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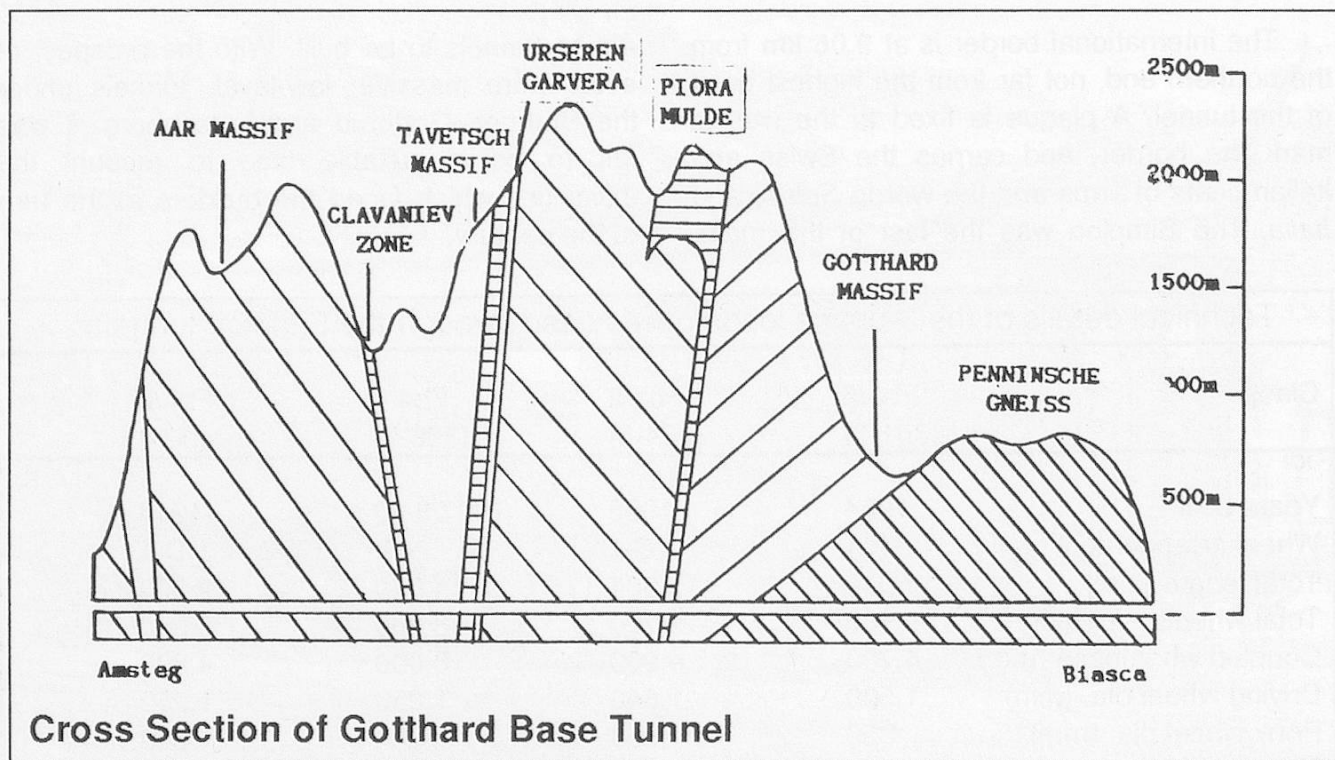
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## A New Gotthardbahn

By Giles Della Gana

**Over the last** twenty-five years or so, traffic across the Austrian, French and Swiss Alps has quadrupled and is expected to double again, to an annual total of 140 million tonnes, by 2020. It is anticipated that half of this will pass through Switzerland. The European Union (EU) has recently requested Switzerland to allow the transit of 40 tonne commercial vehicles. Though a law of 1921 guarantees freedom of transit through the country, the Swiss are unwilling to accept these vehicles, fearing damage to the Alpine environment.

The Gotthard Base tunnel, forming the centre-piece of what is referred to as the *Neu Eisenbahn Alpen Transversal* (NEAT), or *Alp-transit*, offers the mean to cut this Gordian Knot. Planning work had already started in mid-1990 with a Federal grant of SFr.130 million. Almost unbelievably, environmentalists, allied with road interests, obtained 50,030 signatures demanding a referendum on the project. Though some 530 of these were found to be invalid, thereby reducing the figure below the 50,000 needed to force a vote, one was still held. It is pleasing to record that this epic enterprise was given 63.5% support when the

national referendum was held on 27 September 1992.

What is known as the reference alignment for a new railway between Arth-Goldau and Taverne-Torricella has been established and is shown on the accompanying map. The final alignment will be decided after consideration of costs, technical risks, potential for upgrading and effects on the surrounding countryside. The base tunnel will be some 50 km long, though this will be extended by a further 6 km by an approach tunnel between Amsteg and Erstfeld. It must pass, going north to south, through the Igneous Aar Massif, the Sedimentary Clavaniev Zone, the Tavetsch Massif, the Sedimentary Urseren Garvera Zone, the Igneous Gotthard Massif, the Piora Mulde (see below) and the Penninsche Gneiss.

Later this year a 5 km trial adit is to be started from Faido, to be driven into the Piora Mulde zone in order to establish the nature of the rock in this potentially most difficult working area. An adit is a sloping tunnel affording access to the actual working level, such as used at Shakespeare Cliff. The main work is expected to begin in 1996-7 and on the basis

of 340 working days per annum is expected to take up to eight or nine years to complete. Such is the scale of the project that it is anticipated that several groups of contractors are likely to share the responsibility.

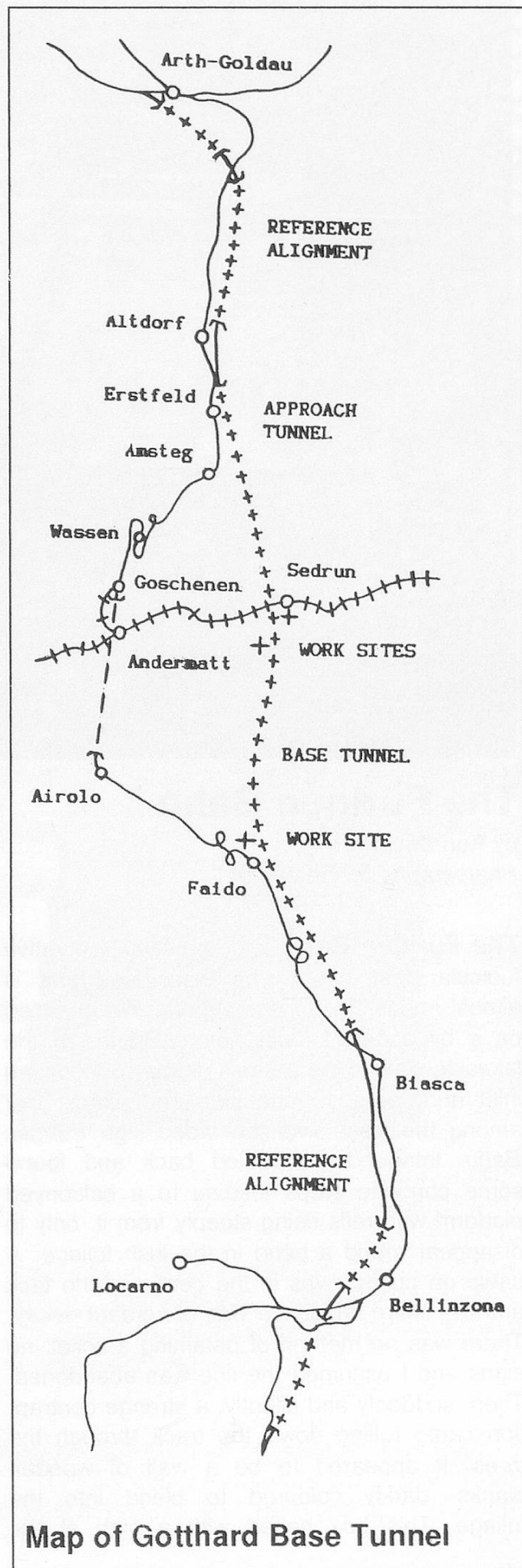
Apart from the previously mentioned Faido adit, work will also be undertaken from a 9 m wide, 800 m deep shaft to be sunk at Sedrun. In order to serve the workings here the capacities of both the Furka-Oberalp and the Rhätische Bahn will be increased. Tunnel boring machines are to be used for most of the way, while drilling and blasting will be used under the Tavetsch Massif. How the Piora Mulde zone is to be dealt with has yet to be decided.

Some of the spoil produced by these efforts will be used along the new railway, some is to be stored along its route for use in further development with the remainder being disposed of elsewhere in the country.

Contrary to previous expectations and following a decision made in March 1993, the tunnel will now take the form of two single track bores. Each will be 9.2 m external diameter with crossovers every 10 km and two sets of passing loops. Provision will be made for an additional running/service tunnel to be constructed should the need arise. Single track bores will allow the segregation of trains carrying hazardous cargoes as well as being far safer for permanent way staff.

The line will be laid out to allow a maximum speed of 200 km/h for passenger and 160 km/h for goods trains. These services will be spared the present climb to 1100 m as no point in the tunnel will be over 500 m above sea level. The anticipated temperature in the tunnel will be between 60° and 70° Celsius, the permitted maximum in the Channel Tunnel will be a comparatively cool 25° Celsius. A tunnel maintenance depot will be established at Erstfeld.

And what, you may be asking, of the present Gotthardbahn? Though expensive to operate owing to its sharp curvature and severe gradients, it will be retained, thus providing, in combination with the base tunnel, a four-track crossing of the Alps. In addition to resignalling to provide shorter headways, work



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down under the large panoramic balcony of the hotel, it is very difficult to obtain a good photograph.

When the car with its strange tandem mini-pan-tographs hove into view, it was seen to contain a wedding party. On arrival at the top of the line, the bride posed for photographs before entering the hotel, while more guests poured into the lower car.

The FÜRIGEN Bahn has a quaint air of Victorian gentility about it and is in stark contrast to the modern plastic and steel versions elsewhere in Switzerland. It is a fascinating funicular while the tremendous views from the hotel balcony complete the experience.

Facing Page: FÜRIGEN Bahn car ascending.

This Page: The top station of the FÜRIGEN Bahn showing car in place.

Both photographs taken on Saturday 4 August 1993

FÜRIGEN Bahn details	
Opened	25 May 1927
Gauge	800 mm
Length	376 m
Climb	201 m



## The New Gotthardbahn *Continued from page 11*

carried out between 1975 and 1981 allows the carriage of accompanied road vehicles of an angle height of 4.0 m (UIC 'C' gauge). The new tunnel will accommodate lorries of up to 4.2 m

angle height. It seems that the work now being brought to a conclusion beneath the English Channel is but an exciting foretaste of what is to come under the Swiss Alps.

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