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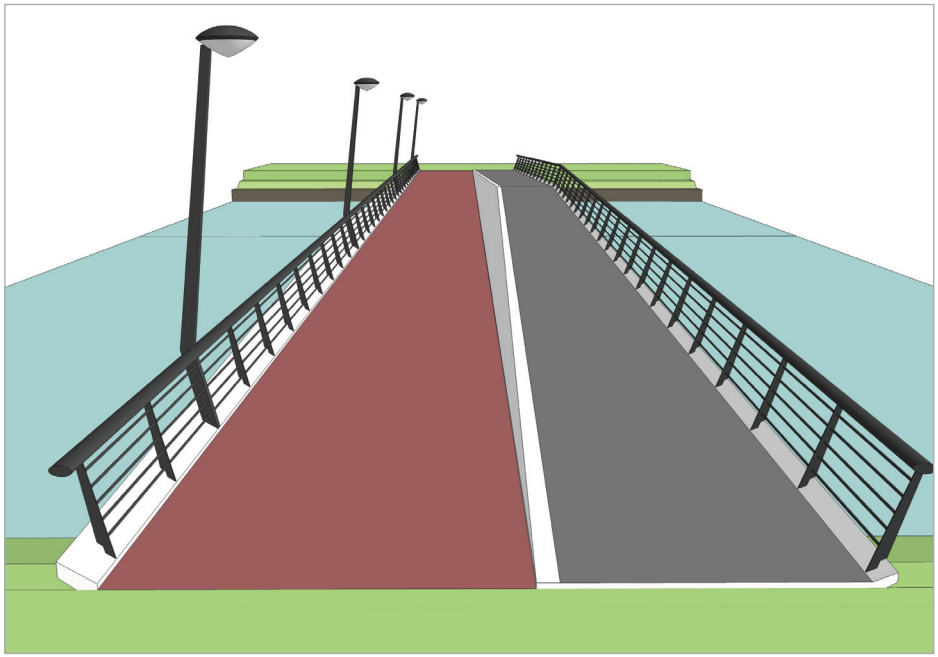
Oranjewoud: A world of opportunity!
Comfortable living, work, travel and recreation are only possible with a proper understanding of space. Oranjewoud's fields of activity consequently range from urban development, mobility, construction and property to rural development, water, the environment, safety, sport and recreation.
We operate in the Netherlands and on an international scale too. Oranjewoud was a major force in land management under Frisian management some 60 years ago. Our organisation has developed into an all-round partner and is much more than just an engineering consultancy.

Mission
Oranjewoud aims to be a leading partner in the development and application of sustainable and integral solutions relating to all aspects of our living environment, such as home, work, recreation, mobility and the environment.

Core values
Enterprising, People-oriented, Development, and Character.



Software: Scia Engineer

Footbridge De Gilden - Dronten, The Netherlands

Introduction
A new residential area is being realized on the west side of Dronten: De Gilden. The bridges in the district were designed by Buro MA.AN from Rotterdam, which was inspired by the large modern wind turbines in the polders around Dronten.

This steel footbridge over the central waterway is part of the main access route for pedestrians, bikes and other slow vehicles.

The design of the steel footbridge is in colour and shape consistent with the distinctive design of modern wind turbines. White-coated steel is used and the shape of the bridge is derived from the tapered blades of a modern wind turbine. The wing sections are placed against each other and have narrow ends that are directed towards the abutments and seem to just barely touch the banks of the canal. This design makes the bridge look like as if it is floating above the water's surface. At the centre of the waterway the cantilevered footpath is 0.5 m higher than the adjacent cycle path. This creates a nice lookout point.

Description of the footbridge
The bridge consists of three spans of 21.85 m, 17.65 m and 23.0 m. The width of the bridge deck varies from 6.70 m up to a maximum of 7.70 m.

The bridge will be made as a continuous steel box girder across 4 supports. The top flange acts as the floor of the bridge. This orthotropic deck consists of a 12 mm thick steel plate stiffened with longitudinal T-shaped stiffeners which are welded to the lower side of the plate. The load is transferred through the stiffeners and the transverse cross girders (approximately 4 m centre-to-centre) onto the side walls. The crossbeams at the location of the supports have the same height as the box girder. This ensures sufficient stiffness to transfer the loads onto the substructure.

The substructure consists of two abutments and two identical pillars made of cast-in-place reinforced concrete, which are founded on precast prestressed concrete piles.

The bridge is slidingly supported at the abutments to enable thermal deformation of the end spans. At the pillars however, rocker bearings are being used, so longitudinal deformations of the middle span will therefore lead to horizontal loads on the pillars.

Use of Scia Engineer
Due to the complexity of the design, it was necessary to create a 3D model. The bridge contours were drawn in Autodesk Inventor. AutoCad was used to create a 3D drawing in which internal components such as stiffeners and cross girders were added. Subsequently the 3D model was imported into Scia Engineer. In this program, the plate and rod elements could easily be added. The concrete substructure was not implemented in the FEM model.

The bridge was checked on strength and stiffness. Fatigue is not an issue for a footbridge.

The loads and load combinations were taken from NEN6706 - Traffic loads on bridges. Besides dead load, the following loads apply: a uniformly distributed load of 5 kN/m^2 (crowd) or a service vehicle with a total weight of 50 kN, wind load, differential support settlement and loads due to uneven heating of the structure.

The model was initially intended for the global strength and stiffness check of the structure and to determine the loads on the substructure. In the detailing phase the model can easily be expanded in order to check the stability of the various elements.

Footbridge De Gilden

Dronten, The Netherlands

Project information

Owner	Gemeente Dronten
Architect	Buro MA.AN
Engineering Office	Ingenieursbureau Oranjewoud B.V.
Construction Period	2011
Location	Dronten, The Netherlands

Short project description

This project is about the steel footbridge De Gilden. It was designed by Buro MA.AN from Rotterdam, that was inspired by the large modern wind turbines in the polders around Dronten. The bridge will be made as a continuous steel box girder across 4 supports. Due to the complexity of the design, it was necessary to create a 3D model with the help of several CAD applications. This 3D model is imported into Scia Engineer. The model is initially intended for the global strength and stiffness check of the structure and to determine the loads on the substructure.