WORLD HERITAGE LIST

Semmeringbahn (Austria)

No 785

Identification

Nomination	The Semmering Railway (Semmeringbahn) - cultural site
Location	Provinces of Lower Austria and Styria
State Party	Republic of Austria
Date	27 September 1995

Justification by State Party

The 41km long railway built across the Semmering Pass between 1848 and 1854 was the first noteworthy mountain railway the world had seen up to that point. It had a lasting influence on the technical development of this relatively new system of transport. Nowhere is the wish to take technical control over nature more clearly shown than in the Semmering Railway. The pioneering achievement of its architect, Carl Ritter von Ghega, was above all the solution of three technical problems. As marking out the terrain was impossible with the means available at the time, new surveying methods and instruments had to be developed. For the planning of the route, hitherto unused parameters with respect to gradient and the radii of the curves were employed. Finally, there was the actual construction of the line, with its fourteen tunnels, sixteen viaducts, and over a hundred arched passageways and the kilometres of retaining walls in extremely difficult and largely mountainous terrain. All these represent an extremely daring architectural and organizational undertaking for the period. The wide variety of aesthetically outstanding buildings can be seen as a *Gesamtkunstwerk* whose technology and architecture are subtly and harmoniously integrated into an important mountain landscape. Hence this 19th century masterpiece of Austrian engineering can be regarded as a synthesis between nature and architecture that was entirely new to the period.

In spite of its 150 years of operation, the changes that the maintenance and functional adaptations of the line required remained within acceptable boundaries from the point of view of monument preservation, thanks largely to its solid construction. This means that the original appearance of the site could be retained to a large degree up to the present day.

The first completely artificial recreation area developed at the Semmering as a consequence of its new accessibility, as it could be comfortably and rapidly reached by train. Grand and palatial hotels, country houses, and villas were designed by the most famous architects of the period, in the so-called "Semmering style," heralding the modern age in alpine building.

The Semmering was soon frequented by both the nobility and the *grande bourgeoisie*, particularly of Vienna and Budapest, and it became a meeting place for notable and important personalities of the Austro-Hungarian monarchy. The varied landscape, the favourable climate, the easy accessibility, and the luxurious accommodation of the area drew a large influx of guests.

Thus, the history of the Semmering reflected the events of economic and political history as a whole. In its heyday during the *fin de siècle* and after World War I it remained a rendezvous for high society. Although the halcyon days of the Semmering were over by the end of the 1920s and the beginning of the 1930s, it became fashionable again as a holiday resort after World War II. After another low period that continued until the late 1980s, the cultural landscape that had been so indelibly marked by the architecture and the concepts of early tourism during the late 19th century met with new public interest. For varied reasons easily accessible recreation areas are being more highly valued once more. In order to revitalize the area through tourism, many villas and country houses were restored during recent years and many hotels and guest houses were modernized to meet present-day standards of comfort. With the help of the Bundesdenkmalamt these changes were carried out so as to cause as little damage as possible to the building fabric, by retaining the external appearance of the old buildings and thereby of the entire Semmering area.

Note The State Party does not make any proposals concerning the criteria under which the property should be inscribed on the World Heritage List in the nomination dossier.

Category of property

In terms of the categories of property set out in Article 1 of the 1972 World Heritage Convention, the Semmering Railway is a *site*. It may also be considered to be a linear *cultural landscape*, as defined in the *Operational Guidelines* (1995), paragraphs 35-39.

History and Description

History

The transport route from the valley of the Mürz to the Vienna Depression has been used since prehistoric times. In the Middle Ages it was considered to be one of the few secure

Alpine crossings. Transport was possible using pack animals and wagons drawn by oxen. It had become one of the most important international land routes from Venice by the 12th century. However, the Semmering had lost much of its trade by the 15th century owing to the opening up of the Brenner and Radstätter Trauern routes further south. In 1728 the Emperor Karl VI ordered it to be improved as both a commercial and a military road, joining Austria with Trieste rather than Venice, hence its name, the "Trieste Route." In 1841 the steep northern approach was relaid, reducing the gradient by some 5%. The new accessibility of the region brought artists and poets there, to admire the wild scenery, as well as attracting considerable commercial traffic, as the Industrial Revolution developed in the region.

The first railway line (horse-drawn) of any significance on the European continent was opened in 1824-32 between Linz and Budweis (Ceské Budejovice) and 1837 saw the installation of the locomotive-hauled line between Florisdorf and Deutsche Wagram. The southbound Vienna-Gloggnitz line opened in 1841 and the section from Mürzzuschlag to Graz was added in 1844, leaving a gap over the difficult Semmering stretch. The line was later extended southwards to Cilli in 1846, Laibach (Ljubljana) in 1849, and finally, over difficult karst terrain, to Trieste in 1857.

The first plan for crossing the Semmering, involving a 1:30 gradient, was drawn up in 1841 but not followed up for technical reasons. The project was taken up again in 1842, when Carlo Ghega was appointed Chief Inspector for the southern line, linking Vienna and Trieste. He began by visiting the USA, where he studied 39 railway lines covering 2413km. This showed him that the technical difficulties seen in the first plan were not insuperable, and he began to survey possible routes over the Semmering. Since no reliable maps were available, he had to carry out a complete survey of the area; the difficult terrain led him to develop new surveying instruments, notably the *Stampfer'sche Nivellier-Höhen- und Längenmessinstrument*, used to measure height and distance, which was to become an important tool in geodetics.

He worked out several routes before settling on one in 1846. It was 42km long, with 22 major bridges and viaducts and a tunnel 1200m long, situated just below the pass; although not the simplest route, it was the most feasible in the light of the technological limitations of the day, notably the lack of powerful explosives for tunnelling. His project plan was completed in 1847, but work did not start immediately, because Ghega was engaged in the construction of the line between Cilli and Laibach.

His project met with considerable opposition , but it was accepted in June 1848 by the new Minister for Public Works, Andreas Baumgartner, who wanted projects offering substantial long-term employment prospects. Despite a storm of protest, from both specialists and the press, work began in August 1848. The entire stretch of line was divided into fourteen sections, each of which was entrusted to a separate firm. At the start 1007 men and 414 women were employed, to increase to over 20,000 as the work progressed.

The maximum gradient of 1:25 and the exceptionally small-radius curves called for a new type of locomotive, and four firms entered a public competition in 1850. None of the entries was considered to be suitable for production in series, although they met the technical requirements, and so Wilhelm von Eggerth was commissioned to combine the best features of all of them in a new design. The result was triumphantly successful and 26 engines were immediately commissioned.

Construction work on the line and the manufacture of locomotives and rolling stock progressed well, with the result that the transport of passengers and goods over the line was able to start, on schedule, on 17 July 1854.

Description

The Semmering railway begins at Gloggnitz Station, at an altitude of 436m, and reaches its highest point, 895m above mean sea level, after 29km in the tunnel over the pass itself, ending after a further 12km in Mürzzuschlag Station, at 677m.

The line can be divided into four sections:

i In the first 7km, to Payerbach Station, it follows the left-hand slopes of the Schwarza valley, with a gradient of 1:10 and numerous abutments and cliff revetments.

ii It then changes to the other side of the valley by crossing the Schwarza viaduct (276m long, 25m high), with a gradient of 1:40, to reach Eichberg Station after 6km at 609m altitude. It skirts the Eichberg and enters the Auerbach valley to continue through dense forest to Klamm-Schottwien Station.

iii After passing through the Klamm Tunnel it reaches the Adlitzgraben and Alpine terrain proper. A series of tunnels and viaducts are followed by transit through the Weinzettelwand, the Krauselklause, and the Polleroswand through several sections of tunnel. Next comes the most dramatic section of the whole route, the two-storey curving viaduct over the Kalte Rinne. The Lower and Upper Adlitzgraben are crossed at a continuous gradient of 1:40; finally, after passing through the Wolfsberg and the Kartnerkogels, Semmering Station is reached after 11km.

iv Immediately after the station the line passes through the 1431m Semmering Tunnel, and then descends gradually along the right-hand slope of the Röschnitz valley, through Stienhaus and Spital am Semmering to Mürzzuschlag.

The total length of the fourteen tunnels is 1477m, ie nearly one-tenth of the entire line. A new single-track tunnel was bored parallel to the 1431m Semmering Tunnel between 1949 and 1952 because the old tunnel had become so constricted from the pressure from above that it had to be refaced. The sixteen major viaducts also total 1477m in length; four of them are two-storeyed, the Kalte Rinne being the highest (46m) and the thirteen-bay Schwarza being the longest (328m). There are 118 smaller arched stone and 11

iron bridges.

Maximum inclines of 1:50-1:40 occur over 61% of the total length of the line and the smallest radius of curves is 190m, over 16% of the length. The boldness of the latter achievement is demonstrated by the fact that the minimum radius anywhere else in Europe at that time was 475m.

Most of the portals of the tunnels are simple but monumental in design, and are variously ornamented. Support structures are largely in stone, but brick was used for the arches of the viaducts and tunnel facings. The 57 two-storey attendants' houses, sited at approximately 700m intervals, that are a very characteristic feature of the Semmering line, were built in coursed rubble masonry with brick trimmings. Little remains of the original stations, which were planned originally as no more than relay stations and watering points, but later became converted into more impressive structures as tourist traffic increased.

During the railway's history a good deal of reconstruction has been carried out, using new materials such as cement blocks and concrete. These changes have been imposed by several factors, such as the increase in axle loading from the original 13 tonnes for which it was designed to the 22.5 tonnes of the present day, and a substantial increase in the speed, frequency, and freight loading of trains using it. The appearance of the whole line was significantly changed between 1957 and 1959, when masts were erected to carry the contact wires needed by the conversion to electrical locomotives.

The Semmering pass itself is well known for the "summer architecture" of its villas and hotels that were built between Gloggnitz and the small market town of Schottwien in picturesque locations for Viennese society. It became one of the first artificially laid out Alpine resorts in the decades following the opening of the railway line.

This process had begun even before that project began, with the development of Reichenau an der Rax and Payerbach, to the north-west of Gloggnitz, as tourist areas in the early decades of the 19th century. The architectural style of the villas and hotels that were built there were strongly influenced by the English architect A J Downing, whose book *The Architecture of Country Houses* appeared in 1850: his work was taken up by Austrian architects such as Christian Ludwig Förstner and Gottfried Semper. The basic form of buildings was dictated by their purpose, function, and construction, but the exterior was dictated only by the creative intentions of the patron and his architect. Romantic historicism influenced the appearance of the villas and hotels built in this area, a number of which have Gothic or Renaissance antecedents. The steep-gabled and fantastically ornate "Swiss chalet" also found favour with many builders.

The Semmering pass itself was not affected by tourist development for some time after the line opened in 1854. The Southern Railway Company, operators of the line at that time, began development in 1880, at the urging of the court sculptor, Franz Schönthaler, with the construction of the Semmering Hotel. It was, however, Schönthaler's own villa south of the hotel that had the strongest influence on architectural design along the Semmering line. The use of traditional Alpine wooden frame construction by his architect, Franz von Neumann, was eagerly seized upon by other patrons, and the "Semmering style" predominated in the buildings erected in the latter part of the 19th century.

Management and Protection

Legal status

Many of the historic buildings within the designated area are protected under the provisions of the Austrian Monument Protection Act (Federal Act of 1923, as amended in 1978 and 1990), as is the entire length of the Semmeringbahn. Interventions that may affect their condition, historical appearance, or aesthetic impact require the written permission of the Bundesdenkmalamt; this also covers the sale of a protected monument. The Bundesdenkmalamt may apply to local authorities protection measures to be taken in cases where serious breaches of these conditions are threatened. The Bundesdenkmalamt has funds for subsidizing the preservation and safeguarding of monuments.

The cultural landscape of the Semmering is also protected by two provincial statutes: the 1955 and 1978 Lower Austrian Act for the Preservation of Nature and by the 1977 Styrian Act for Urban Renewal.

Management

The Austrian Federal Railways (Österreichische Bundesbahn - ÖBB) owns the railway line and the buildings associated with it. Non-railway properties are in private ownership.

There is no reference to the existence of a management plan of any kind, but, since this is an active railway route and is also protected by the Federal Monument Protection Act, continuous maintenance is practised, and in particular upgrading to state-of-the-art technology, and all proposed changes are submitted to the Bundesdenkmalamt for approval.

Conservation and Authenticity

Conservation history

Maintenance of the railway line and its associated buildings has been continuous since 1854. The many non-railway buildings have had varied conservation histories. With the decline of the region as a tourist and recreation area in the 1920s and 1930s, there was a good deal of deterioration from neglect, but a policy of revitalization since the end of World War II, with substantial financial aid for restoration from central and provincial government, has resulted in there being a high level of conservation and maintenance in the whole region.

Authenticity

It is difficult to define authenticity in the case of a railway

line that has been in use continuously since it was opened in 1854. The authenticity of the route itself and the remarkable civil engineering projects that made it possible is unquestionable, but the appearance of the line itself has changed, especially since electrification. However, the overall impact of the line on the landscape is indelibly authentic. The same may be said for the cultural landscape created by the construction of villas and hotels in the late 19th and early 20th centuries: this harmonious insertion of architecture into a rugged Alpine landscape retains its integrity.

Evaluation

Action by ICOMOS

An ICOMOS/TICCIH expert mission visited the Semmering in May 1996.

Qualities

The railway line over the formidable Semmering Pass was the first major project of this kind in the world. Building of the line led to the creation of a cultural landscape of villas and hotels over much of its route that is an outstanding example of the sympathetic insertion of buildings of high and consistent architectural quality into a natural landscape of great beauty.

Comparative analysis

A comparative study of outstanding railway systems of technological and historical importance has been prepared by TICCIH at the request of ICOMOS. The Semmeringbahn complies with all the criteria for evaluation set out in that study and is identified as one of the most significant developments in railway technology.

ICOMOS comments

At the meeting of the Bureau in Paris in June 1996, ICOMOS proposed that further consideration of this nomination be deferred to await the completion of the TICCIH comparative study (see above). This proposal was accepted by the Bureau, which also requested the State Party, at the request of ICOMOS, to supply more detailed maps and information regarding the cultural landscape protection legislation in Lower Austria and Styria. The study has been completed and the State Party has complied with the ICOMOS request for supplementary information.

Brief description

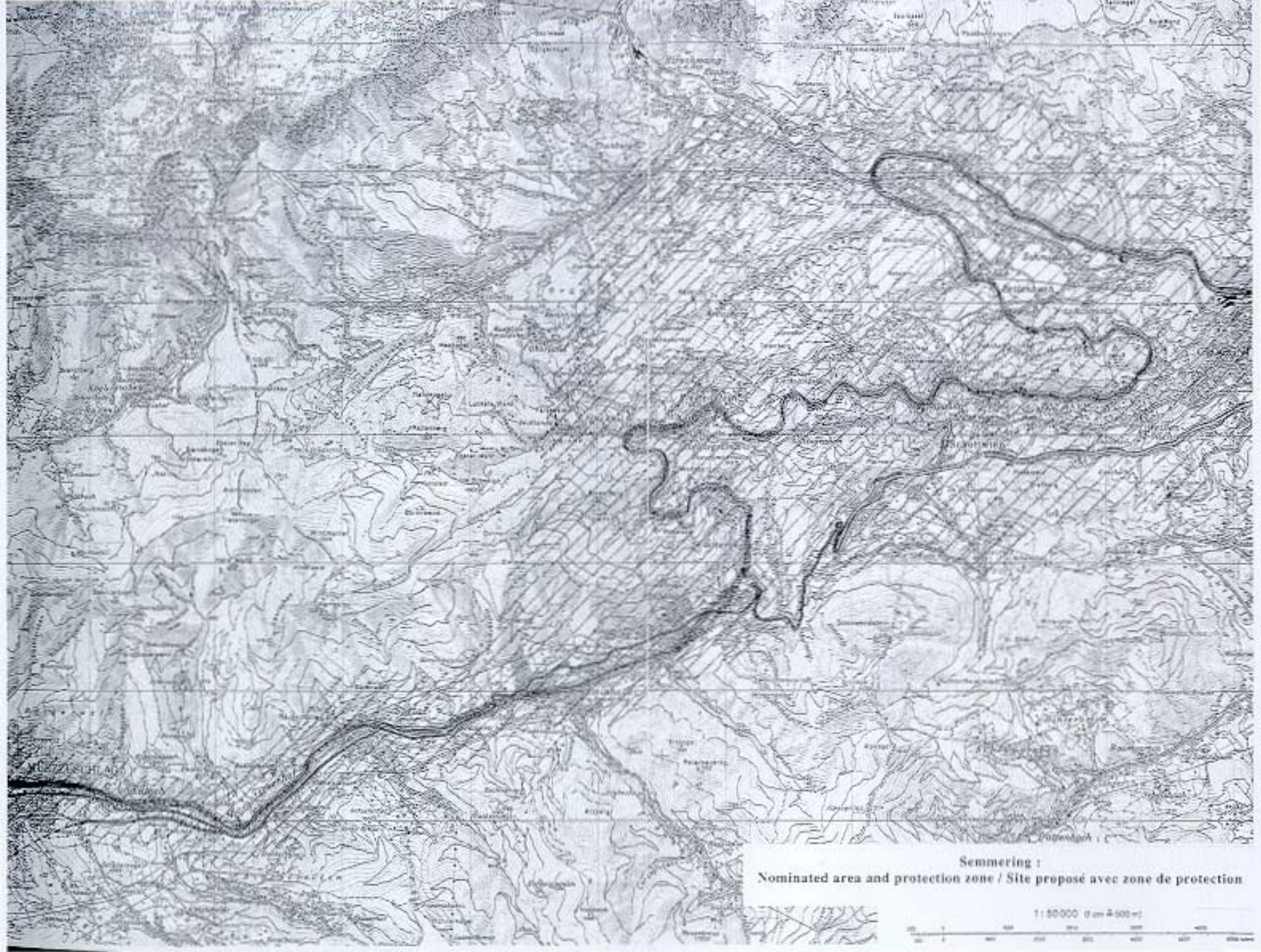
The Semmering Railway, constructed between 1848 and 1854 over 41km of high mountains, is one of the greatest feats of civil engineering during this pioneering phase of railway building. The quality of its tunnels, viaducts, and other works have ensured the continuous use of the line up to the present day, against the background of a spectacular mountain landscape, containing many fine recreational buildings resulting from the opening up of the area with the advent of the railway.

Recommendation

That this property be inscribed on the World Heritage List on the basis of ***criteria ii and iv***:

> ***Criterion ii***: The Semmering railway represents an outstanding technological solution to a major physical problem in the construction of early railways.
>
> ***Criterion iv***: With the construction of the Semmering railway, areas of great natural beauty became more easily accessible and as a result these were developed for residential and recreational use, creating a new form of cultural landscape.

ICOMOS, October 1998



Semmering :
Nominated area and protection zone / Site proposé avec zone de protection

1:50 000 (1 cm = 500 m)