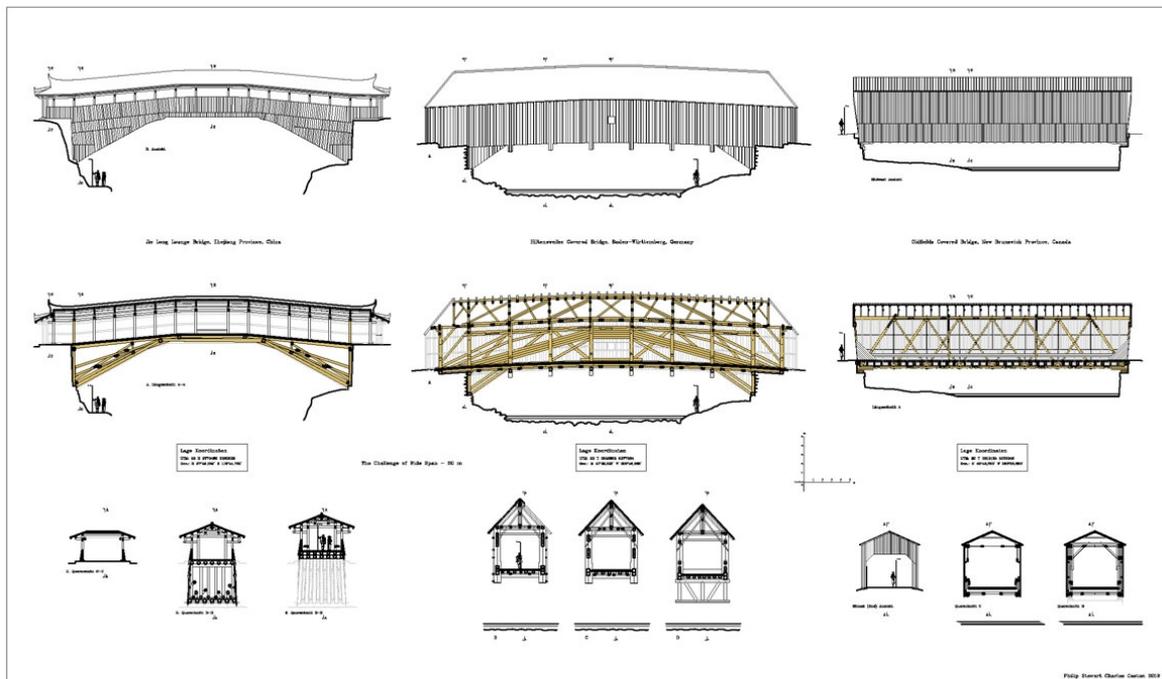




Historic Wooden Bridges / Historic Covered Bridges



Three different construction types. Left: woven arch (PRC), centre: polygonal arch (D) and right "Howe" truss (CDN) 2019.
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Historic "covered bridges" are rare and wonderful wooden structures found in Central Europe, Canada, the United States and parts of Asia. The "World Guide to Covered Bridges" (USA 2009) lists some 800 historic covered bridges in the USA, 150 in Canada, 160 in Switzerland and some 340 in Asia and the rest of the world.

These date from the 16th. Century to the 1950s. The majority of these structures have been photographed, some have been accurately measured and documented and a rare few have been subjected to intense investigation.

Project: National Covered Bridges Recording Project (USA) - Field Team New England

Project dates: Start: Orientation program May 22-24 2003 - Project: 2. June - 15. August 2003 - Debriefing program: 21-22. August 2003

The Historic American Engineering Record (HAER), which is run by the National Park Service (NPS), is currently conducting a major study of America's historic covered bridges. America has more covered bridges than any other country. Out of approximately 880 bridges surviving nationally, HAER is documenting 50. The HAER documentation will provide written and graphic records that will aid interpretation, historic preservation and management of these historical resources, and will be transmitted to the HAER Collection at the Library of Congress



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HAER will run two Field Teams in the summer of 2003. The main field team was based at the University of Vermont (UVM) at Burlington and a second team worked out of Washington. The HAER teams were led by chief of HAER Eric DeLony and project leader Christopher Marston (NPS-Washington). The main field team (Vermont team) consisted of young academics and professionals from America and overseas. The overseas team members were recruited and administered by the United States chapter of the International Committee on Monuments and Sites (US/ICOMOS) which runs a Summer Program covering many projects. The overseas team members (US/ICOMOS interns) attended an orientation program in Washington (22-24 May 2003) before starting the project. After completing the project, the interns returned to Washington and take part in a debriefing program on the 21-22 August 2003.

The Vermont team recorded seven historic covered bridges in New-England with a documentation consisting of measured and interpretive drawings, engineering analysis, historical reports and large-format photographs. The Vermont team consisted of eight architects: Vong Dang (USA), Will Dickinson (USA), Amy James (USA), Douglas Parker (USA), Michiko Tanaka (Japan), Nadine Bauer (Germany) and Arnold Kreisel (Germany) under the supervision of Prof. Dr. Philip Caston (UK), three historians: Lola Bennett (USA), Dr. Mark Brown (USA) and Dr. Joseph Conwill (USA), four engineers: Megan Reese (USA), Rachel Sangree (USA), Francesco Lanza (Italy) and Dorottya Makay (Romania) and photographer Jet Lowe (USA). In addition, each engineer called on the services of the following consultant engineers: Prof. Dr. Dario Gasparini (USA), Dr. Ben Schafer (USA), Dr. John Ochsendorf (USA) and Justin Spivey (USA).

In the first project week in Vermont the complete team were invited to the "Covered Bridge Preservation National Best Practices Conference" held at the UVM.

During the second project week work started on measuring and drawing the individual bridges. Two bridges illustrate the diversity of types and conditions of the structures being measured. Pine Brook Bridge in Washington County, Vermont was built in 1873 and is one of four remaining "Kingpost" truss bridges in Vermont.

The 48'7" span was restored in 1976. The bottom chords have been modified and the whole bridge was lifted 18 inches to avoid spring floods. In addition, two steel joists were inserted under the floor deck as safety precaution. They are placed such that they only carry any loads when excessive deflection of the deck occurs.

The Sulphite Railroad Bridge in Merrimack County, New Hampshire was built in 1896. It is also known as the "Upside Down Bridge" because the railroad track runs over the roof rather than through the structure. It is the only surviving deck-type covered bridge in the United States. It was set on fire by arsonists in October 1980. Despite the outer quarter of an inch of the wooden members being charred, the structure is still able to support itself.

In addition to the HAER bridges being documented several other interesting bridges were documented. One was Comstock Bridge in the vicinity of the Canadian border (by the town of Montgomery). This bridge was built in 1883 by S. and S. Jewett. The 68'10" span is a simple town lattice truss. Interesting is the fact that it has a positive camber, which is not often seen.

The bridge was being restored by the Vermont Agency of Transportation. The photo's here were taken on the 22nd of June 2003. The cladding has been removed prior to dismantling the structure and moving the trusses to the river bank for overhaul. We managed to measure the camber and the position of many of the joints in order to ascertain how the camber was achieved. On revisiting the bridge on the 29th of July 2003 it was found that the bridge had already been dismantled and removed from the river.

The abutments will be rebuilt as their bridge bearing surfaces were found not to be level, which had caused a twist in the two trusses. The trusses are laid horizontally by the roadside leading to the bridge. Only those individual members that are beyond repair are being replaced. This is mainly at both ends where rot has set in due to rainwater being trapped between the bridge and the abutments. Where possible the original treenails remain undisturbed in their holes. However, a number of replacements are necessary where movement in the bridge has worn them or new members are being inserted. The new holes are drilled with several different types of bit including original 19th century augers modified to fit contemporary electric drills.

Several further bridges are currently being restored in Vermont. One is the Gorham or Goodnough Bridge on the Pittsford-Proctor town line crossing the Otter Creek. It was originally built in 1841 or 1842 by Abraham Owen and Nicholas Powers and is roughly 115 feet long. This is not the first time that the bridge has been removed from its abutments. Following the flood of 1927 the bridge was washed away and remained in Otter Creek until the fall of the following year. The rebuilding was finally completed in 1929.

The bridge has been removed as a complete structure in one piece from the abutments and set down in a field near the river bank. It is supported by four crossbeams which are in turn supported on trestles allowing repairs to be carried out on all sides, top and bottom. The bottom chords have to be completely replaced.



Pine Brook Bridge, near Waitsfield, Vermont.



Sulphite Railroad Bridge, near Franklin, New Hampshire.



Comstock Bridge, near Montgomery, Vermont.



Gorham Bridge, near Pittsford-Proctor, Vermont.



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Inventory of Germany's Historic Covered Bridges

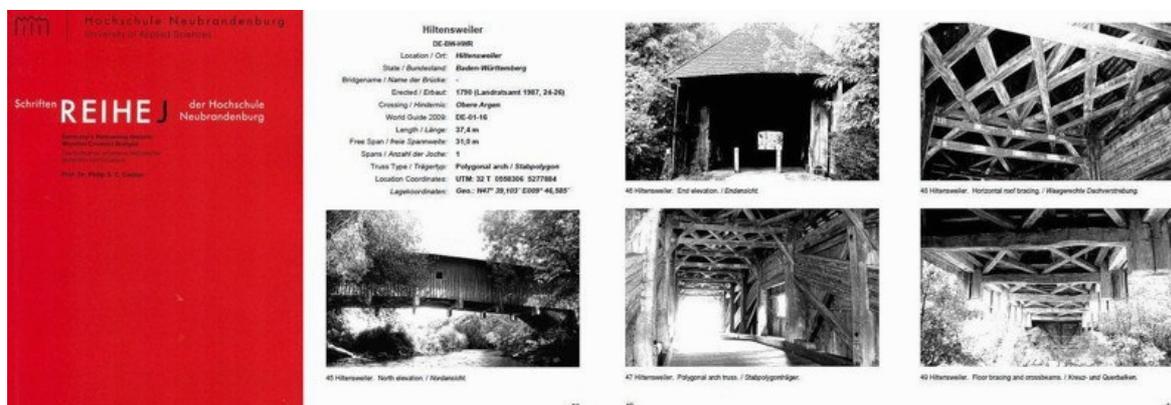
There are some 70 historic covered bridges in Germany. Some are famous, such as the Rhine Bridge at Bad Säckingen (GPS: UTM 32T 421113 m E 5266978 m N) which has the longest covered bridge main structure at just over 200 m in Germany and possibly in Europe. It is also Germany's southernmost covered bridge and probably has some of the oldest timbers still in use in a bridge. The bridge belongs to the German town of Bad Säckingen, but it crosses the border into Switzerland at the deepest part of the river. It has been restored many times and used to carry motor vehicles - now it is a pedestrian footbridge.

Others are only locally known. Germany's most northern covered bridge is the Wildhof covered bridge over the Kammerkanal (Obere Havel-Wasser-Straße) near Ahrensberg (GPS: UTM 33U 368479 m E 5901671 m N). It uses the "Howe" truss design imported from the United States. The bridge was built in 1928, but had to be overhauled following the end of the second world war. By 1995 the deck and lower chords had reached a negative camber of 12 cm. In that year two RSJs were added to support the floor. The 16.6 m long bridge is due to be overhauled in the next few years.

Another famous German covered bridge is in the town of Forbach (GPS: UTM 32U 452984 m E 5391832 m N). The 37.8 m free span between the buttresses is probably the longest or second longest of the remaining covered arch bridges in Germany. The bridge in its visible form has been here since 1778. In 1955 the original late 18th century wooden frame was replaced with the current one. Although the replica duplicates the general design of the original, it differs in detail especially in the use of steel bolts and plates. At over 50 years old it has itself become a historic monument in its own right and documents building conservation theory and practice in post war Germany. In 1976 the roof was covered with red cedar shingles imported from British Columbia, Canada.

This 72 m long covered bridge in Wünschendorf, Thuringia (GPS: UTM 33U 294946 m E 5631039 m N) still retains its original wooden trusses despite being renovated in 1998. The main timbers are 40 cm thick. The bridge is dated 1786 and is still open to motor traffic.

The inventory of Germany's remaining wooden covered bridges, which includes general and detail photographs, basic dimensions, historical data and GPS location coordinates, is available to purchase (Caston, Philip: Germany's Remaining Historic Wooden Covered Bridges [Series J, Volume 7 Neubrandenburg University of Applied Sciences publication], Neubrandenburg 2010 (ISBN: 978-3-932227-89-9).



To order your copy (10,- € + pp) please contact the Neubrandenburg University of Applied Sciences Marketing and Communications department at: presse@hs-nb.de



Rhine Bridge, Bad Säckingen, Baden-Württemberg.



Wildhof Bridge, nr. Ahrensberg, Mecklenburg-Vorpommern.



Murg Bridge, Forbach, Baden-Württemberg.



Covered Bridge, Wünschendorf, Thuringia.



Image Copyright: Philip Caston

Chinese Lounge Bridges

The Third China International Symposium on the Roofed Bridges of Wooden Arched Structure held in Pingnan, Fujian, China between the 15th. and 18th. October 2009 was a good venue to learn about Chinese covered bridges and to explain to an international audience some of Germany's historic covered bridges. The arrival day was crowned by an evening visit to the local opera with traditional and modern Chinese pieces performed by the local ensemble.

The official opening ceremony took place on the morning of the 16th. October and was held jointly with a celebration ceremony of the Inscription of the Traditional Design and Practices for Building Chinese Wooden Arch Bridges onto the "list of Intangible Cultural Heritage in Need of Urgent Safeguarding by UNESCO".

Lecture sessions followed (in Chinese) and included three lectures in English; Cultural Aspects of Wooden Bridge Design (Tom F. Peters); In Search of China's Historic Bridges (Ronald G. Knapp); Germany's Oldest Wooden Covered Bridges (Philip S. C. Caston).

Lectures and presentations continued in the morning of the 17th. October. In the afternoon there was a group visit to Wan'an covered bridge. Following the visits, bridge builder Mr. Chuncai Huang demonstrated how a wooden arched bridge is assembled (in model form) in Pingnan Cultural Centre.

The morning of the final day (18th. October) involved group discussions and a conference summary before another group visit to Qiancheng covered bridge. Further bridges in the vicinity were also visited after the official end of conference.

There is still much research to be done in locating and compiling the history of China's covered bridges. Much emphasis has been placed on the "woven arched" covered bridges, but there are many other historic forms such as "beam and cantilevered supports" which need to be quantified. It seems the same problems as found in Europe and North America beset Chinese covered bridges.

Recently Baixiang covered bridge was lost to fire, others are in a desolate condition, others renewed with a loss of original material, some ancient examples are (as far as is known) however in their original condition. One particularly romantic bridge is the Guangli covered bridge (GPS: UTM 50R 695009 m E 2996354 m N) 18 km north of Pingnan. It could well be several hundred years old and is still in use for pedestrian and bicycle traffic.

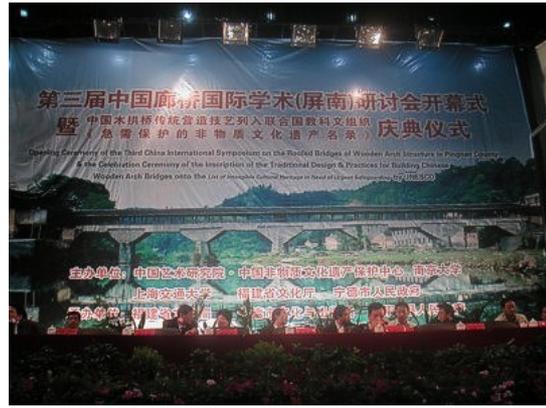
Pingnan county's most famous bridge is the Wan'an covered bridge (GPS: UTM 50R 683326 m E 2968145 m N), 17 km south-west of Pingnan. The bridge is 98.2 m long and spans a wide river with six arches.

Ron Knapp's research into the bridge (Knapp, Ronald G.: Chinese Bridges, 2008, Pg. 240-241) has revealed that it was destroyed many times. Following a tragic fire, the bridge was rebuilt in 1932. Flood damage destroyed nearly one third of the structure in 1952. The bridge was reconstructed in its present form in 1954.

There are probably many hundreds of beam and cantilevered support covered bridges all over China that need documenting. This is the Baogong covered bridge (GPS: UTM 50R 693509 m E 2975555 m N) on the road to Wan'an bridge, ca. 4.5 km south-west of Pingnan. The small free span negates the need for a woven arch. The roof and walls are of the same basic construction as found in the arched bridges. The free span of the beam floor is reduced by cantilevering the first supports out over the river.



Opening ceremony held in Pingnan cinema.



Guangli bridge near Pingnan, Fujian province.



Wan'an bridge near Pingnan, Fujian province.



Baogong bridge near Pingnan, Fujian province.



Image Copyright: Philip Caston

Sabbatical Summer Semester 2019 – World Guide to Covered Bridges

This sabbatical will be spent on helping the *National Society for the Protection of Covered Bridges* update a new edition of its legendary “*World Guide to Covered Bridges*”. Since the last edition in 2009 much new information on European and Chinese covered bridges has come to light.

The latest guide may well include images for the first time. Images and data for Europe will be collected and be prepared for the new edition. This will involve visits to bridges and archives on site, taking measurements and collecting GPS data, analysing a vast collection of already gathered data and building a new data-base for future research.



Ströhberne Brücke

Herzogenberg Weg, Edelschrott, ST, Austria
WG: AT-05-01

River: Guggi Brook?
Date/Age: Built 1816 (1678?)
GPS: N47° 00.483' E015° 03.439'

Date visited: 2015-Aug-28

Info/Truss type: Queen

Stroberne Bridge, Styria, Austria.



Törggelebrücke

Kastelruth (at old railwaystation), BZ, Italy
WG: IT-17-01-03

River: Isarco (Eisack)
Date/Age: Built 1797 (rest 2009)
GPS: N46° 33.872' E011° 30.927'

Date visited: 2015-Sep-10
Info/Truss type: King and queen + later struts
Lit.: **Waiz**, *Landschaft und Brücken*, 20?, S. 108.

Törggele Bridge, Trentino-Alto Adige, Italy.



Road bridge

Bystrá nad Jizerou, SM, Czech Republic
WG: CZ-06-06

Crossing: River jizera
Date/Age: Built 1922
GPS: N50° 36.457' E015° 23.497'

Date visited: 2018-Aug-08

Info/Truss type:

Covered Bridge, Bystrá nad Jizerou, SM, Czech Republic.

Image Copyright: Philip Caston

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