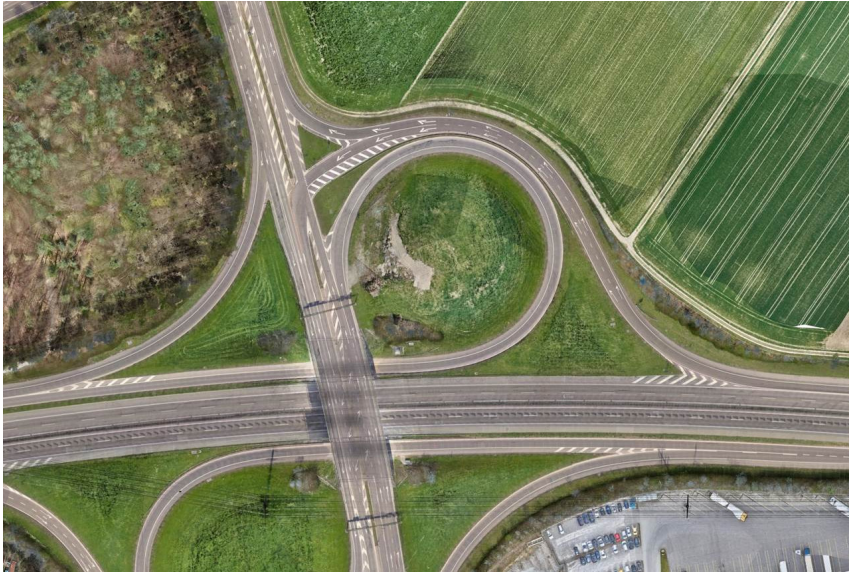


3D planning data for motorway expansion

Planning basis for the A1 motorway extension between Aarau and Birrfeld.



📍 Aarau-Birrfeld, Switzerland
👤 ASTRA
🕒 04/2018 - 10/2018

Expertise

3D Mapping, Airborne
Laserscanning, Aerial images,
Building Information Modeling
(BIM)

The 20 km long motorway section Aarau–Birrfeld of the Swiss national road A1 will be expanded from 4 to 6 lanes by 2030 (see Fig. 1). As an integral planning basis for all project participants, the Swiss Federal Roads Office (FEDRO) commissioned a high-resolution and highly accurate 3D model of the complete infrastructure. BSF Swissphoto secured the contract for the extensive surveying and evaluation tasks at the beginning of 2018, which included the combination of various measurement methods as well as the merging of the resulting data sets for a georeferenced visualisation of the project area. The aim of the project was to deliver a 3D model that would enable the planning of all necessary measures from the preliminary project to the implementation project without requiring further site visits of the project area by the planning engineers.

The project started in April 2018 and took a total of 6 months until delivery. Thus, in addition to the conceptual requirements, it was also an exciting task in terms of scheduling and organisation, as 2,400 working hours had to be coordinated for data collection and evaluation. In the paper, the authors provide an insight into the realised measurement procedures and extensive evaluation tasks.

The acquisition of the topographic base data was a complex task from a surveying point of view, as the combination of different recording methods was required. On the one hand, laser data and image data were recorded simultaneously by helicopter. In addition, a mobile mapping system was used to deliver laser data with an extremely high point density as well as panoramic images of the project area. In order to create a flawless 3D model within the road boundary areas of the motorway, all objects with restricted visibility that were not completely captured by the above-mentioned methods (e.g. undersides of bridges) had to be supplemented with terrestrial terrain surveys by tacheometry. The digital terrain model (DTM) derived from the data was also to be supplemented with 3D buildings in order to provide the acoustic planners with the basis for noise analyses. In a total of 2,400

evaluation hours (>1 man-year), the extensive data was collected, evaluated and combined. All data (aerial photographs, panoramic images and vector data) were made available to the planning engineers by FEDRO in a 3D viewer including extensive measuring tools.

The project passed to Terradata with the integration of the engineering survey. Terradata will carry out further manual supplementary measurements of bridge soffits in February.

Further information on the exciting project can be found [here](#).