

Railway Heritage Preservation Conference

Findings, positions and methods
Zurich, ETH-Zentrum, 23 / 24 / 25 June 2022



Imprint

Organisers

SBB Specialist Service for the Preservation of Historical Monuments
Professorship for Construction Heritage and Preservation at the Federal Institute of Technology Zurich

Project partners

Federal Office for Culture
ICOMOS Suisse
SBB Historic

Information

www.eisenbahndenkmalflege.ch
www.railway-heritage.ch

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Conference office and editorial office

Häusler + Weidmann, Zürich

Media partner

TEC21 / espazium

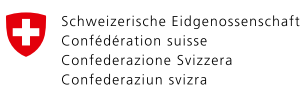
Translations

SBB

Design

DesignLine, Lotzwil

Zurich, 15 June 2022



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Cover

Conversion of the Viaduc du Day near Vallorbe from a steel truss bridge to a concrete arch bridge in 1925 (SBB Historic)

Practical Information

Information hotline: If you have any questions during the conference, please contact the reception desk in the foyer in front of the conference hall (Thursday 23 June to Saturday 25 June) or the Info-Hotline:
Tel no. +41 (0)79 606 38 60 (Monday 20 June to Saturday 25 June).

Conference

Thursday and Friday 8.00–19.30; Saturday, 8.30–11.30
ETH-Zentrum, Rämistrasse 101 (Plan 1)

Reception Desk / Break Hall

Ground floor, Foyer HG E South (Plan 2)

Conference room

Ground floor, Lecture hall HG E7 (Plan 2)

Lunch

Thursday and Friday 13.30–14.30, Floor K, Dozentenfoyer (HG K 30.5)

Apéro riche (for speakers, authors, moderators)

Thursday 19.30–22.00, Floor K, Dozentenfoyer (HG K 30.5)

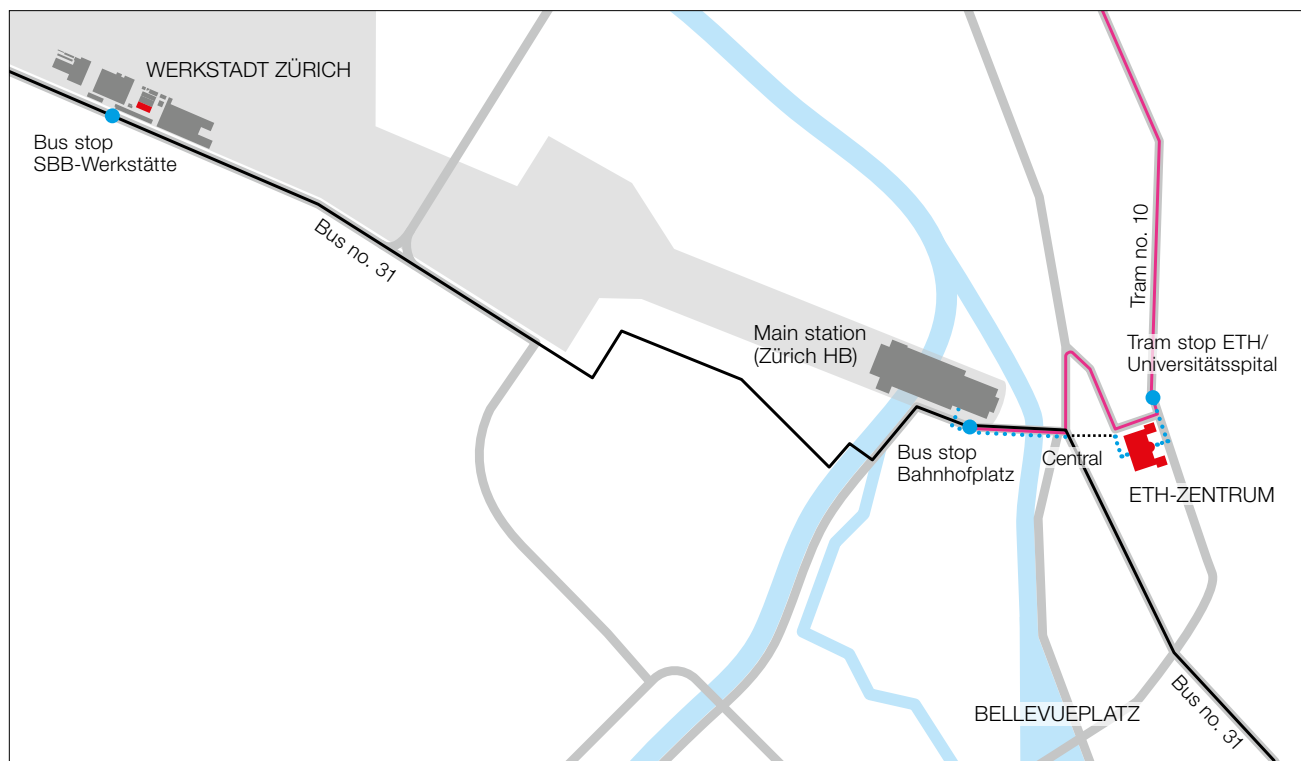
Excursion «Werkstadt» Zurich

Saturday 11.45–14.30
SBB workshop, Hohlstrasse 400, Hall D (Plan 3)

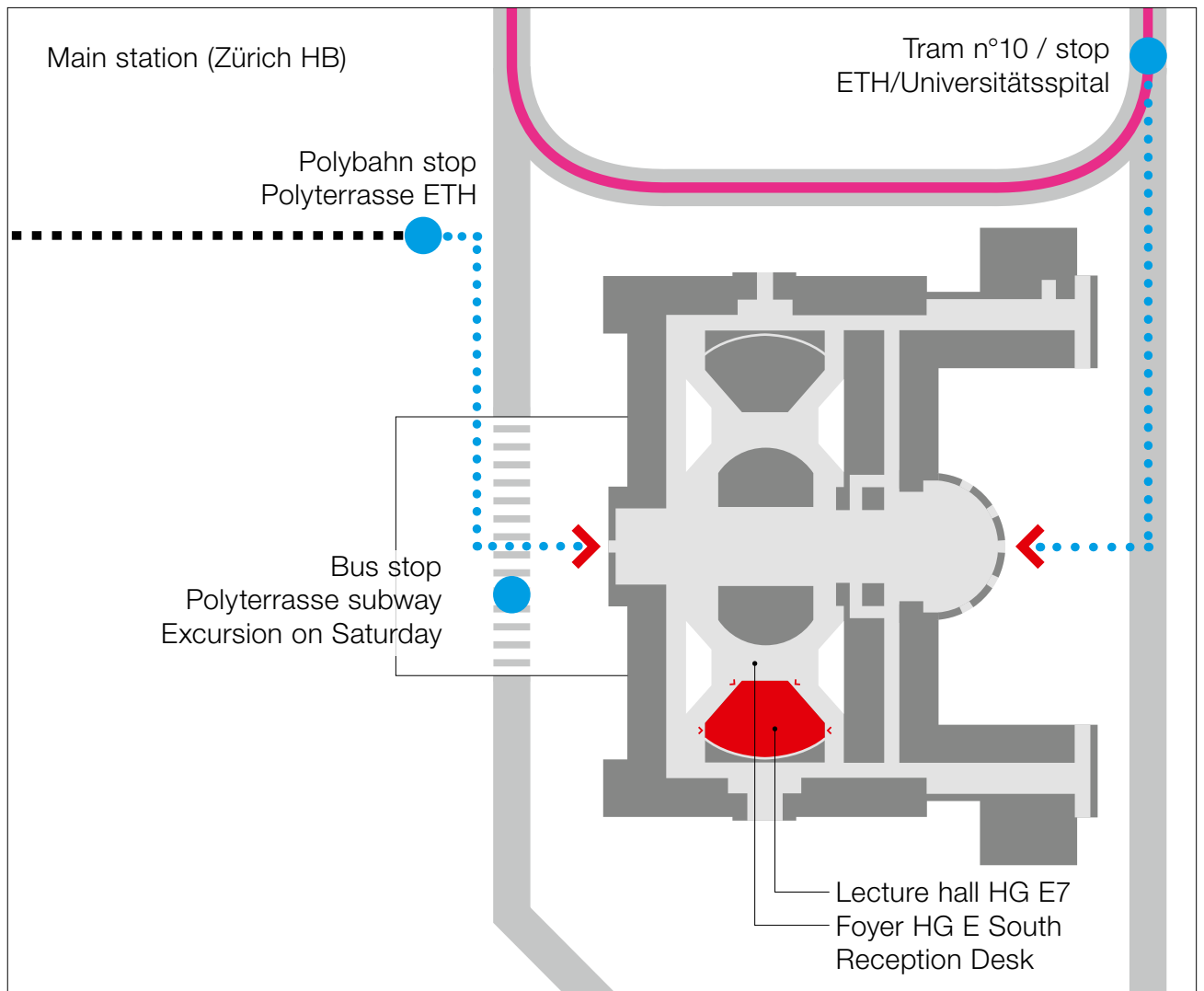
Bus-Transfer 11.45 from the bus stop in the basement under the Polyterrasse (Plan 2)

Snack 12.00–13.00

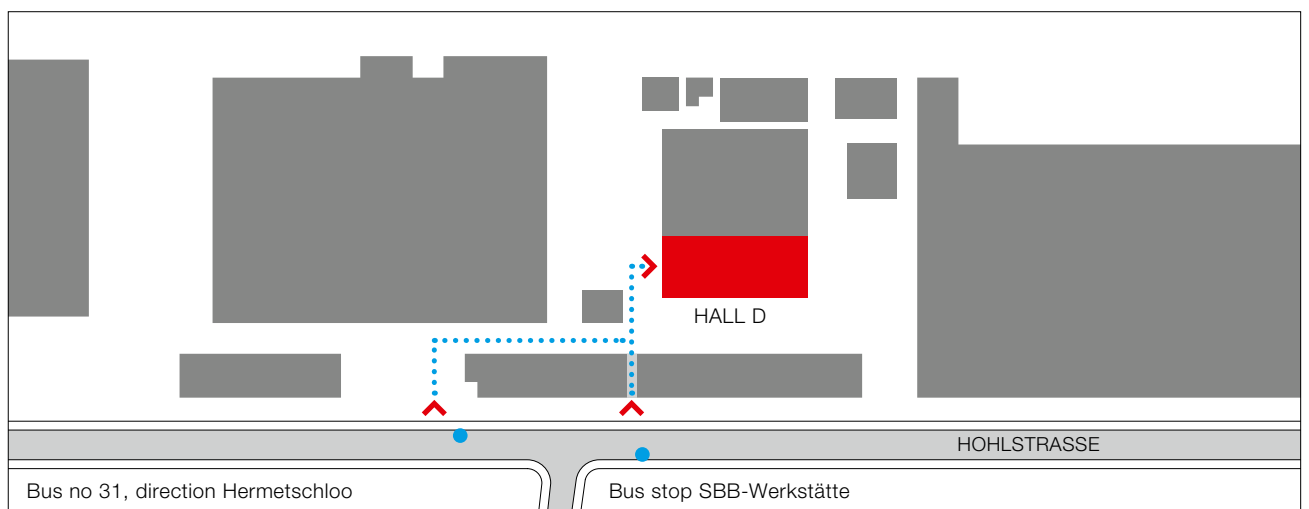
Guided tour 13.00–14.30



Plan 1 ETH-Zentrum, Rämistrasse 101



Plan 2 ETH-Zentrum ground floor plan



Plan 3 Excursion: SBB workshops, Hohlstrasse 400

Railway Heritage Preservation – a stock-taking exercise

Following the postponement of the conference due to Covid-19, the Swiss federal railways (SBB) Specialist Service for the Preservation of Historical Monuments, the Professorship for Construction Heritage and Preservation of the Swiss Federal Institute of Technology Zurich (ETH), the Federal Office of Culture (FOC) and ICOMOS Suisse are delighted to now be able to welcome you to the Railway Heritage Preservation Conference in Zurich.

This year, the conference coincides with the major anniversary celebration '175 Years of Swiss Rail' and the 20th anniversary of the SBB Specialist Service for the Preservation of Historical Monuments. As with the 'Year of Rail' last year, such events provide a suitable context for raising awareness of the importance of railway heritage protection through international exchange. How can we succeed in detailing the important cultural asset that is the railway with its genre-specific characteristics, safeguarding them for future generations, while at the same time meeting the requirements of the technical system of an operational railway?

The aim of this international conference is to take stock of experiences, methods and results, as well as areas of potential, challenges and research desiderata. This information is to serve as the basis for further work on the many fascinating tasks that lie ahead in this area. With this in mind, the conference is deliberately not designed as a hybrid event. It is intended to facilitate exchange and lively discussion in person.

We would like to extend our thanks to all participants who have travelled to Zurich from within Switzerland and from abroad to contribute to the success of this event with their presentations. Over three days, you can expect numerous international talks from both scientific and practical perspectives and subsequent discussions. We wish all participants an interesting and insightful few days.

Reto Bieli

Head of the SBB Specialist Service for
the Preservation of Historical Monuments

Prof. Dr. Silke Langenberg

Full Professor for Construction Heritage and
Preservation
Institute for Preservation and Construction History
Institute for Technology in Architecture ETH Zurich

Programme

LECTURES AND DIGITAL PRESENTATIONS

Digital presentations can be accessed on screens in the foyer and at www.railway-heritage.ch

DAY 1

08.30–09.00 Arrival, coffee, croissants

09.00–09.30 **Welcome:** Silke Langenberg (ETH Zurich, Switzerland)
Reto Bieli (Head of the SBB Monument Preservation Unit, Switzerland)
Benoît Dubosson (Federal Office of Culture, Switzerland)

BLOCK 1 INVENTORY TAKING

09.30–09.40 **Moderator:** Jan Capol (Switzerland)

NATIONAL INVENTORIES

09.40–10.00 Pirjo Huvila (Finland)
Finnish-Railway Heritage

10.00–10.20 Miguel Loos (Netherlands)
Methods and results of station inventory-taking in the Netherlands

10.20–10.40 Chahineze Slimani (Algeria)
Inventaire général pour l'architecture ferroviaire en Algérie (IGAF)
(General inventory for railway architecture in Algeria (IGAF))

10.40–11.00 Bärbel Schallow-Gröne (Switzerland)
Inventar der schützenswerten Bauten und Anlagen der SBB (ISBA)
(SBB inventory of structures and installations worthy of protection (ISBA))

11.00–11.40 Break (40 mins)

INVENTORIES FOR BUILDING TYPES

11.40–12.00 Michael Hascher (Germany)
Brücken an der Schwarzwaldbahn. Ein Bericht aus der Eisenbahndenkmalflege in Baden-Württemberg
(Bridges on the Black Forest Railway. A report from heritage preservation in Baden-Württemberg)

WORLD HERITAGE

12.00–12.20 Rolf Höhmann (Germany)
Grossbogenbrücken des 19. Jahrhunderts als transnationale serielle Nominierung für das Welterbe
(Arch bridges on a grand scale from the 19th century as a serial transnational World Heritage nomination)

RAILWAY HERITAGE ARCHIVES

- 12.20 – 12.40 Martin Cordes (Switzerland)
Fokus Archiv: die Bedeutung von Archiven bei der Erhaltung eisenbahntechnischer Kulturdenkmäler
(Archives in the spotlight: the significance of archives for the maintenance of technical railway heritage sites)

LINE, CANTON AND COMMUNE

- DIGITAL Toni Häfliger / Marion Zahnd (Switzerland)
Das eisenbahnhistorische Streckeninventar der Gonergratbahn
(The inventory of the historic line of the Gonergrat Railway)

- DIGITAL Jasmine Wohlwend Piai / Martina Jenzer (Switzerland)
Remisen, Industriegleise, Wärterhäuschen und Konkurskurve. Das Bahninventar der Stadt Zürich
(Coach houses, industrial tracks, keeper's cottages and bankruptcy curve. The Inventory of railway heritage in the city of Zurich)

SPECIFIC HERITAGE VALUE

- DIGITAL Volker Mende (Germany)
Von der Leere. Eisenbahnbrücken und ihr genius loci
(On empty space. Railway bridges and their genius loci)

- DIGITAL Gisela Vollmer (Switzerland)
Die Schmetterlinge fliegen wieder. Oder: das Verdecken von Kunst im öffentlichen Bahnhof als Zeichen für die Überformung einer ganzen Region
(The butterflies fly again: or the covering of artworks in public railway stations as a symbol for the transformation of an entire region)

WORLD HERITAGE

- DIGITAL Priyanka Panjwani (India)
Railway heritage preservation in the context of societal processes as a whole

- DIGITAL Roland Tusch / Daniela Lehner (Austria)
Vegetation und Topographie: Fragestellungen der Eisenbahndenkmalfpflege?
(Vegetation and topography: issues for railway heritage preservation?)

RECORDING HERITAGE VALUE

- DIGITAL Patricia Ferreira-Lopes (Spain)
Digitizing railway historical and heritage data. Outlining possible guidelines for future inventory and research

PANEL

- 12.40 – 13.30 **Moderator:** Jan Capol

-
- 13.30 – 14.45 Lunch break (1 hour 15 mins)
-

RESEARCH REPORTS

14.45 – 14.55 **Moderator:** Manuel Maissen (Switzerland)

STANDARDISATION

14.55 – 15.15 Dorothea Rosenberg (Germany)
Eisenbahnbauten der Nachkriegszeit. Normative Bau- und Planungsmethoden der Deutschen Bundesbahn
(Railway buildings of the post-war period. DB's normative construction and planning methods)

BUILDING TYPES

15.15 – 15.35 Ömer Dabanli / Elif Özkazanç (Turkey)
Railway Heritage: A Typological Study on Masonry Bridges of Samsun – Kalın Historic Railway line

15.35 – 15.55 Johanna Monka-Birkner (Germany)
Stählerne Eisenbahnbrücken aus der Zeit der Hochmoderne im Stadtgebiet Hannover
(Steel railway bridges from the high modern period in the Hanover urban area)

BUILDING TYPES

DIGITAL Hannah Franz (France)
Inventory tools and strengthening measures for historical French metallic train sheds (1850 – 1931)

PANEL

15.55 – 16.30 **Moderator:** Manuel Maissen

16.30 – 17.00 Break (30 mins)

BLOCK 2 PRACTICE

17.00–17.10 **Moderator:** Eduard Müller (Switzerland)

REPAIR

17.10–17.30 Toni Häfliger (Switzerland)
Eisenbahnen als Denkmale mit Zukunft. Erhaltung, dem technischen Fortschritt verpflichtet
(Railways as heritage with a future. Maintenance bounded by technical progress)

17.30–17.50 Eugen Brühwiler (Switzerland)
«Veredeln» als Ingenieurkonzept für die Erhaltung von genieteten Stahlbrücken
(Refinement as an engineering concept for the maintenance of riveted steel bridges)

17.50–18.10 Deniz Yilmaz (Switzerland)
Korrosionsbedingte Kosten an Ingenieurbauwerken im Schweizer Strassennetz
(Corrosion-incurred costs on engineering structures on the Swiss road network)

18.10–18.30 Philipp Rück (Switzerland)
Betrachtungen zur Lebensdauer von Mauerwerksbauten der Eisenbahnen
(Perspectives on the life-span of railway masonry structures)

WORLD HERITAGE

18.30–19.00 Patrick Schicht (Austria)
Leitfaden Instandsetzung Semmeringbahn
(Guidelines for repair on the Semmering Railway)

Thomas Lampl (Austria)
Sanierung von vier Viadukten auf der Semmeringbahn – Zusammenspiel Denkmalschutz und Technik
(Renovation of four viaducts on the Semmering Railway. Interplay between monument protection and technology)

DIGITAL Florian Müller (Switzerland)
Sanierung der Längshallen im HB Zürich
(Renovation of the longitudinal hall in Zurich main station)

DIGITAL Jacob Riediker (Switzerland)
Die Eisenbahnbrücke Koblenz Waldshut: Massnahmen zu ihrem Erhalt
(The Koblenz Waldshut railway bridge: maintenance measures)

DIGITAL Yann Smith / Fanny Gretillat (Switzerland)
Economie circulaire et conservation du patrimoine pour un mur en pierres sèches
(Circular economy and heritage conservation for a drystone wall)

DIGITAL Erik Meichsner (Germany)
Denkmalschutz im Eisenbahnbrückenbau – Konfliktpotential und Lösungsansätze
(Historic preservation in railway bridge construction – conflict potential and possible solutions)

PANEL

19.00–20.00 **Moderator:** Eduard Müller

20.00–22.00 Refined drinks and nibbles (for speakers, authors, moderators)

DAY 2

08.30–09.00 Coffee and croissants

09.00–09.10 **Introduction to the day:** Silke Langenberg
Reto Bieli

BLOCK 2 PRACTICE (cont.)

09.10–09.20 **Moderator:** Werner Lorenz (Germany)

TRANSFORMATION

09.20–09.40 Borja Aróstegui Chapa (Spain)

The transformations of the great European stations with the arrival of the high-speed rail

09.40–10.00 Alexandrina Striffling-Marcu / Pauline Heron-Detavernier (France)

La conception standardisée de la gare comme patrimoine transnational: Fractionnement, adaptation, préservation?

(The standardized design of stations as a transnational heritage: fractionation, adaption, preservation?)

10.00–10.20 Christina Krafczyk (Germany)

Eisenbahnbrücken – Denkmale im Netz – ein Forschungsprojekt zwischen Denkmalpflege, Ingenieurwissenschaften und Baugeschichte

(Railway bridges – heritage objects in the network – a research project between heritage preservation, engineering and architectural history)

10.20–10.40 Jürg Conzett (Switzerland)

Transformation von Schutzbauten: ein Beispiel zeitgenössischer Arbeitsweise im UNESCO-Kulturerbe

(The transformation of protective structures: an example of contemporary working methods in UNESCO cultural heritage)

DIGITAL Ekaterina Nozhova (Switzerland)

Winterthur-Grüze, Perrondächer von Hans Hilfiker: 1955–1974–1991–2021

(Winterthur Grüze, platform canopies by Hans Hilfiker: 1955–1974–1991–2021)

PANEL

10.40–11.20 **Moderator:** Werner Lorenz

11.20–11.50 Break (30 mins)

BLOCK 2 PRACTICE (cont.)

11.50–12.00 **Moderator:** Ruggero Tropeano (Switzerland)

CONVERSION

12.00–12.20 Andrew Savage (Great Britain)

New uses for heritage stations on Britain's main line railway system

12.20–12.40 Besnik Emini (North Macedonia)

A station without railway: Transformation of Railway station in Skopje

WORLD HERITAGE

12.40–3.00 Mohammad Mohsenian (Iran)

**The need to give more attention to the landscape visits of the world registered railways.
Case study: Trans-Iranian Railway**

DIGITAL Wittfrida Mitterer (Austria)

Albergo Diffuso: Die Neunutzung der Bahnwärterhäuser an der Brennerbahnlinie

(Albergo Diffuso: Reuse of signaller's houses on the Brenner Railway line)

DIGITAL Barbara Berger / Tobias Listl (Switzerland)

Wassertürme. Umgang mit stillgelegten Industriebauwerken

(Water towers. Approach to decommissioned industrial structures)

DIGITAL Heinrich Speich (Switzerland)

**«Schwenkelbergbahn» oder «Schipkapassbahn»: Inwertsetzung einer stillgelegten
Bahnstrecke im besiedelten Gebiet**

(Schwenkelberg Railway: valorisation of a decommissioned railway line)

PANEL

13.00–13.30 **Moderator:** Ruggero Tropeano

13.30–14.45 Lunch break (1 hour 15 mins)

BLOCK 3 WORLD HERITAGE

- 14.45–15.00 **Moderator:** Günter Dinhobl (Austria)
- 15.00–15.20 Benoît Dubosson (Switzerland)
A valeur universelle, exigences exceptionnelles
(A universal value, exceptional requirements)
- 15.20–15.40 Vinita Srivastava (India)
Where the water flows fast and the train is slow: Urban pressures and railway infrastructure responses in the mountain railways of India
- 15.40–16.00 Karl Baumann (Switzerland)
Umgang mit steinernen Infrastrukturbauten bei der Rhätischen Bahn (RhB)
(Dealing with stone infrastructure buildings on the Rhaetian Railway)
- 16.00–16.20 Günter Dinhobl (Austria)
«...in sinnlosen verlängernden Serpentinaen...» Erfahrungen zur Semmeringebahn als Welterbestätte
(«...in pointless lengthening serpentinaen...» Experiences with the Semmering Railway as a World Heritage Site)
- 16.20–16.40 Vahid Alighardashi / Seyed Mohammad Nikaeen (Iran)
Technical and engineering experience for maintaining the Trans-Iranian Railway
- DIGITAL Hans Kordina (Austria)
Neubau einer Bahntrasse im Welterbegebiet
(New construction of a railway line in the world heritage area)
- DIGITAL Christian Hanus (Austria)
Die Donauuferbahn im UNESCO-Welterbe «Kulturlandschaft Wachau» – ein Streckendenkmal zwischen Entwicklungsdruck und Erhaltungsanspruch
(The Danube embankment railway in the UNESCO World Heritage Site «Wachau Cultural Landscape» – a railway line monument between development pressure and preservation requirements)
- DIGITAL Mohammad Hassan Talebian (Iran)
Monument and landscape conservation of Trans-Iranian Railway
- PANEL**
- 16.40–17.20 **Moderator:** Günter Dinhobl
-
- 17.20–18.00 Break (40 mins)
-

CONCLUSION

18.00–18.30 Silke Langenberg
Reto Bieli

EVENING TALK

18.30–18.40 **Welcome:** Toni Häfliger (Switzerland)

18.40–19.10 Helmut Adelsberger (Austria)

**Vom Habsburger- und osmanischen Reich in die Zukunft:
der Westbalkan-Transportkorridor**

(From the Habsburg and Ottoman Empires into the future: the west balkan core network corridor)

19.10 Questions, conclusion

DAY 3

08.30–09.00 Coffee and croissants

09.00–09.10 **Introduction to the day:** Silke Langenberg
Reto Bieli

PRACTICAL EXCURSUS: SITE DEVELOPMENT

09.10–09.20 **Moderator and introduction:** Andreas Vass (Austria)

RAILWAY HERITAGE PRESERVATION AND SITE DEVELOPMENT

09.20–09.40 Walter Engeler (Switzerland)
Rechtliche Stellung von Bahndenkmalern in der Interessenabwägung
(The legal status of railway heritage sites in the weighing of interests)

09.40–10.00 Lukas Bühlmann (Switzerland)
Raumplanung und denkmalpflegerische Interessenabwägung (Praxis)
(Spatial planning and weighing the interests of heritage preservation (practice))

CASE STUDY OF ST. GALLEN

10.00–10.20 Matthias Fischer (Switzerland)
Vom Zusammenspiel von Städtebau und Eisenbahn
(On the interplay of urban development and railway)

PANEL

10.20–11.20 **Moderator:** Andreas Vass
Guests: Peter König (Federal Office of Transport, Head of Legal Affairs)
Stefan Wülfert (President of the Federal Commission for Monument Preservation)
Susanne Zenker (SBB Real Estate, Head of Development)

11.45 Bus ride

12.00–13.00 Lunch (1 hour)

SUPPORTING PROGRAMME

13.00–14.30 **Guided tour by:** Barbara Zeleny (SBB Real Estate, Head of Investment Property)
Barbara Buser (architect, Baubüro in situ ag)

Werkstadt Zürich: transforming SBB workshops into an open, urban-development site for work and leisure through conversion and development

DIGITAL Mohammad Mohsenian (Iran)
Rome-Shahbazan
Film on www.railway-heritage.ch

Contributions

BLOCK 1 INVENTORY TAKING

PIRJO HUVILA

Railway architect 1985–2017, Member of ICOMOS Finland 2000–2021

Finnish-Railway Heritage

In 1998 railway station areas were protected with the Railway Agreement signed between the owners, VR, The Finnish Heritage Agency, and Ministry of the Environment. Station protection included 800 buildings and 80 railway parks. The protection was on the national level and later also local level. Typical Finnish station is a timber frame wooden building and architecture styles from National romanticism to jugend etc. Typical station area has 10–20 railway buildings surrounded by the railway park.

MIGUEL LOOS

Architect and advisor for architecture and urbanism, Bureau Spoorbouwmeester, Netherlands

Methods and results of station inventory-taking in the Netherlands

As the in-house design consultant for Dutch railway companies NS and ProRail, over the last decade, Bureau Spoorbouwmeester has made an extensive contribution to the inventory-taking and specification of station buildings with cultural-historical value. This process was approached systematically over successive steps in order to secure the architectural and cultural-historical value of the railway stations over the long term. The methods and results will be outlined in the presentation:

1. General overview of Dutch rail history
2. Initial general inventory-taking of the entire historical and modern station portfolio, conducted by external architectural and building historians
3. Creation of an initial long list with the subsequent selection of 50 stations to make up a station collection
4. Publication of the station collection and anchoring of its special importance in asset management
5. Definition of generic analysis standards in preparation for the development of station-specific cultural-historical studies
6. Development of the cultural-historical studies into all protected stations (the station collection)
7. All studies made accessible digitally on www.spoorbeeld.nl
8. Integration of the studies into standard asset management and station development
9. Explanation of the “spatial quality framework” design method

CHAHINEZE SLIMANI

Doctoral student, ETAP lab, Institute of Architecture and Urbanism, University of Saad Dahleb, Blida 1, Algeria

Inventaire général pour l'architecture ferroviaire en Algérie (IGAF)

(General inventory for railway architecture in Algeria (IGAF))

The introduction of the railways in Algeria in 1857 saw the construction of many railway lines, buildings and infrastructure. Its extensive physical and intangible legacy reflects the identity of the places where the stations and structures were built. Although this railway heritage has only been safeguarded and recognised as such to a limited extent today, it still bears witness to the history of architecture and engineering. This presentation explores the inventory of railway architecture of stations and buildings in western Algeria along the Oran/Morocco border line. Faced with the real risk of losing the authenticity and integrity of this heritage, we aim – by rationally analysing first-hand archive sources from French military engineering and consulting literature on the heritage from the 19th and 20th centuries complemented by in-situ investigations – to make a contribution towards improving academic knowledge by identifying and recognising this heritage. Based on the inventory methodology of the 'heritage programme', examples of stations and engineering works belonging to the Oran/Morocco border line – locations rich in history and worthy of national and even international protection – are presented from a heritage perspective to preserve their memory.

BÄRBEL SCHALLOW-GRÖNE

Dr. phil., SBB Specialist Service for the Preservation of Historical Monuments

Inventar der schützenswerten Bauten und Anlagen der SBB (ISBA)

SBB inventory of structures and installations worthy of protection (ISBA)

Heritage preservation of transport-related monuments is a relatively young branch of industrial heritage preservation. Thus far, there have not been any uniform, systematic approaches to recording and evaluating heritage sites that do justice to the specific historical value of the current "historic railway line" system. In practice, this often led to an isolated approach to heritage inventory-taking, divorced from the historic context of the line and the object portfolio as a whole. The SBB inventory of structures and installations worthy of protection [ISBA], which is currently in development, aims to record, research and evaluate SBB lines that are worthy of protection, with their inventory of objects and their ensembles, in line with scientific standards. To do justice to the multi-faceted historical value of the dynamic railway system, this inventory is based on the methods of the ICOMOS Charter on Cultural Routes (2008). Historic rail lines are inventoried accordingly as a total of material elements that are worthy of protection, in conjunction with the historical value of the line or the rail operation system. This methodical approach has a significant impact on the value horizon. For example, groups of objects which can be associated with historically significant construction phases or the development of the line gain importance. The inventory approach is to be discussed as part of the stock-taking exercise.

MICHAEL HASCHER

Dr. phil., Consultant for industrial and technological cultural monuments at the State Office for Heritage Preservation at the Regional Council of Stuttgart, ICOMOS monitor for the Ore Mountains World Heritage Site, speaker for the working group on the preservation of industrial monuments at the Association of State Heritage Officers

Brücken an der Schwarzwaldbahn. Ein Bericht aus der Eisenbahndenkmalpflege in Baden-Württemberg

(Bridges on the Black Forest Railway. A report from railway heritage preservation in Baden-Württemberg)

There are various reasons why a bridge may be a heritage monument in the eyes of the heritage protection laws. One reason is that they form part of a protected railway line. Considering this case is a good opportunity to shed light on particular elements of the broad and multi-faceted area of railway heritage. Primarily, the question is about distinctions between heritage value, on the one hand, and how to approach protected railway bridges in practice, on the other. The presentation focuses on the Black Forest Railway as a common thread: the entire line of this railway is a cultural monument in accordance with section 2 on the Baden-Württemberg states law on the protection of cultural heritage. One important aspect of its heritage character was the train path layout with constant traction resistance. This is also true of the 143 bridges that no longer date from the time of construction (1864–73, double track 1921), but instead were partially or wholly rebuilt at a later time. Other bridges still largely date from the time of construction. The presentation explains how – taking into account constructive criteria – the heritage value of the bridges is assessed within this spectrum and how work with Deutsche Bahn AG is conducted when managing them. In the past 10 years, this work has focused on rather different priorities compared to the more well-known DBU railway bridge project.

ROLF HÖHMANN

Engineer, Büro für Industrie-Archäologie Darmstadt, AG Industriedenkmalpflege ICOMOS, Germany

Großbogenbrücken des 19. Jahrhunderts als transnationale serielle Nominierung für das Welterbe

(Arch bridges on a grand scale from the 19th century as a serial transnational World Heritage nomination)

Railway heritage has so far been included in the World Heritage List in various forms: as major linear transport systems, such as the Semmering Railway, or as access railways for mountain regions and tourism, such as Albula and Bernina, and the Indian Mountain Railways. The aspect of “railways and landscape” was always taken into account in this context. Individual railway objects also appear in the tentative lists of various countries; however, so far, only the Firth of Forth Bridge in Scotland – which is undoubtedly unique and has outstanding universal value in terms of the UNESCO Convention – has been included on the World Heritage List. As part of the ongoing tentative list for Germany, there are currently two initiatives to nominate railway bridge structures. The federal state of Saxony proposes the Göltzsch Viaduct. Ten years ago, the state of North Rhine-Westphalia tried to include the Müngsten Bridge in the Federal Republic’s tentative list of the time; the expert jury, however, asked them to look for similar bridges around the world and, if possible, include the bridge in a transnational serial application. Six European bridges now make up this series of great iron and steel arch bridges, built to similar dimensions during the last quarter of the 19th century in the context of a type of peaceful competition:

first the Ponte Maria Pia by Eiffel, located in Porto, and then his Garabit Viaduct in France. The Ponte Dom Luis I in Porto was designed by a colleague of Eiffel, while the Ponte San Michele in Lombardy was designed by the Swiss-born engineer, Jules Röthlisberger. The Müngsten Bridge can be considered a response to these constructions from the German architects of the time. The Viaduc de Vaur in France represented an end point to this development phase around the turn of the century. When researching the history of these bridges, the discovery of countless links between the architects, engineers and construction companies raised particular interest: communication over the borders of the nations involved appeared to be easy and this attests to an early phase in European collaboration.

MARTIN CORDES

Head of Archives and member of the Management Board for SBB Historic (SBB Heritage Foundation) until June 2022

Fokus Archiv: die Bedeutung von Firmenarchiven bei der Erhaltung eisenbahntechnischer Kulturdenkmäler

(Archives in the spotlight: the significance of archives for the maintenance of technical railway heritage sites)

If cultural assets of railway engineering are not only to be presented in museums, but also communicated actively as a part of industrial and economic history, it is desirable that the objects are maintained in a usable condition and can be used for their purpose. To maintain and operate technical cultural assets to this level, comprehensive documentation is indispensable. Information about the initial development, use and any modifications carried out during operation form the basis for the strategy of restoration, maintenance and continued operation. That is where archives come in. In the best-case scenario, the files, plans, photographs and audiovisual documents stored in the archives provide information about the development context of an object, how it was constructed and its original condition, as well as any changes made to the cultural asset during the time it was in active use. The particular importance that company archives can have on maintenance and continued operation is to be illustrated using examples of historic railway installations and historic traction units.

TONI HÄFLIGER

Architect BSA SIA, FSU planner, technical expert

DIGITAL PRESENTATION

MARION ZAHND

Dipl. architect ETH/SIA, Architecum Sàrl Montreux

Das eisenbahnhistorische Streckeninventar der Gornergratbahn

(The inventory of the historic line of the Gornergrat Railway)

The Gornergrat Railway entered operation in 1898 and is the second highest rail-bound mountain railway in Europe after the Jungfrau Railway, which went into operation in stages between 1896 and 1912. The approximately 9.4-kilometre-long route leads from the valley station in Zermatt (1,604 metres above sea level), situated directly next to terminus station of the Visp–Zermatt Railway, up to the Gornergrat at an altitude of 3,000 metres, where visitors can experience an impressive all-round view of the glacial Alpine world around Monte Rosa and the Matterhorn. The construction of the Gornergrat Railway is a consequence of the explosion of railway euphoria

that took place particularly in the second half of the 19th century, which led to emergence of a dense railway network in Switzerland – some of which crossed the Alps – as well as numerous rail-bound mountain railways for tourism purposes. The Gornergrat Railway is the result of an impressive achievement of construction and surveying in a high Alpine landscape. The precise train path routing is particularly notable, crossing various natural and geological zones from the wooded high valley to barren high Alpine areas. The system is cleverly laid out in such a way that minimal artificial structures are required with the most regular incline possible. The railway system generated its own traction current from the very start. In connection with the planned replacement of a bridge structure dating back to the construction of the railway, the authorising body requested that an inventory be drawn up. The historical railway line inventory that was then developed provides a general overview of this railway system, divided into three line sections, eight ensembles and 136 individual objects, and contains aims and suggestions for managing the inventory.

JASMINE WOHLWEND PIAI

DIGITAL PRESENTATION

Lic. phil. I, City of Zurich, Head of Heritage Inventory (Deputy)

MARTINA JENZER

Dr. sc. ETH Zürich, City of Zurich, Head of Heritage Inventory

Remisen, Industriegleise, Wärterhäuschen und Konkurskurve. Das SBB-Inventar der Stadt Zürich

(Depots, industrial tracks, signaller's houses and bankruptcy curve. SBB inventory in the city of Zurich)

The buildings and installations of SBB and its predecessor companies still characterise the cityscape of Zurich today. As a driver of urban development, the railway is inextricably linked to the emergence of the modern metropolitan area of Zurich in a multitude of ways: railway buildings characterise the landscape and residential development, and also act as an economic engine. Structures such as bridges, dams and walls chronicle the achievements of engineering and many buildings have remained important urban landmarks in the city to this day. The railways also created new professions that only a few scholars of railway history will remember today. For numerous buildings, utilisation pressure is growing due to the increasing traffic volume of SBB; other buildings are no longer required by SBB, and so large railway areas in the city area are being converted. This fact poses great challenges for heritage preservation in the city and canton of Zurich. In 2018, in its capacity as owner of the infrastructure, SBB agreed with the City and the Canton to work together on creating an inventory of the buildings and installations in the urban area. Following a complete inventory, the heritage bodies for the City and the Canton coordinated several rounds of joint evaluation together with the SBB Specialist Service for the Preservation of Historical Monuments, including the involvement of external experts as well as the responsible commissions for heritage preservation. The aim was to determine which objects had important historical value in terms of the building and planning law of the canton of Zurich. In 2020, the Office for Spatial Development of the Canton of Zurich identified 105 objects of supra-municipal importance. The City Council of Zurich then included a further 30 objects of municipal importance in the inventory. This inventory of SBB objects in Zurich now enables the public and private property owners to have the greatest possible legal and planning certainty. At the same time, it represents an important instrument for the heritage preservation of surviving relics of an important part of the city's history.

Von der Leere. Eisenbahnbrücken und (ihr) genius loci

(On empty space. Railway bridges and their genius loci)

The various historical, technical and military aspects of my dissertation on fortified railway bridges will be disregarded in the following paper. The focus will instead be on a topic which I have increasingly become aware of: vacancy as an inherent characteristic of heritage value. The former technical conservationist of Brandenburg, Dr Matthias Baxmann, called objects preserved in this way “just-there monuments”. In the age of utilisation concepts, such objects undoubtedly constitute an antagonism: closed doors, bird screens, no disabled ramp, no explanatory displays – according to the usual practice, this simply shouldn’t be! However, particularly in the area of military heritage such as castles, fortresses and other similar World War II relics, permanent or predominant non-use is an inherent part of the history of a structure. For example, roundhouses, engine driver’s dormitories or signal boxes may have a permanent use but this fourth dimension never – or only in exceptional cases – applies to the military installations that were built to defend railway bridges. This is because it was only in the exceptional case of war that people ever kept watch, were stationed and possibly even spent the night here. And this is exactly what makes such buildings so valuable as monuments: vacancy as an immanent functional state. My presentation will attempt to make clear that ‘not having been used’ should be recognised as an essential heritage characteristic, not without also withholding contemporary counter-examples. Using practical examples, I discuss opportunities and obstacles to demonstrate that vacancy can be a dimension – admittedly one that is sometimes difficult to grasp – of the genius loci of a railway bridge.

Die Schmetterlinge fliegen wieder. Oder: Das Verdecken von Kunst im öffentlichen Bahnhof als Zeichen für die Überformung einer ganzen Region

(The butterflies fly again: or the covering of artworks in public railway stations as a symbol for the transformation of an entire region)

The BLM station in Mürren was built between 1962 and 1966 as part of a new tourism initiative for Mürren. The facility – built by Emmi and Peter Lanzrain (Thun) – is classified as worthy of conservation and represents an important contribution to the development of tourism in the Bernese Oberland. Upon arrival in Mürren, tourists used to encounter a mural by Alex Walter Diggelmann, which through its flowers and butterflies anticipated the flower power of the 1960s.

Around 50 years later, the owner of the station displayed a ‘Top of Europe’ poster over the image; an advertising board for the Jungfrauoch, which has nothing to do with Mürren. The station as a total work of art (Gesamtkunstwerk) of 1960s tourist advertising thereby lost its uniqueness and its location-specificity. Art in public space became a placeholder for an advertising board that appears throughout Switzerland and the region. An occupation of public space that is also visible in other places and turns train stations into anonymous spaces. Moreover, the “liberation” of the mural by a group of Mürren enthusiasts led to a criminal complaint. Jungfrau Railways have now decided to preserve the mural! Other Baukultur aspects that should be very important for these locations are however lacking from the ongoing redevelopment.

Railway heritage preservation in the context of societal processes as a whole

Relevant Questions:

- What contribution can railway heritage preservation make to the development of an area?
- What protection interests for sites of interest and environmental protection are relevant with regard to railway areas and railway monuments?
- What significance do railway areas have for a sustainable environment, identification with the local area and civic awareness?

Topic: Preserving the Matheran Mountain Railway: Challenges and Opportunities

Matheran Light Railway (MLR) is a 20 kilometre long mountain railway line that was built in 1907 to reach the hill station of Matheran in the West of India. Matheran was initially a health sanatorium and a summer resort in British colonial India; the hill was notified as an 'Eco-Sensitive Zone' (MESZ) in 2003 and no motorized road vehicles are permitted entry beyond the Aman Lodge station. MLR is an extraordinary industrial heritage asset which is deeply connected to the local culture and the livelihood of the people. The Matheran Mountain Railway is not only popular among tourists, but it also serves as an important means for the transportation of essential services. Patches of the MLR track get damaged due to heavy monsoon rainfall every year and cause technical failures such as derailments. The rail landscape is also vulnerable to fires, poor maintenance & new infrastructures such as ropeways etc. Despite the several threats, MLR and its assets play a crucial role in local area development and local community life. The living heritage site of the Matheran Light Railway has been on the Tentative UNESCO World Heritage List since 2014, as an extension of the World Heritage Mountain Railways of India with three inscribed sites. This paper will evaluate the various social, economic and environmental factors responsible for the railway's integration into the local ethos.

Vegetation und Topografie: Fragestellungen der Eisenbahndenkmalflege?

(Vegetation and topography: issues for railway heritage preservation?)

The train path routing for a railway changes the landscape on a major scale. At the beginning of the construction of the railways, areas are cleared and the topography is modelled and the foundations prepared with embankments and trenches. A unique infrastructural landscape was created on the Semmering Railway in the mid-19th century when the foundations were supplemented with impressive engineering structures. In the first years of operation, passengers were presented with a bare landscape, characterised by scree and mounds of debris from the construction site. Over time, the forests reclaimed the landscape. At the time of steam-powered trains, a corridor was kept free of wood to protect against fire. Once the line was electrified, this corridor was also reforested. Today, tourists demand unobstructed views of the viaducts, galleries

and tunnel portals, and so visual axes are cleared. How are these phases of landscape change to be classified in the context of heritage preservation? The modernisation dynamics of railway monuments and the procedural dynamics of the landscape pose equal challenges for railway heritage preservation. Appropriate landscape conservation measures must be developed to accompany the modernisation of the railways and to be understood as cultural contributions to the development of a continuous historical process. The presentation discusses the landscape aspects of topography and vegetation of railways. The different historical phases of the Seamerling Railway, from its construction to the building of the new base tunnel, serve as examples. This helps to highlight current issues in the landscape context of railway monument preservation.

PATRICIA FERREIRA-LOPES

DIGITAL PRESENTATION

Scientific Researcher, Andalusian Institute of Historical Heritage (IAPH). Honorary researcher, HUM799, DEGA, ETSA University of Seville

Digitizing railway historical and heritage data. Outlining possible guidelines for future inventory and research

Railway heritage covers a great diversity of elements and relationships, both tangible and intangible, which requires a series of actions from the identification and documentation phase, through its analysis to the treatment and intervention of its elements. Documenting and analysing this complex web of elements is extremely difficult with traditional methods, and even more challenging if we take into account each discipline operating within it. In this sense, making this information/documentation visible and recognising the materiality of it is of great significance, since both (information and materiality) are sources of knowledge. However, this knowledge is fragile when the data does not have an integral structure that guarantees its easy access, interoperability and reuse. This paper will discuss about: how railway historical data and heritage should be documented? What standards and/or conceptual models of data and metadata (CIDOC-CRM, Dublin Core, Arches, OntoME, etc.) should be used? How HGIS could be used to facilitate railway heritage documentation and research? We report in this paper an on-going research that focus on the Andalusian railway memory and heritage as a case study. We will present an overview of the problems we have found – which may be familiar to other case studies – and explore possible solutions taking into account FAIR data principles and the particularities of railway heritage.

DOROTHEA ROSENBERG

Doctoral candidate at the Brandenburg Technical University Cottbus-Senftenberg, Chair of Railway Engineering, Project Manager at DB Engineering & Consulting GmbH

Eisenbahnbauten der Nachkriegszeit. Normative Bau- und Planungsmethoden der Deutschen Bundesbahn

(The normative construction and planning methods of Deutsche Bundesbahn (German Federal Railway))

Railway buildings from the post-war period still receive little attention and are rarely considered from the perspective of heritage protection. The attempts of Deutsche Bundesbahn to standardise the planning and manufacturing processes for building constructions in the decades following World War II has been examined as part of a research project. This analysis of ideal-typical railway

buildings, such as the entrance building and the infrastructure installations for signal boxes, is intended to reveal whether the regulations of the railway industry influenced the building construction activities of Deutsche Bundesbahn, to what extent the application of standardisation to the area of building construction was successful, and to what extent the findings of the research can be applied to future repair measures for railway buildings. The buildings investigated are of interest from the perspective of architectural history, construction and heritage preservation and are also currently highly topical due to the numerous renovation measures. Other railway companies can learn from the successes and failures of earlier efforts by German Federal Railways and draw conclusions relevant to the future implementation of normative planning and construction methods. Moreover, a long-term view of construction history may also support the forward-looking planning and maintenance of railway buildings.

ÖMER DABANLI

Assistant Professor at Istanbul Technical University, Faculty of Architecture; member of ICOMOS Turkey and founding president of Blue Shield Türkiye; founding director of the Conservation and Restoration of Cultural Heritage Department in FSMVU

ELIF ÖZKAZANÇ

Research assistant at Fatih Sultan Mehmet Vakif University, Faculty of Architecture and Design

Railway Heritage: A Typological Study on Masonry Bridges of Samsun – Kalın Historic Railway Line

Invention and development of railway technology contains well rounded values for World heritage. This is mainly because railway is both evidence and agent for industrial and technological development. This fact is also valid for railway network in Anatolia which is constructed mainly in late Ottoman and early Republican times of Turkey. Besides, it kept a crucial role in development of country in a modern way, structural achievements of tunnels, roads and bridges on railways are part of precious architectural heritage. This paper discusses heritage values and typology of historic masonry bridges of historic Samsun – Kalın railway line in northern Anatolia. Also, the paper evaluates archive documents which contain original projects of railway line and recent surveys of 12 historic bridges. Furthermore, the data about the bridges converted into a typological research and classification to facilitate future investigations on historic railway bridges. Preliminary results of comprehensive investigation of bridges in terms of architectural, structural, materials and building techniques was given in the paper.

JOHANNA MONKA-BIRKNER

Research assistant at the Institute for Concrete Structures, TU Dresden

Stählerne Eisenbahnbrücken aus der Zeit der Hochmoderne im Stadtgebiet Hannover

(Steel railway bridges from the high modern period in the Hanover urban area)

The infrastructure of the railway network has far-reaching effects on development and landscape planning and thus is deeply entwined with cultural and historical developments. At the beginning of the 20th century, the existing railway network was greatly expanded, which led to a massive increase in the construction of railway bridges. Due to the growth of population and industry,

railway capacity had to be increased, particularly in big cities. A large part of these structures were the iron plate girder constructions that can still be found in many places today. The draft standards established at the time and the greater availability of iron had a major impact on the choice of construction. This presentation will highlight the various causes for the increased construction of these bridges. Using the example of railway bridges built in Hanover at the time, the presentation will aim to shine a light on this development. Due to the enormous increase in traffic and the intolerable conditions in the urban area, a new freight bypass was built and a large part of the existing tracks were elevated from street level in order to pass over the streets. This resulted in a large number of steel bridge structures in art nouveau style, some with cast iron supports and elaborately designed abutment pylons. Despite intensive use for over 100 years, many of these structures still exist today and they will be presented here with a selection of examples. The underlying research project 'Railway bridges – monuments on the network', funded by the German Research Foundation, is intended to lay the foundation for a systematic evaluation of railway bridges as cultural monuments and to present their development into 'monuments on the network'. The overall objective is to develop further criteria for assessing whether infrastructure structures are worthy and suitable for being listed as heritage monuments.

HANNAH FRANZ

DIGITAL PRESENTATION

PhD student at Université Gustave Eiffel in Nantes, France

Co-authors: Sylvain Chataigner, Université Gustave Eiffel, France

Lamine Dieng, Université Gustave Eiffel, France

Jean-Luc Martin, AREP, France

Mario Rinke, University of Antwerp, Belgium

Inventory tools and strengthening measures for historical French metallic train sheds (1850–1931)

In France, about 70 train sheds built between 1850 and 1931 with a metallic structure have been preserved and are still in service. One of the main criteria for the inventory of those train sheds within the French railway company SNCF is the typology of the girders. The girders are an important cultural asset of architectural and technical heritage. Their typologies have been extensively described in historical and more recent literature and used as a tool of classification and comparison between countries. The secondary trussed beams used both as purlins and rafters are, however, also distinctive structural elements. Resulting from varied design approaches, they testify to an original construction practice and architectural style inclined towards delicacy and ornamentation, characteristic of the French heritage. In train shed renovations of the last 20 years, strengthening measures of the metallic structure mostly address stability problems of the secondary trussed beams. Two main strategies prevail, locally increasing cross-sections or adding constraints. Their technical variations can be evaluated through criteria such as structural efficiency, ease of implementation, degree of heritage preservation. The research project aims to provide a new basis for targeted and sensitive restoration of train sheds. This contribution elaborates on relevant inventory tools for heritage enhancement and on currently used strengthening measures.

BLOCK 2 PRACTICE

TONI HÄFLIGER

Architect BSA SIA, FSU planner, former Heritage Officer at SBB

Eisenbahnen als Denkmale mit Zukunft. Erhaltung, dem technischen Fortschritt verpflichtet

(Railways as heritage with a future. Maintenance bounded by technical progress)

Railways are part of the transport infrastructure of a country or region and fulfil important duties. Without effective transport systems, modern society would no longer be conceivable. Today's society based on the division of labour and with its needs for transport and mobility is closely coupled to the railway; elements favour or reinforce one another. Railway heritage preservation must deal with the fact that railway systems are "dynamised" and influenced, if not even justified, by societal, political, spatial planning, economic, operational and legal aspects. Getting to grips with this presents both a problem and an opportunity. The railway is a socio-technical wheel-rail system; the various components interact with each other and linked via largely standardised typologies that are technically and operationally defined (stations, workshops, bridges, embankments, tunnels, trenches, shunting sidings, energy systems, railway engineering facilities, etc.). Each component is part of the identity and authenticity of the railway. As a "machine" that is spread out into the landscape, so to speak, there is a constant pressure on the railway to adapt and change. The resulting changes are usually technically state of the art; over time, the system comes to contain elements from an array of generations of (construction) technology. This "tradition" requires a good Baukultur.

EUGEN BRÜHWILER

Prof. Dr. dipl. Ing. ETH/SIA; EPFL – Swiss Federal Institute of Technology Lausanne, Head of the Structural Maintenance and Safety Laboratory (MCS-IIC-ENAC), Lausanne, Switzerland

«Veredeln» als Ingenieurkonzept für die Erhaltung von genieteten Stahlbrücken

(“Refinement” as an engineering concept for the maintenance of riveted steel bridges)

Railway bridges with Baukultur value deserve to be treated with respect during maintenance. It is not sufficient simply to determine their Baukultur value, legal barriers and standards. Instead, technical solutions are required to facilitate the continued use of railway bridges as a component of modern rail operations. To achieve this goal, high-quality engineering that goes well beyond the primitive application of building standards is essential. A real paradigm shift is required. 100-year-old railway bridges no longer need to be replaced systematically. This talk presents examples of how interventions in riveted steel railway bridge construction could be limited or avoided completely. New methods of engineering were used to precisely record the railway loads acting on the steel bridges, for which measurement data from monitoring of the most heavily stressed components was used directly to demonstrate the load-bearing capacity and fatigue resistance. The aim of this method is to obtain detailed and realistic information about the load-bearing behaviour of the bridge in order to restrict interventions to only those that are absolutely necessary. However, if structural interventions are required, new technologies using high-performance building materials are usually expedient. The presentation will demonstrate how the cement-bonded fibre composite building material UHPC can be used to modernise the track on riveted steel bridges while simultaneously preserving Baukultur value

DENIZ YILMAZ

ETH Zurich, IfB, Chair of Durability of Engineering Materials

Korrosionsbedingte Kosten an Ingenieurbauwerken im Schweizer Strassennetz

(Corrosion-incurred costs on engineering structures on the Swiss road network)

A large part of damage to civil engineering structures is caused by corrosion. In the work presented here, a detailed analysis was conducted on representative maintenance projects for civil engineering structures on the Swiss road network. In the cases examined, it was revealed that 56% of maintenance costs ($\pm 11\%$) are caused directly by corrosion. This corresponds to costs of an estimated CHF 260 million to 510 million per year, i.e. around CHF 1,000 per minute. In addition to the road network, corrosion costs are also to be expected in other civil engineering structures, such as in the energy sector, in residential and office buildings and in railway infrastructure, which were not considered as part of this analysis. Likewise, indirect costs were not quantified (traffic, environmental damage, etc.). Considering that the SBB network alone includes approximately 30,000 engineering structures – a significant number of which are already well over 50 years old – it can be assumed that corrosion is also an important issue in the domain of railway infrastructure. The direct costs (presented here) of corrosion on civil engineering structures on the Swiss road network correspond in large part to the data available for the USA and can therefore potentially also be applied to other industrialised countries. Given the economic significance of corrosion, it is crucial to have the phenomenon under control as best as possible. This urgently requires technological innovations and up-to-date training of specialists within the construction industry.

PHILIPP RÜCK

Dr. sc. nat. ETH, dipl. Geologe ETH/SIA, Founder of Materialtechnik am Bau AG; Chair of the working groups SIA 266/2 (new construction of natural stone masonry) and SIA 269/6 (maintenance of natural stone masonry); member of the Cantonal Commission for Heritage and Archaeology, Canton of Aargau

Betrachtungen zur Lebensdauer von Mauerwerksbauten der Eisenbahnen

(Perspectives on the life-span of railway masonry structures)

Structures made of natural stone masonry constitute the majority of historical railway structures. Masonry bridges, tunnel vaults, water culverts and retaining walls are the primary structural categories. Whether or not an object needs to be replaced depends on the many factors in each specific case. This presentation will discuss to what extent the structural category, the construction and the materials used influence the service life of an object. Many different local rock types were used as building components, with sandstone from the Mittelland region and limestone from the Jura in frequent use. After 100 years, these materials often bear signs of significant but rarely irreparable deterioration. The softening of masonry mortar due to moisture and frost has proven to be the most serious sign of deterioration. In the case of masonry structures with high amounts of mortar, this softening leads to deformation and a gradual decrease in load-bearing capacity. Such damage is usually irreversible and severely limits the life-span of a structure. The structures were built at the time of the transition from air-hardening lime mortar to hydraulic lime mortar and then finally to cement mortar. Depending on the exposure and the type of mortar, the softening process may be faster and more distinct. The different structural categories are exposed to this process to varying degrees and therefore differ fundamentally in terms of life expectancy. Typical cases of deterioration are presented and attention is drawn to particular constellations, thereby contributing to a superior evaluation of the remaining service life of natural stone masonry structures on the railways.

PATRICK SCHICHT

DI, Dr. Dr., Federal Monuments Office, State Curation Office for Lower Austria, responsible for the Semmering Railway as area expert since 2007

Leitfaden Instandsetzung Semmeringbahn

(Guidelines for repair on the Semmering Railway)

As part of preparations for the UNESCO World Heritage application, the Semmering Railway received national listed status in 1997. The protection status concerns all objects owned by the state-owned federal railways (ÖBB), including tracks, revetments, tunnels, bridges and sheds, stations and guard houses. After the public's desire for transparent and economical public authorities grew in the 21st century, seven structural guidelines were developed between 2010 and 2018 in collaboration with ÖBB (under the leadership of Dr Dinhobl); these represented a guideline for each of the main categories (from tunnel portals to guard houses) with the aim of making work on upcoming projects goal-oriented and efficient. The background of this was the Standards der Baudenkmapflege ('Standards for the preservation of architectural monuments'), published in 2014, which prescribes the specialist process for recording, preserving and altering heritage monuments. Between 2014 and 2019, four large viaducts were restored on this basis. They are an excellent example of the development from a standard model inspired by railway law to a case-by-case consensus that nevertheless meets all technical and structural requirements. This approach enabled consistent modernisation work to be carried out, while ensuring a practically complete retention of substance, appearance and artistic value, and without disrupting operations or causing delays. The presentation aims to detail this process, from the reappraisal of substance and archiving, to the intensive project planning in partnership, through to execution and publication.

THOMAS LAMPL

DI, ÖBB-Infrastruktur AG, Line Management and Facility Development

Sanierung von vier Viadukten auf der Semmeringbahn – Zusammenspiel Denkmalschutz und Technik

(Renovation of four viaducts on the Semmering Railway. Interplay between monument protection and technology)

The Semmering Railway constitutes a section of the Baltic-Adriatic corridor and provides a connection from Vienna to both Italy and Slovenia. In 1997, as part of Austria's submission of the Semmering Railway to UNESCO World Heritage, an assessment process was undertaken that permanently established its heritage status. During regular inspections of the bridges on the Semmering Railway, a great degree of damage was detected on the supporting structures for four viaducts (built 1854; last renovated in the 1950s). As a result, structural analysis was carried out on the four viaducts but no significant structural deficiencies were found. Missing or defective sealing layers were identified as the cause of the damage that had occurred. It was therefore decided in 2014 to install track slabs as sealing layers on all four viaducts, which would also lead to a structural improvement regarding the load on the arches. The installation of the track slabs required reconciling the requirements of (railway) engineering and heritage protection. The challenges posed by this and the solutions that were implemented will be illustrated and explained with the help of sections of plans and images from the sites.

FLORIAN MÜLLER

DIGITAL PRESENTATION

AFRY Schweiz AG

Co-authors: Aldo Conti, SBB Infrastruktur

Thomas Suter, A. Aegerter & Dr. O. Bosshardt AG

Sanierung der Längshallen im HB Zürich

(Renovation of the longitudinal hall in Zurich main station)

Zurich main station is a listed ensemble of supra-cantonal importance. In addition to the construction work on the southern hall, which can be clearly identified due to the cranes and scaffolding, the northern areas with platforms 4 to 16 are also undergoing a complete renovation. This area consists of almost 100-year-old riveted steel constructions with shed guttering roofs, large glass surfaces, gravel roofs and drainage channels made of sheet-metal covered reinforced concrete elements. The presentation explains the measures implemented and the approach in terms of heritage protection in the interplay of the heritage protection needs of the existing structure in relation to security and technical usability.

JACOB RIEDIKER

DIGITAL PRESENTATION

SBB expert for civil engineering, expansion and renewal projects, project management

Die Eisenbahnbrücke Koblenz Waldshut: Massnahmen zu ihrem Erhalt

(The Koblenz-Waldshut railway bridge: maintenance measures)

The Koblenz-Waldshut bridge, built between 1857 and 1859, and its overland section on the Swiss side, are the oldest railway bridges over the Rhine that are still in use as such. In recent years, SBB has implemented various measures to preserve the lattice structure bridge made of puddled steel and the railing construction of the bridge approach, made of grey cast iron. Measures for the preservation of the bridge are currently being planned in cooperation with DB. After considering the history of the bridge, the measures that have already been implemented will be presented:

- Bracing of the bridge track as a temporary solution
- Sampling for the repair of the steel bridge
- Cast iron welding on the railing from 1859 using the Eutalloy process

Finally, an outlook on the planned repairs will be provided.

YANN SMITH

DIGITAL PRESENTATION

Certified civil engineer ETHZ; OPAN concept SA, lead design engineer and management team member

FANNY GRETILLAT

Certified environmental engineer EPFL; OPAN concept SA

Economie circulaire et conservation du patrimoine pour un mur en pierres sèches

(Circular economy and heritage conservation for a drystone wall)

Between 2020 and 2021 OPAN concept SA led the restoration of a support wall on a railway site in La Chaux-de-Fonds (canton of Neuchâtel). The drystone structure was built in 1889. Never having undergone major renovation, the condition of the 130-metre-long wall with an average height of 2.5 metres had deteriorated significantly. Identical restoration to take account of the wall's heritage value and respect for the site (UNESCO heritage site) while meeting regulatory requirements (including Federal Office of Transport approval) was favoured. Another factor in favour of this option is that drystone structures are in line with a sustainable development approach.

Uniqueness of the project: reuse of stones dismantled from a nearby structure

The opportunity to recycle some of the stones from a railway bridge built in 1903 (Malakoff, La Chaux-de-Fonds) was identified and utilised. When the bridge was dismantled, 240m³ of material was deposited in a storage facility. The stones were then sorted and enhanced by craftsmen for use in the support wall instead of being milled to make aggregate. The outcome: materials recovered from the pre-existing wall and from the bridge made up 63% of the volume of the new wall. The project is an excellent example of simplicity, the efficient use of resources and the circular economy.

ERIK MEICHSNER
Marx Krontal Partner

DIGITAL PRESENTATION

Denkmalschutz im Eisenbahnbrückenbau – Konfliktpotential und Lösungsansätze

(Heritage protection in railway bridge construction – potential conflicts and approaches)

As a key component of network infrastructure, railway bridges are indispensable for rail mobility. A major social responsibility of DB Netz AG is to ensure the route network in Germany – including the railway bridges – is available securely and operates at a high standard. Beyond their importance for the network infrastructure, existing railway bridges also make a valuable contribution to Baukultur. The oldest structures date back to the early days of the railways in 1835. Many constructions are under heritage protection. This includes not only major structures of outstanding importance, but also numerous smaller arched bridges that contribute a sense of identity to their surroundings and in the consciousness of many people. When managing protected railway bridges with historic value, there are many additional aspects to consider in comparison to new construction projects. The responsible body for heritage preservation should be involved in the planning and approval processes in good time. When managing historic bridges, a standardized procedure coordinated at an early stage with project partners is a prerequisite for the required planning and approval certainty in the course of the project. In this context, a working group comprising representatives from DB Netz AG, the Lower Saxony State Office for Heritage and the engineering firm Marx Krontal Partner developed a working aid for dealing with railway bridges, published in January 2020. The project was funded by the German Federal Environmental Foundation and supported by an interdisciplinary advisory board. In this digital contribution to the Railway Heritage Preservation Conference, the working aid is presented and the initial results from its use are to be reported.

BORJA ARÓSTEGUI CHAPA

Dr., lead architect for the design of Spencer Dock Station and the enhancements of Connolly Station in Dublin
Teacher at the MUA (Máster Universitario en Arquitectura) in the University of Navarra's Higher Technical School of Architecture. Madrid and London, 2018–2020)

The transformations of the great European stations with the arrival of the high-speed rail

The emergence of the high-speed train in Europe in the last few decades of the 20th Century represented the resurgence of a means of transport in progressive decline since the popularization of the car and the plane. The railway decay brought, in many cases, the abandonment, or even the demolition, of historical stations and the deterioration of their urban environment. In response to that neglect, a greater social awareness towards preserving the railway built heritage also increased in the last quarter-century. The need to adapt the great railway stations to serve the new transport system, and the interest in enhancing the historic buildings and their central

locations, have resulted in significant modifications. Within Europe is where the most relevant examples of station transformations with the arrival of the high-speed train are located. The study of key European stations, such as the Gares of Paris, St Pancras Station in London, Atocha Station in Madrid and five other stations of Central Europe –Amsterdam Centraal, Antwerpen Centraal, Köln Hauptbahnhof, Frankfurt (Main) Hauptbahnhof and Gare de Strasbourg–, lead to the identification of the three main implications that the arrival of the high-speed rail brings to these historic stations:

- **Intermodality:** the trip does not start when the passenger gets on the train. Before that, he has reached the station by another means of transport. Intermodality becomes necessary.
- **Commercial development:** nowadays, the emergence of commercial areas is not necessarily linked to passenger flows but created as a hotspot due to their privileged position in the city centre.
- **The enhancement of the station and its urban development:** with the arrival of the high-speed rail, the old European stations have moved from being a problem for the city and for the railway companies to being an excellent opportunity to improve the stations and their urban settings.

In the last decades of the 20th Century, the great innovation in railway architecture was to consider the station as the place where all the means of transport could interact to lower the travel time. The first decades of the 21st Century, in turn, are marked by a more significant presence of commercial and recreational activities within the stations. The best way of preserving the railway heritage is by upgrading the stations to the railway system's actual needs while being highly respectful of the historic buildings. The examples presented herein are a great starting point for future station transformation projects.

ALEXANDRINA STRIFFLING-MARCU

Doctoral student in architecture, IPRAUS (ENSA Paris-Belleville), AREP

PAULINE HERON-DETAVERNIER

Doctoral student in architecture, LIAT (ENSA Paris-Malaquais), AREP

La conception standardisée de la gare comme patrimoine transnational: Fractionnement, adaptation, préservation?

(The standardized design of stations as a transnational heritage: fractionation, adaptation, preservation?)

In recent decades, European rail projects have focused on high speed. At a time when our mobility systems must be decarbonised and access to less densely populated areas improved, the historic stations of small and medium-sized towns face modern-day challenges. Adapting them to meet the needs of contemporary lifestyles and types of mobility has given rise to a large number of strategies at the European level to develop the role of these passenger buildings. Programmes are emerging in various countries – including Belgium, the Netherlands, the UK, France, Spain and Italy – which see the role of these stations in very different ways (design of new reproducible modular structures or transformation programmes for former stations). Most of these small and medium-sized stations were constructed based on standard serial design schemes across entire rail networks to ensure speed of completion and profitability. This feature is a key part of their heritage value and reflection upon it. It is not so much the building itself but the serial design which represents its richness and resilience. This presentation aims to highlight the various strategies developed in six European countries to adapt the heritage of railway stations in small and medium-sized towns to meet modern-day challenges. Do these initiatives contribute to the fragmentation or the preservation of railway heritage at European level? In a second part,

the historical mise en abyme of these projects – with the emergence of standardised railway station architecture from the 19th century – explores the palimpsest character of the railways. How can the transnational scale of this series design enlighten our approach to contemporary challenges (resilience, modularity, re-use)?

CHRISTINA KRAFCZYK

Dr.-Ing., Chair of the Lower Saxony State Office for Heritage Preservation

Eisenbahnbrücken – Denkmale im Netz – ein Forschungsprojekt zwischen Denkmalpflege, Ingenieurwissenschaften und Baugeschichte

(Railway bridges – heritage objects in the network – a research project between heritage preservation, engineering and architectural history)

Since the end of 2020, the architectural and artistic heritage department of the Lower Saxony State Office for Heritage Preservation and the Institute for Concrete Structures at the University of Dresden have been researching railway bridges as ‘monuments on the network’ as part of the German Research Foundation priority programme Kulturerbe Konstruktion (‘Cultural Heritage: Construction’). Functioning railway bridges are subject to constant change brought about by maintenance, repair and renovation. Complete material preservation is therefore possible at best temporarily, but not permanently. The evidence of the history of change is part of the heritage object and a constraining element for any heritage preservation plan. The methods to be developed and the insights gained from this project that uses the example of railway bridges are therefore, in principle, transferable to other categories of heritage objects whose “artistic” value cannot be the focus of heritage assessments. An individual bridge, usually registered as a “single monument”, exists within broader contexts: its significance lies in its role within the network as a whole. This leads to the key questions of the project:

- a) How must the history of the typology of ‘railway bridge’ in particular be extended if repairs and (partial) replacements are understood as typological elements of architectural history to be studied?
- b) How can typical and atypical changes be identified and evaluated?
- c) How does heritage inventory methodology change for a genre of heritage object that necessarily undergoes change?
and looking forward:
- d) How can railway bridges be preserved as heritage monuments in a sustainable way and at appropriate expense?

The presentation aims to explain the objectives and methods of the project and open them to discussion.

JÜRIG CONZETT

Civil Engineer ETH/SIA, Conzett Bronzini Partner AG, Chur, Switzerland

Transformation von Schutzbauten: ein Beispiel zeitgenössischer Arbeitsweise im UNESCO-Kulturerbe

(The transformation of protective structures: an example of contemporary working methods in UNESCO cultural heritage)

In the area of the Alp Grüm station of the Bernina line of the Rhaetian Railway, the railroad crosses the steep slope three times. To protect the tracks from avalanches, galleries were built in the early 1950s using a very light construction method with prefabricated concrete elements. In recent years, the damaged galleries had to be replaced. The design and realization of these

new galleries had to meet monument preservation, aesthetic, technical and construction logistic requirements. The article sheds light on the background of the design and construction process of the new buildings from the first sketches to the finished structure. In addition, based on this experience, an attempt is made to formulate some general theses on new construction in the historical context of buildings of the railroad. What do keywords like “memory”, “historicism” and “reconstruction” mean in the context of engineering structures?

EKATERINA NOZHOVA

DIGITAL PRESENTATION

Dr. sc. ETH, SBB Specialist Service for the Preservation of Historical Monuments

Winterthur Grütze, Perrondächer von Hans Hilfiker: 1955 – 1974 – 1991 – 2021

(Winterthur Grütze, platform canopies by Hans Hilfiker: 1955 – 1974 – 1991 – 2021)

The stop in Winterthur Grütze by Hans Hilfiker, a monument of national importance, was considered a prototype for a possible series of SBB platform canopies. The aim was to develop an industrially manufactured structure that could be flexibly adapted to different situations and quickly assembled with as little disruption to rail operations as possible. The paper describes the platform canopies as a trademark of SBB: what are the qualities of the corporate design? The execution of the platform canopies combined the methods of boiler construction with clever, spontaneously developed solutions for concrete hardening: what does technology mean in construction? The paper describes three major conversion phases for platform canopies as well as the related heritage preservation problems. In 1971, the central pillar for the platform canopy above platform 3 tilted due to a failure of the foundation. The foundations of all three pillars were rebuilt in 1974 and the concrete pillars were replaced by steel structures with sheet metal cladding. In 1990/91, the platform canopies were hydraulically raised by 0.45 metres to match the clearance/structure gauge of the Zurich S-Bahn. Planning to adapt to the needs of people with disabilities has been under way since 2019.

ANDREW SAVAGE

Executive Director of the RHT from 2010 to April 2022

New uses for heritage stations on Britain’s main line railway system

Since 1985 the Railway Heritage Trust has given advice and sponsorship to improve and find new uses for heritage stations on Britain’s main line railway system. Initially funded by British Rail, the RHT now gets its funding mainly from Network Rail, and some from the Historical Railways Estate, managed by National Highways and looking after closed lines. The RHT has an annual budget of £2.7 million (€3.2 million), and in its first 36 years has sponsored 1,880 grants to a value of £62.8 million (€73 million, drawing in external funding to the industry of over £85 million (€99 million) in the process. Andy Savage was Executive Director of the RHT from 2010 to April 2022, the conclusion of a 52-year career in the industry. He will speak about how the RHT works and show examples of how it has helped save and restore historic railway structures around Great Britain. Andy will also touch briefly on how heritage railways look after their historic buildings, mainly from his experience on the Ffestiniog Railway, Britain’s oldest railway company, and look at how success with restored heritage buildings is celebrated across the British Isles.

BESNIK EMINI

Dr., Historian; Researcher at the Institute of Cultural and Spiritual Heritage of the Albanians in Skopje

A station without railway: Transformation of Railway station in Skopje

Skopje was connected with a railway line with Thessaloniki in 1873. Ottoman Empire wanted to build railway infrastructure for faster transportation of its military troops in its European part. Skopje was a transit point if the railway which started in Thessaloniki and continued through Prishtina and finished in Mitrovica. The basic idea was the line to continue to Sarajevo and to be connected with Europe. Through the years the priorities of the corridors have been changed, and Skopje station become more important and the traffic increased. In 1937 on the place of old railway station build in 1873 started the construction works for new station. The new station was built to satisfy the modern needs of the transportation, including underground access to passenger platforms. In 1940 station was ready and opened for use. Early in the morning 26 July 1963 Skopje was hit by a devastating earthquake. Among the object which were damaged was also main railway station. It was decided that the station would not be rebuild, and should be used as museum of Skopje, and as damaged building to serve as a memorial of the earthquake. With a new plan for rebuilding Skopje, the new station was replaced in other location, and old station was disconnected from existing railway network. Today old railway station is not exhibiting examples of old trains or similar equipment. In 2023 it will be 150 year of first train arriving in Skopje, and the space around the old station is under construction of many buildings of private companies which have limited its outside space. The presentations will present a history of the station from the beginning until present time through the available sources.

MOHAMMAD MOHSENIAN

History Researcher of Trans-Iranian Railway

The need to give more attention to the landscape visits of the world registered railways. Case study: Trans-Iranian Railway

Rail museums and tourist trains are familiar responses to the demand of railway enthusiasts. However, the most attractive and comprehensive features of the railway as a tourist attraction is the railway landscape with all its elements such as parallel rails, bridges, tunnels, galleries, buildings and of course the train that passes by that scene. Therefore, the possibilities of visiting alongside the railway should be facilitated. Preparing appropriate routes in different classes for cars, bicycles and pedestrians, combined with information can make it possible. The information can be presented by specific maps, apps and signboards which indicate the locations with proper visibility to railway. There are routes nearby all world-registered railways that provide the infrastructure for this type of visit. So far, few routes have been implemented for this purpose but we are still far from the desired situation. Trans Iranian Railway has a real prospect in this regard. In the southern part, there is a 90-year-old service road with relics of when the railway was under construction. It is located at the closest distance to the railway, in the core and buffer zone of the registration area. By repairing and securing it, a private route to visit the railway landscape will be introduced which is itself part of the history of railway construction. On the other hand, by generating revenue, the positive effect on further belonging to the railway for the local community nearby the railway line could be expected. And as a result, the preservation of the world registered route, will be.

Albergo Diffuso: Die Neunutzung der Bahnwärterhäuser an der Brennerbahnlinie

(Albergo Diffuso: Reuse of signaller's houses on the Brenner Railway line)

Of the approximately 30 signaller's houses along the Brenner railway line present in 1867 – most of which are listed monuments – some have been demolished, others are threatened by dereliction. A small number are used and inhabited. The railway and line signaller's houses were erected in 1867 according to the model plans of railway architect Wilhelm von Flattich and their sequence was determined by the walking distance for maintenance and inspection rounds by the trackman. The quality of construction corresponds to that of station buildings. The railway network only lasted during the mobile phone-free period because the railway and track attendants kept the track clear of mudflows, rockfalls and weather-related obstacles by directly monitoring the track, ensuring smooth track operation throughout the year. Today, a cycle path runs alongside the Brenner line, at points crossing the train path and partly running on its own. There are crossings and connections with the regional road network. The urgent matter of a new use and purpose is a question of survival for the charming technical gems, which together with the Brenner Railway form an ensemble. As an example for the entire stretch and as a symbol of renewal and the appreciation of railway architecture, the signaller's houses near Freienfeld, near Brennerbad and in Sachsenklemme are to be repaired. Tourism could serve as the new purpose for the small buildings along the cycle path: an "albergo diffuso" could primarily use the signaller's houses in the various functions in the context of a bike and technology course; for example, short-stay rental as a B&B, or a bike repair shop, services, food and drink, water stations with drinking fountains. Particular importance is to be attached to the development and the surroundings of the objects, which are to be made more attractive through topographical changes and planting. The project proposals can be accessed on the University of Innsbruck website.

Wassertürme. Umgang mit stillgelegten Industriebauwerken

(Water towers. Approach to decommissioned industrial structures)

Managing obsolete, monofunctional supply structures represents a complex task for heritage preservation – railways with their operational facilities are no exceptions. There are the possibilities of a complete demolition with no trace of the original structure, a conversion and/or translocation. This topic will be discussed using the example of the former water tower in Basel, which was built around 1900 to supply steam locomotives, and then dismantled in individual parts or groups of components and stored in 1996. In recent times, employees of the Chair of Construction Heritage and Preservation at ETH Zurich, with the support of students, measured all components of the tower on behalf of the SBB Specialist Service for the Preservation of Historical Monuments and examined them through building research. The dismantled state and the weight and complexity of the individual parts presented particular challenges. With the creation of comprehensive overview plans, models and a component catalogue, a basis for the planned reconstruction is now set to be created. The technical-constructive genesis of machines and

systems in railway construction reflects the complexity of the constantly advancing technology. These can only be modified and adapted to a certain degree. The introduction of new technologies marks a turning point and thrives in new forms and ways of building, after which obsolete structures are abandoned. The proposed presentation is intended to address the recurring question of practical heritage preservation for the management of disused industrial buildings.

HEINRICH SPEICH

DIGITAL PRESENTATION

Dr. phil., Deputy Head of Operations IBID, Project Leader

Co-authors: Ernst Grünenfelder, Dipl. Ing. ETH, Former cantonal engineer for the Canton of Glarus

Albert Gubler, Dipl. Ing., Political commune of Regensdorf (Canton of Zurich)

Christian Hanus, Univ.-Prof. Dr., dipl. Arch. ETH; Donau University Krems (Austria)

Michael Heiserholt, Dipl. Ing., Political commune of Regensdorf (Canton of Zurich)

Stefan Keller, Dr. iur., Member of the Foundation Board for Etwilen-Singen Railway

«Schwenkelbergbahn» oder «Schipkapassbahn»: Inwertsetzung einer stillgelegten Bahnstrecke im besiedelten Gebiet

(Schwenkelberg Railway: valorisation of a decommissioned railway line)

A train will never run over the Schwenkelberg again. However, the railway line represents a decisive phase in the history of Swiss transport and industry. The railway was built in 1877 for political reasons and the prospect of short-term profit. The remains of the railway constructed at the time of railway euphoria and industrialisation now rest in a state of deep slumber. The commune of Regensdorf wishes to better anchor the railway line and the period of its construction within regional memory. In order to do so, a participative and explicitly open and unbiased approach to the question of the valorisation of this cultural heritage is planned. The project starts with an analysis of the heritage value of the existing engineering structures on the line. Only then will the relevant strategies be developed and implemented with as broad a political support as possible.

BLOCK 3 WORLD HERITAGE

BENOÎT DUBOSSON

Federal Office of Culture, Head of the Advice and Expertise Department (Cultural Heritage)

A valeur universelle, exigences exceptionnelles

(A universal value, exceptional requirements)

The world heritage list includes the recognition by the UNESCO authorities of the 'outstanding universal value' of a cultural and/or natural asset. This fundamental principle is based on compliance with a set of specific criteria and conditions concerning integrity and – for cultural assets in particular – authenticity. In 1994, the Nara Document on Authenticity further defined its meaning and scope. The application of the condition of authenticity to railway systems – part of technological heritage – was the subject of analysis by ICOMOS (Anthony Coulls, Railways as World Heritage Sites, 1999). By recapping the key principles of the world heritage system, this presentation aims to outline the challenges of including railway assets on the world heritage list and of conserving them for future generations.

VINITA SRIVASTAVA

Executive Director/Heritage, Ministry of Railways, India

Where the water flows fast and the train is slow: Urban pressures and railway infrastructure responses in the mountain railways of India

The mountain railways in India are remnants of the colonial era, as a blissful escape for the British from the sweltering Indian summer. Built under a financial guarantee system, where finances from abroad helped buy locomotives & tracks, these railways were often projects made on impossibly shoestring budgets and extremely arduous conditions. Their continued existence is a bit like time travel, back to a world that exists in imagination – in endless cups of tea, while watching sunrise sweep the mountain ranges. This paper begins with a brief history of the unusual circumstances in which mountain railways of India originated. The engineers who operate & maintain these old systems face challenges of technology, society and relevance. Industrial heritage is a dark and less understood subject for nations who experienced the ill-effects of the industrial age with its accompanying violent wars. The mountain railways of India have managed to fashion a new identity – a tourist's delight where even the ordinary person can come close to the Himalayas and enjoy their beauty. The train makes this possible. The paper dwells on issues surrounding workshop maintenance of steam locomotives, vintage coaches and most of all, passenger expectation from the systems. Support from a government controlled railway, with legal backing of the Railway Act in India, protects the route to some extent. Land assets, old workshops, printing presses and a variety of buildings need adaptive reuse to conserve them properly. These and other strategies for asset monetization to unlock the value of 150 year old systems are actively being discussed today. The paper will conclude by case study discussions of three mountain railways and their varied cultural approach toward the encroachment problem in different geographies of India.

KARL BAUMANN

Rhaetian Railway, Infrastructure, Head of Civil Engineering Structures

Umgang mit steinernen Infrastrukturbauten bei der Rhätischen Bahn (RhB)

(Dealing with stone infrastructure structures on the Rhaetian Railway)

The pioneering lines of the Rhaetian Railway were built between 1888 and 1896. They were not uniform in their elements and they had not been designed to last in terms of quality. In the period from 1901 to 1914, six further lines were constructed and in 1914 the single-track narrow-gauge network was completed with a total length of 384km. The most important line was the Albula railway. It was constructed according to new technical standards for train pathing and civil engineering construction. The construction of the Albula railway coincided with the heyday of masonry construction. Before the turn of the century, predominantly steel structures were produced, and after 1930 mostly concrete structures. It is therefore not surprising that natural stone was almost exclusively used for the construction of the Albula railway. Standards were developed that would subsequently be adopted for the construction of many other railways. They enabled the construction of large straight bridges with spans of up to 50m and curved bridges on high piers. The standards enabled the construction of high-quality structures with an architecturally impressive use of form. Now, around 100 years after their construction, the emphasis is on renovating these structures. To that end, RhB has again developed a concept for the renovation of masonry viaducts, which is widely used. In the case of tunnels, deeper interventions into the supporting structure are required. This has recently led to conflicts between aspects of technical standards and heritage preservation perspectives, an example of this being the tunnel portals.

GÜNTER DINHOBL

Mag. Dr., Research & Development team member at ÖBB-Infrastruktur Bau AG. Monitoring Agent of ICOMOS Austria for the Semmering Railway World Heritage Site

«...in sinnlosen verlängernden Serpentinaen...» Erfahrungen zur Semmeringebahn als Welterbestätte

(“...in pointless lengthening serpentines...” Experiences with the Semmering Railway as a World Heritage Site)

The Semmering Railway continues to play a pioneering role today: its construction in the mid-19th century heralded the construction of mountain railways the world over, and at the end of the 20th century it became the first railway to be inscribed on the UNESCO World Heritage List. If at first it raised technical challenges about building a railway in the high mountains, it would later come to pose questions about the compatibility of a World Heritage Site with a functioning railway. This triggered an international discussion and led to the ICOMOS ‘Railways as World Heritage’ study in 1998, which remains a guiding reference point to this day. Meanwhile, the Semmering Railway can now look back on 20 years of experience as a World Heritage Site. With a few serpentine twists and turns of its own, this presentation will outline the most significant waypoints from this experience, including the establishment of a continuous monitoring body for the Austrian World Heritage Site via ICOMOS-Austria, the creation of the zone and management plan and the ICOMOS mission to reconcile the new construction of a Semmering base tunnel with concrete recommendations. The railway engineering structures of the Semmering Railway have national listed status and are preserved and developed within the jointly defined framework of guidelines. The wide range of experiences are rounded off by supporting measures such as public relations work to improve awareness and knowledge of the Semmering Railway World Heritage Site among the profession, within the region and among visitors.

VAHID ALIGHARDASHI

Director of the General Infrastructure Engineering & Supervision Bureau of the Iranian Railway

SEYED MOHAMMAD NIKAEEN

Head of Infrastructure Projects of the Iranian Railway

Technical and engineering experience for maintaining the Trans-Iranian Railway

Typically, there are interactions between the railway and its surrounding regions. Occasionally, such interactions impact the development, enhancement, rehabilitation, strengthening and commercial purposes of the railways. For example, there are cases of “increasing the tonnage of freight and the number of passengers”, “double tracking”, “construction of newer railways with higher speeds of transportation”, and “natural disasters consequences” over the years. As a result, many buildings, station tracks, bridges, tunnels and other infrastructural assets confront changes in their original structures, which is common for old and historic railways. However, for the railways with universal heritage values, there are specific procedures to retain and protect their historical identity.

When considering such protective procedures, it is necessary to:

1. Preserve the historical identity of the railways
2. Minimize changes in the structures
3. Monitor changes over time

Seismic retrofitting, protection against natural disasters, rehabilitation and renovation of historical railway structures are increasingly important in Iran. There are plans to increase axle load to achieve a higher freight capacity. To do so, it is required to monitor the behaviour of such structures permanently. The railways of Iran has experience in such fields. We will present the following examples of such experience: 1) seismic retrofitting of railways bridges, 2) permanent monitoring of some crucial bridges, 3) protective proceedings against rockfall, flood and landslide and 4) renovation of some abandoned buildings to serve as recreational complexes and preserve them against deterioration and erosion.

HANS KORDINA

DIGITAL PRESENTATION

Architect, engineering consultant for spatial planning and development planning
Kordina und Riedmann ZT GmbH

Neubau einer Bahntrasse im Welterbegebiet

(New construction of a railway line in a World Heritage area)

The object of this presentation is the particularity of the accompanying control of a railway expansion project in a World Heritage area in Austria, which not only achieves a higher design quality, but also secures the World Heritage status of the existing route.

- Reference to the World Heritage site of the existing Semmering route
- EIA for the new construction of a relief route as a basis for design control
- Definition of a design advisory board for the assessment and professional support of the new buildings, as per the requirements of the approval notice with accompanying control of the implementation, including supervision
- Design advice for essential accompanying buildings in the vicinity of the core zone of the existing Semmering route – especially tunnel portals with bridges and feeder and exit routes, ventilation structures, landscaping in the area of the train path, landfills, hydraulic engineering systems and roads
- Selection of the advisory board members by the approval authority, the federal ministry responsible for World Heritage issues and the project promoter ÖBB
- Technical independence of the advisory board, made up of experts from Austria and Switzerland with experience in railway expansion, design control in heritage protection and World Heritage issues, as well as official approval
- Cost coverage according to expenditure for regular assessment of current construction measures by the project promoter ÖBB
- Design principles and technical criteria/catalogue – with reference to the existing route under heritage protection/World Heritage status
- Accompanying activity of the design advisory board for the framework planning, detailed planning as well as tendering and implementation through to the completion of the construction work, with regular involvement of the supervision of ICOMOS and their regular report on the results to the federal ministry responsible for the world heritage
- Presentation of examples: tunnel portals, bridges, stairwells, flying roof . . .
- Presentation of samples for discussion and definitive definitions for windows, stairs, entrances/exits, flying roofs, choice of colour and shape of fastenings for noise protection elements, railings, etc.

Die Donauuferbahn im UNESCO-Welterbe «Kulturlandschaft Wachau» – ein Streckendenkmal zwischen Entwicklungsdruck und Erhaltungsanspruch

(The Danube embankment railway in the UNESCO World Heritage Site «Wachau Cultural Landscape» – a railway line monument between development pressure and preservation requirements)

The Danube River Railway leading through Wachau opened in 1909 and is completely unique in that Rudolf Matthias Pichler, an artist and conservationist (!), played a key role in its construction. This fact manifests itself in an extremely subtle route through the vineyards and villages, which hardly had to make way for existing buildings and in which the historic town centres along the Danube were able to retain their characteristic bank location. The railway line, which has been listed since the 1990s, has also constituted an integral element of the UNESCO World Heritage Site “Wachau Cultural Landscape” since the turn of the millennium. With the cancellation of scheduled traffic on the route in 2010, a heated debate arose about the impairment of the outstanding universal value of the World Heritage site as well as its sustainable development. The route was later disconnected and buildings and facilities that were not required for operation were sold. A private university, a saffron speciality shop or residential buildings – the railway buildings today are used for very different purposes. On the section of the line running through Wachau, rail services are now offered for tourists during the summer months, while the tracks were partially dismantled on the further route through the Nibelungengau and Strudengau. There are currently calls for the reactivation of continuous rail traffic in public debate. The conflict between the pressure to develop and the need to preserve is to be discussed here.

Monument and landscape conservation of Trans-Iranian Railway

The 1394-km-long Trans-Iranian Railway, TIR, connects the Caspian Sea in the north to the Persian Gulf and Oman Sea in the south. It links the Iranian ports of Bandar-e Torkaman in the northeast to Bandar-e Imam Khomeini in the southwest. Operationalized in 1938, the TIR has been fully active since. Crossing over or through deep valleys, high peaks and fast-flowing rivers in various geographical regions with different climates (temperate, plain, mountainous and desert), and passing through eight geographical regions, the TIR can be regarded not only as an engineering masterpiece but also a fine example of well taming the nature besides creating industrial and cultural landscapes. In view of the importance attached to the TIR corridor, a site boasting significant ancient, historical, cultural and natural sites, the TIR is inscribed on the Iranian National Register of Cultural Heritage, under the registration no.: The TIR World Heritage Base cooperates with the Iranian Ministry of Cultural Heritage, Tourism and Handicrafts, the Department of Environment and the Forest, Range and Watershed Management Organization to protect and monitor the TIR corridor based on a management plan and an organizational chart. This paper is an attempt to unveil the OUV, analyze the state of conservation, authenticity and integrity and other relevant activities in relevant examples.

EVENING TALK

HELMUT ADELSBERGER

DI Dr., Traffic planner, now an independent consultant. Former Head of Unit “General Transport Planning and International Transport Networks” at the Federal Ministry of Transport in Vienna and National Expert at the EU Commission (DG MOVE) in Brussels; retired since 2013

Vom Habsburger und osmanischen Reich in die Zukunft: der «Westbalkan-Transportkorridor»

(From the Habsburg and Ottoman Empires into the future: the “Western Balkans transport corridor”)

It took a long time to create a plan for an “Alpine-Western Balkans Core Network Corridor”, leading from Salzburg and Linz in the north west across the Eastern Alps via Slovenia, Croatia and Serbia and branching out in two directions at Niš: towards Istanbul via Bulgaria and to Piraeus via North Macedonia. At the end of 2021, the EU Commission presented nine future European transport corridors as part of its proposal for the revision of the TEN Regulation: the new “Western Balkans transport corridor” includes the “Alpine Southeast Core Network Corridor” but also comprises other branches in the Western Balkans and in Greece and continues across the sea to Cyprus. This historic connection of the old Danubian monarchy and the Ottoman Empire has grown together from different sections over the decades. As the backbone of south-eastern Europe, following its coordinated expansion, this connection will be an axis of economic development, social peace and political stability. The presentation is a hypothetical journey of discovery along this corridor: numerous photos of train stations, bridges and tunnels from times gone by reveal remnants of the past, but also how much still needs to be done to fully integrate the south-east of Europe into the EU, including its rail network, and without erasing valuable memories.

PRACTICAL EXCURSUS: SITE DEVELOPMENT

WALTER ENGELER

Dr. jur. und Dipl. Ing. SIA, Engeler BDS AG, Bütschwil

Rechtliche Stellung von Bahndenkmalern in der Interessenabwägung

(The legal status of railway heritage sites in the weighing of interests)

Objects of fixed railway heritage are for the most part historic railway lines, structural ensembles or individual objects, as well as the associated facilities (e.g. hydroelectric power plants) and their surroundings. Buildings and installations that are wholly or mainly used for rail operations are assigned to fulfil a federal task (Art. 18 RailA, SR 742.101 in conjunction with Art. 2 NCHA, SR 451). The legal consequence of this is that planning and approval procedures (sectoral plan procedures, planning approval procedures) and questions of heritage preservation (NCHA) are fundamentally subject to federal law. Despite the primacy of federal law, the Cantons can place railway monuments under heritage protection provided that this action does not disproportionately restrict railway companies in the fulfilment of their tasks (e.g. BGE 121 II 8, Gümmenen viaduct). The weighing of interests between heritage preservation interests and other public and private interests is required by the Federal Constitution (Art. 5 and 36 Cst., SR 101) and specified in the NCHA and SPO (SR 700.1) (Art. 3 para. 1 and Art. 6 para 2 NCHA, Art. 3 SPO). Interests in a rail heritage monument can include the intrinsic value (interior, exterior) as well as the situational

value. When weighing up the interests, a contemporary use of the rail heritage monument that takes into account the heritage protection goals is desirable (Art. 11 Granada Convention, SR 0.440.4). For the fulfilment of a federal task (which also includes SBB's real estate business), the self-obligation as per Art. 3 NCHA requires a railway operator to preserve railway monuments undiminished, provided that the interest in protection outweighs the other interests. If a railway monument is included in an inventory as per Art. 5 NCHA (ISOS, ITRO, ILNM), in the event of a serious planned intervention in a corresponding protected object of national importance, an equal or higher interest must oppose the intervention in order to justify a weighing of interests at all.

LUKAS BÜHLMANN

Dr. h.c., Lawyer and spatial planner. Bellaria Raumentwicklung

Raumplanung und denkmalpflegerische Interessenabwägung (Praxis)

(Spatial planning and weighing the interests of heritage preservation (practice))

In a popular vote in 2013, Swiss voters approved a revision of the Spatial Planning Act. The new law marked a paradigm shift from outwards to inwards development. If the development reserves on an existing site have not yet been exhausted, there can be no new building land allocated. As a result, densification is now the order of the day – and as high quality densification as possible too: the Spatial Planning Act also speaks of 'high-quality inwards settlement development'. A high-quality inwards development – together with the compensation for added value that Swiss law also provides for – aids planning projects in securing a political majority and helps to avoid legal disputes, which are inevitable because building on existing sites is much more likely to generate conflicts than building on green field sites. Conflicts often arise in the context of the protection of heritage monuments and sites of local character. Cities and municipalities must therefore carefully consider where and where not densification should take place, and to what extent. A medium and long-term development strategy and a comprehensive weighing of interests are essential. Swiss planning law provides for a three-stage weighing of interests. The regulations on the protection of monuments and sites of local character are of great importance during the weighing of interests. A particularly Swiss feature in this regard is the Inventory of Swiss Heritage Sites (ISOS), which is designed to preserve and carefully develop the substance, structure or character of an area. Several examples are used to show how the conversion of industrial and railway wasteland has – both successfully and less successfully – taken into account the protection of heritage and sites of local character.

MATTHIAS FISCHER

City of St. Gallen Heritage Preservation

Vom Zusammenspiel von Städtebau und Eisenbahn

(On the interplay of urban development and railway)

Given the location of the city of St. Gallen – in the narrow and long high-valley between Rosenberg in the north and Bernegg and Freudenberg in the south – few options were available for the construction of a railway line. The railway line runs diagonally across the valley floor and has had a significant influence on existing and subsequent urban developments, which can still be clearly seen in the structure of the city today. The flourishing embroidery industry led to an expansion of railway infrastructure at the beginning of the 20th century. In addition to a new station building (1913) and Switzerland's largest circular locomotive depot (1903), this expansion was

also marked by the construction of a new freight station with a freight forwarding building and a customs building with a bonded warehouse (from 1902). The freight station had close links to the nearby business district for embroidery, both functionally and with regard to urban planning. Ever since the freight station was decommissioned in the 1990s, work on developing the area has been ongoing. After a complete overhaul was rejected by voters in 2007, the current test planning is focused on the question of how a connection to the motorway can be established on the site and how an appropriate urban development can be facilitated at the same time. The scenarios that have been developed demonstrate that the breaking away of important parts of the site represents a loss for railway heritage preservation while also damaging the architectural unity of the railway area and the business district. Simultaneously, the development represents an opportunity to strengthen the existing structures – taking into account the key existing buildings – and head towards the future with a high-quality Baukultur.

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