

**maeg**

- BRIDGES AND VIADUCTS

# Viaducts

# Specialist in the **design**, **manufacturing** and **installation** of steel structures

## About Maeg

Maeg is an international player in the construction sector. With more than 40 years of experience, Maeg's expertise can adapt to each project characteristics to devise tailor-made and innovative engineering solutions, concretely transforming design into substance.



ISO 9001:2015



ISO 1090-1/2



ISO 3834



EURO SOA



RFI - SQ008 TMF-001



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# SKURU BRIDGE

## Location

Stockholm, Sweden

## Client

Swedish Transport Administration (Trafikverket)

## Contractor

Itinera S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2020-2021

## Weight

5.800 tons

## Length

317 mètres (41+63+99+68+46)

Situated in the east of Stockholm in the municipality of Nacka, the new Skuru Bridge substitutes the existing arch bridge from 1914 to solve an untenable traffic situation for people commuting to the capital, a figure exceeding 52,000 every day.

The design of the bridge has been chosen out of an international contest among design firms and it has been chosen for its slender and aerodynamic shape made as transparent as possible to create a connection between the two structures, without the new bridge blocking the view of the old. The bridge is structured in two separate carriageways connected by welded cross beams only in correspondence of the pillars and embankment. The geometry of the decks is quite complex as it curves both transversally and longitudinally. It is made of steel "wing profile" closed sections, composed of

orthotropic steel slab. The bottom part of the pillars is made of concrete, while the upper part connecting to the deck is made of steel. Considering the limited amount of space, on the shore it is realized at a height of 15 meters a temporary factory with a surface of 2.500 square meters and a height

of 18 meters inside which the steel deck will be assembled, welded, painted and launched with hydraulic jacks and launching nose 72 meters long. Once the launching is complete, the whole steel deck will be lowered to the pillars to be welded in its final configuration.





# SVILAJ VIADUCT

**Location**

Svilaj, Croatia

**Client**

Republic of Croatia & Bosnia and Herzegovina

**Contractor**

Hering d.d.

**Scope of work**

Design, fabrication and installation of steel structures

**Period of execution**

2017-2019

**Weight**

5.300 tons

**Length**

640 meters (70+85+100+130+100+85+70)

The realization of this bridge, crossing the Sava River at the border between Croatia and Bosnia and Herzegovina, is part of a broader European project aimed to improve the viability system of the Western Balkans and connect the area within the European road system.

Svilaj Bridge is a double-lane bridge with an overall length of 640 meters, divided in seven spans. The steel structure has an overall weight of 5.000 tons and lays on four concrete pillars, two of which inside the fluvial riverbed. Single elements have been firstly pre-assembled on the ground, then erected in position on the top of temporary structures and staxo towers for those areas above the shore, while the central span is installed and supported by mean of a crane. To ensure accessibility also during flooding season, two banks have been created within the river by using sheet piles to stem the water flow.





# MUHAMMAD BAQUIR AL-SADR BRIDGE

## Location

Basra, Iraq

## Client

Basra Governorate

## Contractor

Maeg Branch Iraq

## Scope of work

General Contractor

## Period of execution

2013-2017

## Weight

6.100 tons

## Length

1.188 meters

This structure, crossing the union of the rivers Tigris and Euphrates, is the first great realization of a broader urbanization program of the Iraqi region. By connecting the city of Basra to its suburbs developing transport and trade, the project has had a remarkable impact on the local population. Maeg was appointed as a General Contractor, completing the work in just 26 months.

The project is composed of two viaducts having a length of 450 (37+43\*8+69) taking to a central cable-stayed bridge 288 meters long (69+150+69) and supported 14 steel cables connected to two antennas 40 meters tall. The width of the bridge is 21.5 meters. Altogether, the weight of the steel structures is 6.017 tons, supported

by 25 concrete pillars having a diameter between 1.8-2 meters, dug into the ground at a depth of 50 meters to offset the seismicity of the area. Overall, 33.500 cubic meters of concrete have been used. The assembly method was designed to meet two main requirements: firstly, to concentrate as many activities as possible on the ground, where working conditions are easier and more controlled, and secondly to avoid interference with the maritime traffic.

The solution was to create on both sides of the bridge a pre-assembly area equipped with gantry cranes to prepare 10-12 meters long segments to be slid on roller conveyors by means of jacks and then installed by incremental launching. Similarly, steel antennas were firstly transported at location horizontally, then lifted with jacks and a specially designed equipment installed in front and behind the antenna to allow final positioning.





# LOUKKOS RAILWAY VIADUCT

## Location

Larache, Morocco

## Client

Office National des Chemins de Fer (ONCF)

## Contractor

Société Générale des Travaux du Maroc (SGTM)

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2012-2015

## Weight

10.500 tons

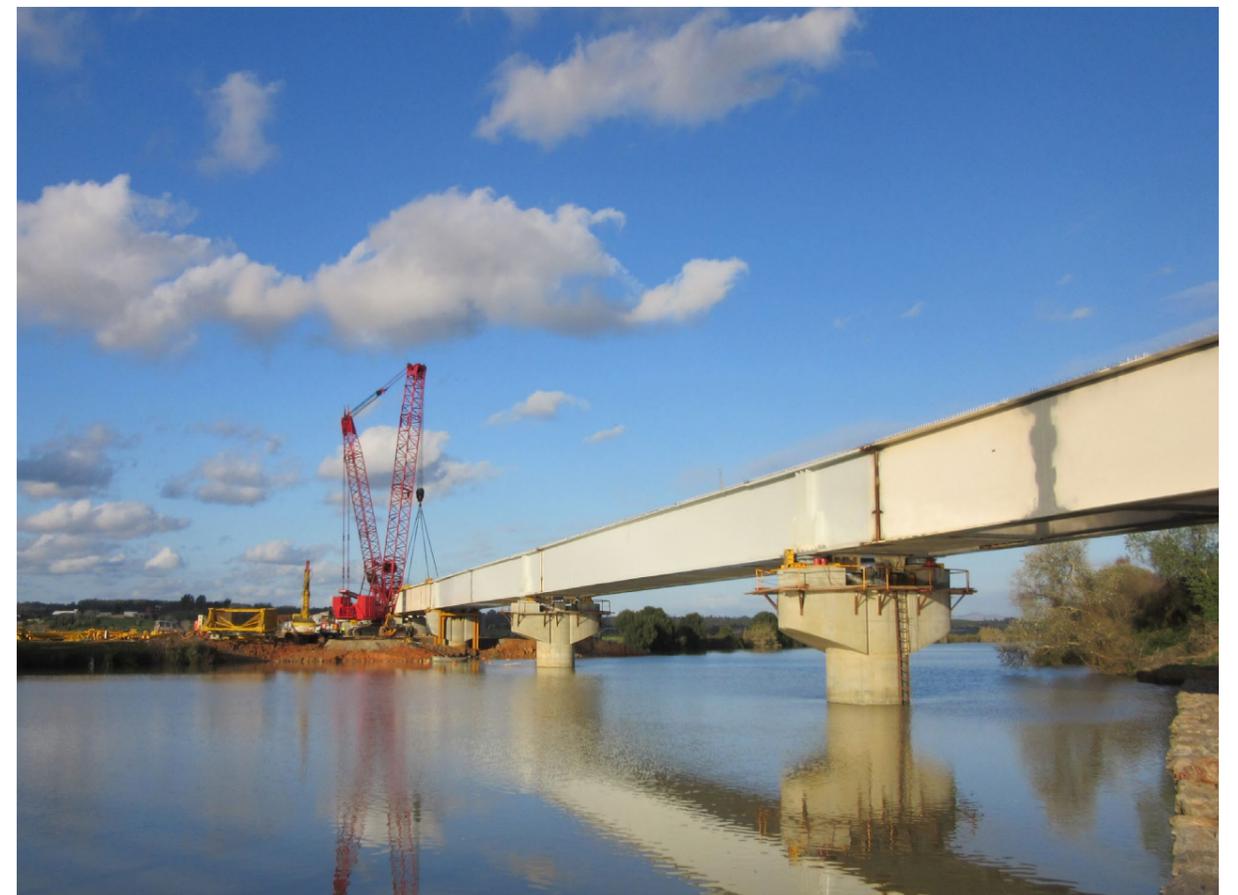
## Length

2.256 meters

Part of the broader project arriving to Casablanca, it serves the 350 kilometers long high-speed train line between Tangier and Kenitra, halving the travel time among the main cities of the country. At the completion of the works, this railway line will be one of the longest in the whole Africa.

The Loukkos Railway Viaduct crosses the Loukkos River and has a total length of 2.256 meters, divided in 41 spans with a variable length between 51.6 and 56.5 meters. Single spans were lifted and launched from the ground. From the planimetric point of view, the viaduct has a constant curvature with a radius of 25.000 meters. The structure is composed of two main double-T beams, 3.75 meters high and with an interaxle spacing of 6.3 meters, whose thickness increase in

correspondence of the bearings. On the lower part of the structure, 2 meters wide flat slabs are placed and fixed to the main beams by means of studs and concrete, acting both as a bracing and planking level to inspect the structure.





# ACILIU VIADUCT

## Location

Sibiu, Romania

## Client

Romanian National Company of Motorway and National Roads

## Contractor

Collini Lavori Spa Trento - Sucursala Bucuresti

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2013-2014

## Weight

8.100 tons

## Length

1.100 meters (14\*78)

Built along the 82 km long motorway A1 between Orastie and Sibiu, in Romania, the Aciliu Viaduct is one of the several infrastructures planned to upgrade the IV Pan-European corridor running through Eastern Europe. It is also known as the longest and the highest viaduct in Romania, with a height of 80 meters and a length of 1.100 meters.

The Aciliu viaduct is made with inclined double-T beams in Corten steel, with welded longitudinal and transversal joints and bolted reticular internal bracings. The viaduct has a length of 1.100 meters, divided in fourteen spans 78 meters long, with a width of the deck of 24 meters. The structure dominates the Aciliu valley at a height of 80 meters from the ground and rests on concrete piles planted at a depth of 40 meters

into the ground to offset the instability of the sandy soil of the valley. The viaduct was assembled in macro-segments in the assembly field on the ground with 80 tons gantry cranes and then incremental launched with the aid of a launching nose, proceeding simultaneously on each direction.





# VALTELLINA VIADUCT

## Location

Morbegno, Italy

## Client

Anas S.p.A.

## Contractor

Ing. Claudio Salini Grandi Lavori S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2009-2014

## Weight

8.250 tons

## Length

3.850 meters

The project is part of the variant of the state highway n. 38 between the intersection with the road n. 36 “of the Como lake” at the km 8+200, so-called “dello Stelvio”, in the municipality of Cosio Valtellino. The infrastructure will improve the connection of the lower part of the Valtellina valley, reducing the transit on local roads and ensuring safety and livability to residents.

The Valtellina Viaduct consists of two parallel mixed viaducts having a total length of 3.850 meters, divided into seven segments measuring 480 meters and composed of ten spans each (40+50\*8+40) and a final eighth segment with eleven spans having a length of 490 meters. The section of the viaduct measures 13 meters of width and comprises two main beams with inclined web with a variable height of the beam

between 1.75 and 2.80 meters (in correspondence of the pillars). The connection between the two main beams is made by mean of lower reticular bracings aimed to absorb horizontal loads. Altogether, the weight of the steel

structure amounts to 8.249 tons. The installation of the viaduct crossing the bottom of the Valtellina valley has been performed from the bottom using cranes.





# GIOSTRA VIADUCTS

## Location

Messina, Italy

## Client

Anas S.p.A.

## Contractor

Ricciardello Costruzioni Srl

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2010-2013

## Weight

4.800 tons

## Length

3.700 meters

The Giostra viaducts are part of a complicated project to reorganize the viability of Messina, allowing a significant reduction of traffic by completing the urban project of the area. These highway junctions consist of fourteen elevated viaducts on various levels with a total extension of 3.7 km.

The fourteen viaducts composing the Giostra highway junctions consist of double-T beams made of Corten steel with bolted reticular diaphragms, weighing 4.800 tons. Overall, the work has a length of 3.7 kilometers divided into spans of variable length based on the specific location of the viaduct. The width is divided into seven unidirectional single-lane ramps with a deck width of 8.25 meters and seven unidirectional double-lane ramps with a width of 10.75 meters. Built at

the base of the Nebrodi mountains, within an urban context, the work was entirely launched from below.





# FORNELLO EAST VIADUCT

## Location

Verghereto, Italy

## Client

Anas S.p.A.

## Contractor

De Sanctis Costruzioni S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2012-2013

## Weight

1.000 tons

## Length

220 meters (52+115+53)

The Fornello Viaduct was originally built between 1968 and 1970 in concrete. However, the structure has proven to have deformability problems, therefore it has been substituted with a steel option to modernize and improve the seismic performance of this structure, part of the road E45, with clear safety benefits.

The Fornello Viaduct is composed of two parallel viaducts, named "East" and "West" with the same characteristics: they have a width of 12 meters, a length of 220 meters divided in three spans with a variable section between 2 and 5.2 meters. Beams are located at 4.9 meters. The steel structure was pre-assembled and welded on the top of the existing viaduct made of reinforce concrete, then installed with an incremental launch. Basing on the variable section and of the

relevant distance of 115 meters during the launching phase, particular attention was placed in the study of the launching nose. The new viaduct is built on top of the already existing

concrete pillars. To improve seismicity, in correspondence of the bearings have been also installed seismic isolators.





# CABALLA VIADUCT

## Location

Morano Calabro, Italy

## Client

Anas S.p.A.

## Contractor

Cogip Infrastrutture. S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2010-2011

## Weight

1.855 tons

## Length

654 meters

Realization of three viaducts within the intervention of modernization and improvement of the portion of the A3 highway between Salerno and Reggio Calabria, to ensure the required level of safety to the structure part of an important segment 11 km long.

The project is composed of three double-carriageways viaducts substituting the namesake previous concrete viaduct, now demolished. The viaduct North Caballa has a constant section 324 meters long (54+72+72+72+54) and with a weight of 847 tons, launched from the ground by mean of cranes. The viaduct Caballa 1 is characterized by a variable section between 3 and 5.5 meters and has a length of 220 meters (60+100+60) and a weight of 738 tons. The structure was installed with an incremental launching to overcome the distance of 100 meters of the central span. Lastly, the viaduct Caballa 2 has a length of 110 meters (55+55) and a weight of 300 tons.





# TEVERE VIADUCT

## Location

Monterotondo, Italy

## Client

Anas S.p.A.

## Contractor

Tecnis S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2009-2010

## Weight

2.400 tons

## Length

375 meters (50+75+125+80+50)

The realization of the Tevere Viaduct is part of a broader project of renovation of the state road Salaria n. 4 in Monterotondo connecting it with the provincial road "Tiberina". It consists of a viaduct with double-T beams with a variable section, with welded longitudinal and transversal joints.

The steel structure of the Tevere Viaduct has a weight of 2.400 tons with an overall length of 375 meters. The peculiarity of the project lies in the erection methodology conceived for the installation of the 125 meters long central span above the Tevere River. The conformity of the site made impossible to install any temporary equipment inside the river and offered a limited manoeuvring space on the shores, forcing to opt for a cantilevered solution for the installation. To overcome these constraints, two pitches have been realized on the shores, also using

sheet piles, in a way to create more space able to support two 600 tons cranes. The cantilevered installation of the segments has forced the cranes to work at the top of their payload.





# SANGRO VIADUCT

## Location

Fondovalle Sangro, Italy

## Client

ANAS S.p.A.

## Contractor

Tecnis S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2008-2009

## Weight

1.054 tons

## Length

344 meters (58+92+92+60+42)

The realization of the Sangro Viaduct is part of the broader project for the renovation of the section between the Gamberale and Civitaluparella stations, 2° lot – 1° section of the State Road n. 652 named “Fondovalle Sangro”.

The deck of the structure has a static scheme with a constant beam basing on six bearings, with spans of 58+92+92+60+42 meters made of double-t beams with a variable section and an interaxle spacing of 9 meters. Webs have a 24° inclination respect the lower flange. Overall, the deck has a width of 13.5 meters and an overall weight of 1.054 tons.





# SARDINIAN GRENADIERS BRIDGE

## Location

San Donà, Italy

## Client

ANAS S.p.A.

## Contractor

Tecnis S.p.A.

## Scope of work

Design, fabrication and installation of steel structures

## Period of execution

2007-2008

## Weight

2.270 tons

## Length

480 meters (90+100\*3+90)

The Sardinian Grenadiers Bridge, built over the Piave River, takes its name in honour of the ancient Italian Army unit who fought during the First World War not far from the place where the bridge is built.

The structure consists of five spans, two side ones 90 meters long and three central ones 100 meters long. The use of concrete and steel makes the structure extremely resistant to seismic movements and, to give greater protection from atmospheric agents, the external surface has been painted with a waterproofing cycle typical of the naval sector. Particularly important has been the launching of the two sections composing the central span above the river: they have been firstly assembled on the ground and then positioned with a combined operation from the two shores, using a unique crane in Italy with a 800 tons capacity. Part of the 2nd lot of the variant of San Donà di Piave

to the highway 14, this bridge has allowed to completely modify the road structure and direct the heavy traffic far from the inhabited centres. The roadway includes two lanes (one for each direction) and passable verges along the bridge with cycle paths and sidewalks.





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