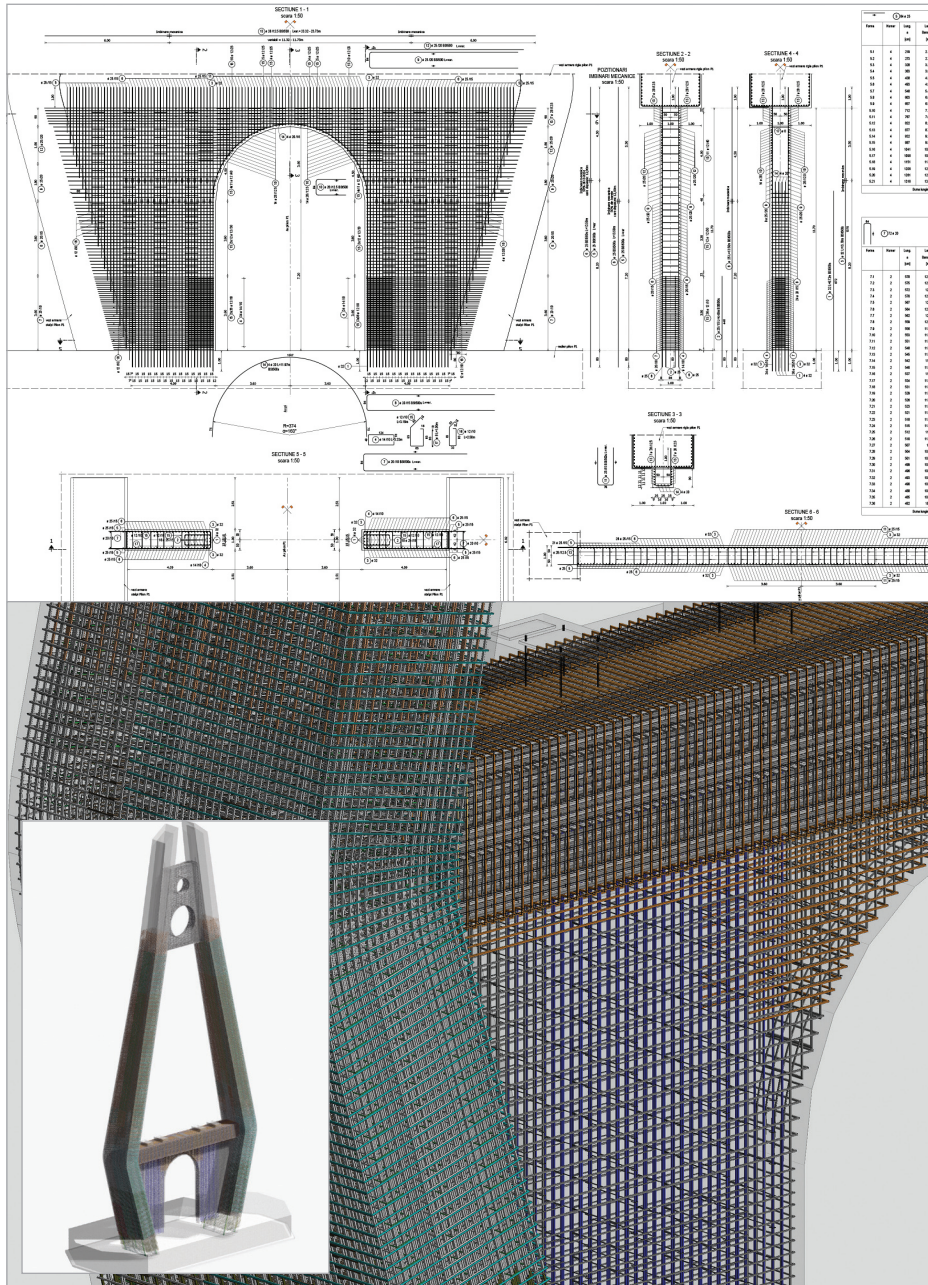


Bridge over the Danube - Agigea Constanta, Romania



The bridge over the Danube-Black Sea Channel from Agigea - km 0 + 540 - is located at the confluence of the Black Sea and the Channel, near Constanta seaport. The bridge ensures the connection between the Northern and Southern zones of the harbour, now separated by the Danube-Black Sea navigable canal. The structural engineers from Search Corporation SRL are using Allplan Engineering to carry out this special project.

The bridge and access viaducts have a total length of 906.82 m, with 362.00 m for the bridge and 544.82 m for the viaducts.

The overpass of the Danube-Black Channel is carried out with a cable-stayed bridge which has three spans of 81.40 m and 200.00 m + 81.40 m; the superstructure has a total length of 362.80 m.

The deck of the cable-stayed bridge is made from a composite structure (steel + concrete), partly made of prestressed concrete on the lateral spans, and metal, partly in collaboration with the flooring from the reinforced concrete of the bridge superstructure. The access viaduct decks are made from prestressed, precast, reinforced concrete beams, which works through a monolithic plate and prestressed concrete cross pieces.

Above the anchorage area, the pillars are made from composite sections: steel box (where the anchorages of the cables are positioned) embedded in concrete. The cooperation is achieved with flexible connectors welded to the steel box of the anchorages. The total height of these pillars is 62.00 m.

The design elements for the bridge over the canal and viaducts, as required by the specifications and project are:

- The clear height under the bridge should be equal to the railway bridge from the lock, which is 17.70 m and provides the navigation gauge required for the Danube-Black Sea Channel which has a height of 17.50 m, a width of 35.00 m in the middle of the waterway and 10.00 m on the remaining width. This is required by both technical and economic conditions and also for ensuring the safety zones, protection and stability of the channel section;
- The bridge is equipped with a roadway width of 14.80 m, which provides four lanes: two lanes for traffic

and two lateral pedestrian sidewalks with a minimum width of 75 cm;

- A life-time of at least 50 years, designed according to norm AND 554-2002;
- The structural strength of the bridge over the canal and the access viaducts is designed for live loads according to STAS 3221-86 "Bridges Road. Convoy type and class loading";
- In terms of the seismic design, the work is placed according to norm SR-EN 1998-2:2006 and National Annex SR-EN 1998-2: 2006/NA: 2010.

In the cross-section, the bridge superstructure is made from two steel box cuffed girders in collaboration with reinforced concrete flooring, respectively from two prestressed concrete cuffed beams.

The solution adopted for the execution of the bridge is characterised by the modern design structure, which presents a number of technical and economic advantages such as:

- Combination of relatively simple structural components with known technologies in a unitary complex structure;
- Reducing the duration of construction, with all the benefits arising from achieving this goal;
- Achieving a work with a particular architectural aspect;
- Achieving a work with a height of reduced construction, of only 3.05 m, representing approximately $L / 70$ of the central span of the bridge, $L = 200$ m.

Workflow with Allplan Engineer

The design started with the generation of the digital model of the terrain using the specific functions from Allplan (Digital Terrain model).

The road and the deck elements were created using the Bridge/Civil Engineering module.

The general arrangement drawing files were realised directly from 3D using the Associative Views module. Because of the reinforcement complexity, the reinforcement model had to be checked for every inserted placement of bars. Using the function Collision check and displaying bars with different surface colours, the structural engineers did this more efficiently.

Special 3D objects and textures were used for obtaining a realistic presentation.

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Search Corporation is one of the most important companies in Romania specialised in planning road transportation networks. With four offices, it is located in the most important cities of Romania: Bucharest, Cluj, Timisoara, and Iasi. Founded in 1991, our company was built on the idea of creating a strong professional organisation that operates according to international standards with competitive prices. Valuing teamwork, quality and perseverance, the company seeks to meet the needs of its clients, whether they are governmental agencies, municipalities or private entities. In the past, Search Corporation has contributed in the preparation of the national strategy for road network development, alongside the Ministry of Transport, the Romanian National Company for Motorways and National Roads, and local authorities. Due to its values, Search Corporation has become a strong and reliable resource for the road and airport administrators in Romania, in the planning, designing and construction management required for road infrastructure projects and airport development.

Project information

Owner	Compania Nationala Administratia Porturilor Maritime S.A
Architect	Search Corporation S.R.L
General Contractor	Ministerul Transporturilor, Constructiilor si Turismului
Engineering Office	Search Corporation S.R.L
Location	Agigea - Constanta, Romania
Construction Period	06/2010 to 12/2013

Short description | Bridge over the Danube

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