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**Autor:** Della Gana, Giles  
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## The Gotthardbahn

by Giles Della Gana

**It would not be unreasonable** to say that the Gotthardbahn (GB) is probably the best known of the SBB's constituent companies. In international terms it was, and still is, by far the most important. Taken as a mere list of opening dates the Gotthardbahn system would be soon dealt with, to this article will also touch upon the economic, engineering and political struggle to get this line, now such a vital part of Europe's transport system, built.

The successful construction of the Austrian Semmering line inspired ideas for a rail crossing of the Swiss Alps that generated a tremendous controversy. The choice of route falling between the Gotthard, the Grimsel, the Splügen or the Lukmanier passes. As the first two routes would start from Luzern and the second pair from Chur it was agreed for suitable current railway projects to be extended to these two places. Subsequent developments were to leave Chur at the end of a branch line as far as standard gauge is concerned. As all the proposed routes would pass through Biasca, a company with the grandiose title of The Central European Railway Company was established in London to build lines in the Ticino to the plans of the Zürich engineer Kaspar Wetli in 1864. Despite a vigorous start to construction, money soon ran out and the promising project was abandoned. None of the works were subsequently used by the Gotthardbahn.

We have got a little ahead of the main story however. The cities of Basel and Luzern had a long tradition of interest in the route over the St.Gotthard; the pass takes its name from an eleventh century bishop of Hildesheim. In August 1853 the first Gotthard conference was held in Luzern, interested parties pressing the advantages of the route to the Swiss Parliament. In 1860 a so-called Gotthard Committee was formed, charging Wetli to plan a line from Luzern to the northern end of Lake Maggiore. Carried out in only five and a half

months during 1861-2, the work was vetted by K.Beckh of Stuttgart and Robert Gerwig of Karlsruhe. By 1864 a definitive plan had been prepared. Unfortunately the Swiss Parliament did not agree on the allocation of a building concession and the interested Cantons, squabbling amongst themselves, could not provide the necessary funds to construct the line.

It was clear that if a Gotthard railway was to be built, foreign money would have to be obtained. Another Gotthard conference opened in Bern on 15 September 1869 which, lasting about a month, adopted the Beckh-Gerwig-Wetli plan and on 13 October an international Gotthard treaty. The treaty was ratified by Switzerland in 1870 and by the Kingdom of Italy and the new German Empire in 1871. Some opposition was put up by France, who wanted all trans-alpine traffic to use the Mont Cenis route, but her defeat in the war of 1870-1 rendered this move ineffective.

The Gotthard treaty specified a standard gauge railway, double track between Flüelen and Biasca, with a summit of less than 1162 metres above sea level. The maximum gradient was originally set at 1 in 40, though circumstances were to dictate a final maximum of 1 in 37. Funding was split as follows: Italy SFr.45 millions, the German Empire and Switzerland SFr.20 million each with private interests providing SFr.102 million. The Gotthardbahn company was incorporated on 6 December 1871 with Alfred Escher (see Part III) as its president. On 2 April 1872 Gerwig was appointed as engineer. He was regarded as an expert on the helicoidal or spiral tunnel, examples of which were to be an important feature of the new railway.

Soon after work began it became apparent that the SFr.187 million allowed for construction would not be enough. Relations between all parties became strained and Gerwig resigned.

His place was taken in 1875 by his former assistant, Konrad Wilhelm Hellwag of Eutin in Schleswig-Holstein who had already been involved with the construction of the Brenner line. He revised the estimated building costs upward by SFr.102 million. Not surprisingly this led to another crisis and another international conference in 1877. The additional costs were cut to SFr.40 million by dint of the adoption of single line only, the steepening of gradients and the postponement of the construction of the Zug to Arth-Goldau and Luzern to Immensee access lines. The deletion of the spiral tunnels and their substitution by either rack worked inclines or switchback reversing lines was considered, but fortunately rejected. Disputes broke out between Hellwag and the Gotthardbahn which led to the engineer's resignation in 1878. The Swiss engineer, Gustav Bridel of Biel/Bienne was appointed chief engineer and it was under his direction that the railway was completed.

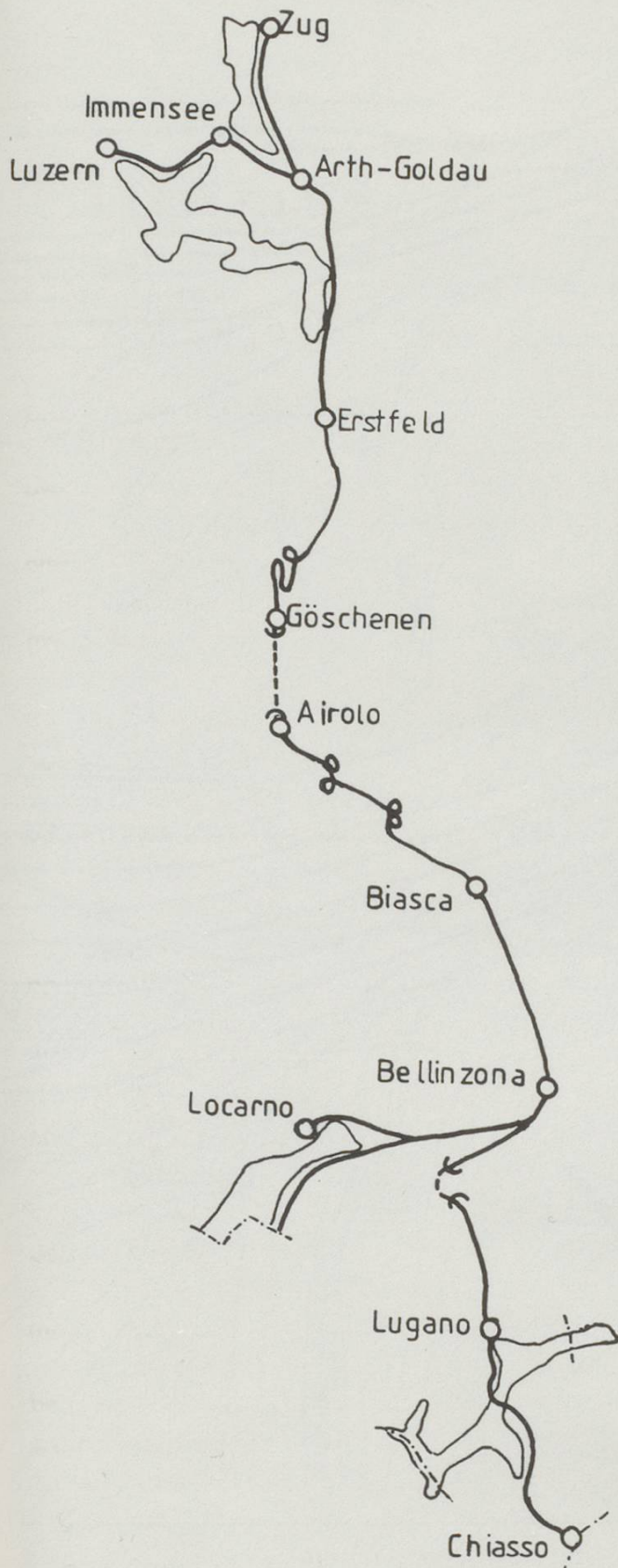
As if the above mentioned difficulties were not bad enough, appalling difficulties attended the construction of the summit tunnel between Göschenen and Airolo. It was the first of the great Alpine tunnels to be built under contract, which was awarded to Louis Favre of Geneva, who submitted the lowest of seven bids at SFr.42 million. All seemed set fair, much experience had been gained during the construction of the Mount Cenis and the tunnelers had the aid of the Colladon-Sommeiller rock drill and Alfred Nobel's dynamite. The compressed air plant was overseen by Welker, who was later to work on Watkin's abortive Channel Tunnel. The Belgian method of tunneling was used, whereby a pilot tunnel was driven at roof level and then broken out to full size and lined by two further groups of miners at the rear. Work started, using manual drilling, on 13 September 1872. Even with the introduction of mechanical drilling, progress was painfully slow, work being hampered by the ingress of vast quantities of water, temperatures of up to 112°F., rock dust and fumes from explosives. However, by mid 1875 the rate of advance had greatly improved

and it looked as though work might be finished on time.

In 1878 the miners hit difficult rock, hard serpentine in the northern heading and a friable formation in the south. At Airolo the supply of water to the air compressors, powering the drills and providing ventilation, now proved inadequate and manual drilling had to be resumed as the temperature rose to 122°F.! Under Andermatt a completed section of tunnel collapsed where the feldspar and gypsum rock through which it passed became plastic and clay-like owing to contact with the moist air. This section of tunnel was only stabilised after two years of struggle, culminating in the construction of massive lining work. The battle eventually overcame the unfortunate Favre who died, at the age of 53, after being struck down by a stroke whilst inside the tunnel on 19 July 1879. A breakthrough was finally achieved on 29 February 1880 and the first standard gauge train passed through from Göschenen to Airolo on 24 December 1881. The 15,003 metre tunnel had cost SFr.66.6 million and 177 lives to build.

The easiest sections of the railway, in the Ticino, were completed quite rapidly, coming into operation in December 1874. Biasca to Bellinzona and Lugano to Chiasso on the 6th and Bellinzona to Locarno on the 20th. The Lugano to Chiasso section included the crossing of Lake Lugano by a causeway at Melide. This was constructed by the tipping of broken rock onto a pre-existing submerged ridge of glacial debris. The Italian Soc.Ferroviana dell'Alta Italia (SFAI) opened to Chiasso from Como on 28 September 1876.

The Gotthard tunnel was officially opened on 1 January 1882, Giubiasco, junction for the Locarno line to Lugano - the so-called Mount Ceneri - opened on 10 April 1882. The construction of bridges and tunnels to take only single track had been forced on the builders of this section by the company's financial difficulties. Through services were finally established on 1 June 1882 with the opening of the Immensee to Göschenen and Airolo to Biasca sections. Access to the northern railways



## The Gotthardbahn

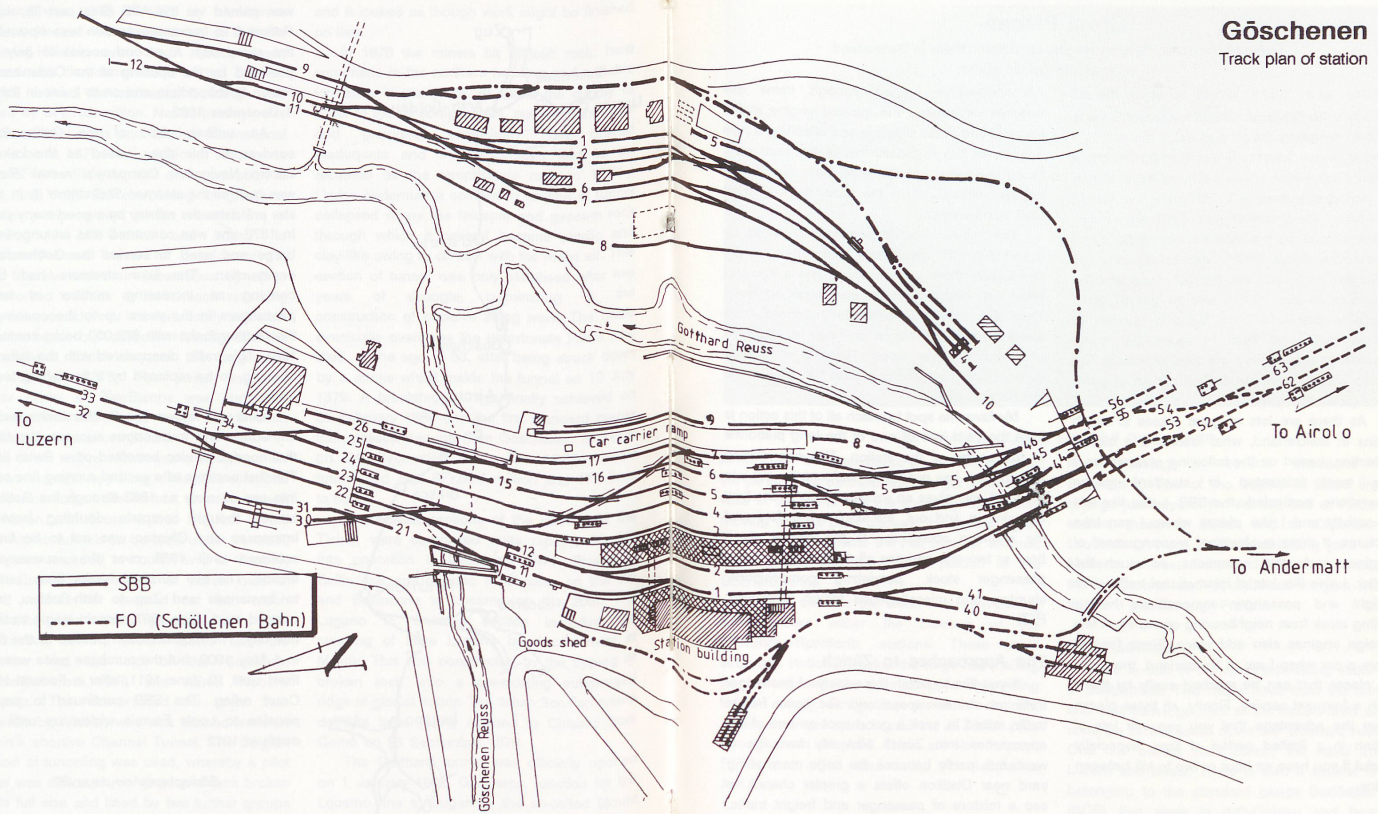
was gained via the ASB (See part III), whose Rotkreuz to Immensee section was opened on the same day. A second access to Italy was provided by the opening of the Cadenazzo to Ranzo S. Abbondino and on to Luino in Italy on 4 December 1882.

An unlikely relic of the Gotthardbahn survives to this day, indeed as the Lake of Luzern Navigation Company's vessel *Famme* was built as the steamer *St. Gotthard* (I) in 1843 she pre-dates the railway by a good many years. In 1872 she was converted into an unpowered barge and used to service the Gotthardbahn construction. The lake steamers had been carrying an increasing number of transit passengers in the years up to the opening of the Gotthardbahn with 832,000 being carried in 1881. This traffic disappeared with the railway's opening, to be replaced by a flourishing tourist trade.

As is well known, the Gotthardbahn was an immediate and tremendous success, the traffic that flooded in also benefited other Swiss lines. The first sections of a second running line came into use as early as 1883 through the Gotthard tunnel, though complete doubling between Immensee and Chiasso was not to be finally achieved until 1965 over the causeway at Melide. The two deferred feeder lines, Luzern to Immensee and Zug to Arth-Goldau, both opened on 1 June 1897, remain single track to this day. The Gotthardbahn passed to the SBB in 1 May 1909, but the purchase price was not fixed until 10 June 1911, after a Federal High Court ruling. The SBB continued to pay a pension to Louis Favre's widow up until her death in 1912.

*Bibliography on page 26*

*The writer would like to acknowledge the help of Malcolm Hardy-Randall in providing information and allowing him to 'poach' his territory.*



**The Gotthardbahn** *Continued from page 25*

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