents. The outcomes vary from masterplans to detailed plans.

Geotechnics and Rock Mechanics
We perform geotechnical and rock mechanical investigations; hydro-geological field and laboratory investigations, as well as environmental geotechnology subsoil exploration. We conduct surveys and planning for foundations, excavations, landfill, rock plants, soil and rock reinforcement, structural support and more. During the contracting phase of work, we produce documentation for geotechnical, rock mechanical and environmental monitoring as well as up-dates.

Environmental Impact Assessment (EIA)
We conduct comprehensive audits, assessing ecological impact, damage to areas of outstanding natural beauty or historical significance and the likely visual and acoustic effect of structures in densely populated areas. EIA's clear analysis of these factors, and their recommendations for impact-limiting measures, are critical to most projects we undertake. EIA specialists are therefore involved in most stages of a project's development.



6.2 Port of Karlshamn
Investigations and design for future development of the harbour including industrial estate and marshalling yard.



6.3 Silverdal Churchyard, Stockholm
Detailed landscape design.



6.4 Block Jankovitz, Gothenburg
Extensive landscape programme for a 332 apartment development.



6.5 Roundabout, Road 70/71, Djuras
A crossing with traffic lights was replaced by a roundabout and the project consisted also of two other roundabouts as a cycle and footpath.



6.6 Third Runway, Arlanda Airport, Stockholm
Geotechnical investigations, detailed design of runways, taxiways and drainage systems.



6.7 Biltema, Halmstad
Design of soil improvement for a new harbour area consisted of dredged soil.

OTHER SPECIALIST SERVICES continued

Geographical information

For any kind of urban planning, design and construction, or any kind of civil engineering operation or maintenance activity, there is a need for geographical data. This may consist of drawings, maps, orthophotos or models, all of which describe the surface of the ground's elevation. This geographical information will include all geodetic measurements, airborne and terrester laserscanning, digital photogrammetry, orthophotos, satellite images and remote analysis, mobile mapping, visualisation and Virtual Reality (VR) and GIS. WSP provide all of these measuring services.

Landscape Architecture

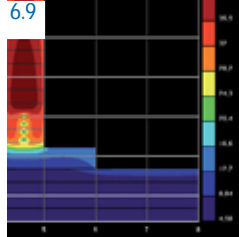
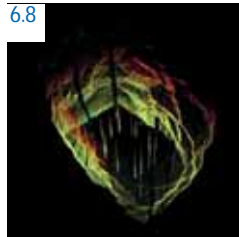
Creating public spaces which are both functional and beautiful is at the heart of this discipline. The aim is to create spaces people enjoy being in. To achieve this, we analyse the landscape's current problems and assess its possibilities. Our proposed changes anticipate all the potential effects on every type of user of the space. When planning maintenance measures for our green spaces, we aim for financial efficiency and simplicity.

Land Development

We carry out consultancy services for surveys, conceptual design and detailed design. We also complete request documents for all types of ground constructions. The services we provide could include everything from simple grading of plots to the planning of mass exploitation of areas for housing, offices and industries.

Surveying and Mapping

We take measurements as a basis for planning and design. During the construction phase, this work consists of set-ups, as well as control and relations measuring. Terrain models are drawn up for planning and quantity computations and as a basis for regulation. Our specialists manage and perform complex measurement assignments, including GPS measuring and precision measuring, and the analysis and presentation of digital picture data and computations.



6.8 Laserscanning of Skip Shaft, Kiruna
The shaft for the mine hoist is 930 metres deep and was investigated in order to obtain a view of the wall roughness.

6.9 Temperature crack analysis
Analysis of temperature cracks in concrete, e.g. a bridge pillar.



6.10 National Museum, Stockholm
Laserscanning and terrester surveying as a 3D and Virtual Reality model of the interior and exterior of the museum.



6.11 Laserscanning of Highway 45, Trollhattan
Airborne laserscanning to generate terrain modelling.

6.12 Drottningholm Palace, Stockholm
Orthophoto and photogramatic survey to record the entire palace in minute detail for restoration purposes.

6.13 Soderby Golf Course, Uppsala
Design and 3D modelling of the golf course whilst preserving a historical Viking site.

This brochure aims to give you an overview of what we do.

It can only describe so much. If you would like to talk to someone about any of the services described in this brochure, or just want an initial discussion about your plans, please get in touch. We are sure to have a specialist who can help you.

WSP
Arenavägen 7
SE-121 88 Stockholm-Globen
Tel: +46 8 688 6000
Fax: +46 8 688 6999

info@wspgroup.se
www.wspgroup.se

