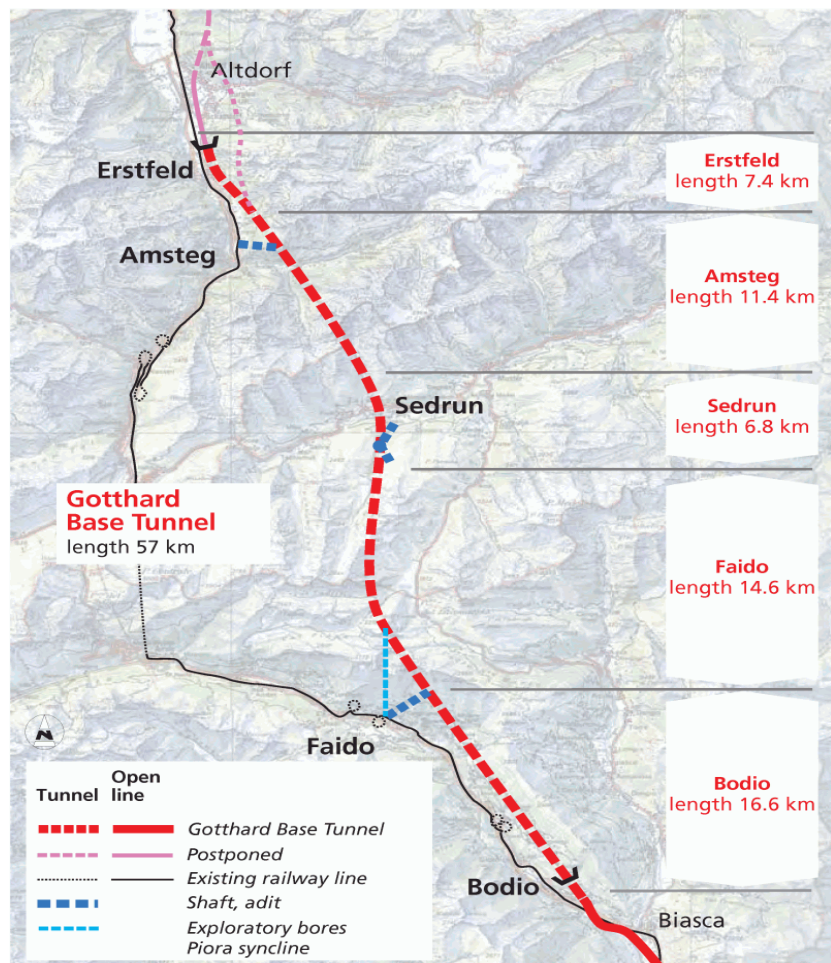


Project Profile – Amsteg Rail Tunnel Project

Overview

The Amsteg Rail Tunnel Project is one segment of the AlpTransit Gotthard railroad tunnel. AlpTransit Gotthard is constructing a flat rail link through the Alps from (Erstfeld) to (Bodio) for “futuristic” travel which will enable passenger trains to travel at speeds up to 250 KM per hour. At the center location of this new transalpine rail route is the world’s longest tunnel – the 57 KM Gotthard Base Tunnel. This has been termed as the “pioneering achievement of the 21st century” and will bring major improvements to travel and transportation systems within the “heart” of Europe. The new railway will enable more efficient, reliable, and environmentally safe travel.

The Amsteg sector of the rail tunnel spans a length of 11,350 meters, and consists of two tunnels, each measuring 9.58M in diameter. The axes of the tunnels are parallel, spaced at a distance of approximately 40M. Fifty years of planning was required in order to develop the final design and to begin construction on the project. Consideration was taken in order to provide a railway for faster trains with better connections, as well as to protect the environment. Several variations were proposed over the years for approval. It was not until 1995 that a combined solution was accepted for development and construction. A railway consisting of two single-track tunnels, linked by connecting galleries approximately every 180M was determined to be the best solution. With this design, each tunnel could serve as an escape route for the other eliminating the need for a service tunnel. Two multi-function stations and crossovers were also included in the final design. The railway design is considered to be one of the most innovative engineering efforts in European history.



What We Did

Stump ForATec AG of Naenikon, Switzerland received the contract to supply instrumentation and monitoring services for sections of the tunnel that were bored through unstable rock. Instrumentation consisted of 1 to 4 point extensometers installed into the unstable rock with anchor depths between 3 and 20m. To meet the project requirements of rapid delivery and flexible configuration Stump developed the SGD-300 extensometer, with displacement measurements made using 250mm range water-resistant linear potentiometers.

We were tasked with providing hardware and software to meet the automated monitoring requirements of the project, this included the following:

- Supply of CR215 Dataloggers and RF415 Spread Spectrum Radios from Campbell Scientific. The dataloggers include 5-channels of measurement capability and wireless access using an integrated spread spectrum radio. These loggers were usually installed immediately after the Tunnel Boring Machine (TBM) had progressed through the area of unstable rock. Site personnel using a laptop computer equipped with the RF415 Spread Spectrum Radio could interrogate the units installed in the roof of the tunnel. Use of the wireless CR215 was necessary because the 500m length of the TBM meant that physical access to the datalogger location was impossible until the TBM had progressed beyond the extensometer installation location.
- Supply of CR200 Dataloggers from Campbell Scientific, MiniMux Instrument Multiplexers from Canary Systems, RS-485 Interface Adaptors, and Lantronix UDS-10 Serial Device Servers. The MiniMux expanded the measurement capability of the CR200 to 16-channels, this allowed for connecting multiple extensometers to a single CR200. The RS-485 Interface Adaptor allowed for multiple CR200 Dataloggers to be connected together in a local network which would monitor a group of extensometers. The UDS-10 Serial Device Servers were used to connect the RS-485 network to the fiber-optic hubs that were available after the fiber-optic communication cable was extended through new sections of the tunnel. The fiber-optic communication cable is part of the Wide Area Network (WAN) for the project, this network facilitates Stump personnel in their offices in Naenikon having access to the data acquisition systems as well as site personnel having access to the data. A view of a typical installation with CR200, Minimux (in separate enclosure), extensometer cables and RS-485 cables is shown at right.
- Supply of MultiLoggerDB to automate system configuration, data collection, monitoring, database archival and data access. MultiLoggerDB was enhanced to support the PakBus communications protocol of the CR2xx series dataloggers, as was the CRBasic program generation. Insite, the database client data access tool included with MultiLoggerDB, provides an easy-to-use interface to the project data via the WAN of the project.



Who to Contact

Manual Wolfensberger - Stump ForATec AG

E-mail: messtechnik@stump.ch

Web: <http://www.stump.ch>