MANAGEMENT OF HISTORIC BRIDGES IN FINLAND

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ABSTRACT

With its predecessors, the Finnish Road Administration, the body responsible for Finland's highway network under the Ministry of Transport and Communications, has been the largest organisation responsible for the construction and maintenance of roads in Finland [1]. Their history is part of Finland's cultural heritage and national wealth. To maintain this heritage, Finnish Road Administration launched its road museum in 1980. In 1998, the museum became a heritage organisation and the collection management was outsourced, with the exception of the administration and maintenance of museum roads and bridges. Today, the main partner of the Finnish Road Administration is the national automobile and road museum Mobilia [2], which provides the majority of the maintenance, exhibition and research services for Road Administration's collections. Currently, the sites of historic value include 37 bridges and 22 roads, which were nominated in 1982-1998. The maintenance of museum bridges is carried out in conjunction with regular highway maintenance while adhering to their museological objectives. This article concerns the management of the historic collection and the development of management from the point of view of museum bridges.

1. CURRENT HISTORIC BRIDGES AND THE HISTORY OF ROAD TRANSPORT IN FINLAND

The museum roads and museum bridges in their built surroundings are a part of cultural landscape and history. Through them, road users get an insight into the development of road administration and road transport as well as the construction of road links, their builders, uses and users. Historical research of bridges has been minimal in Finland, though bridges have been included in wider publications and studies on the history of roads. The Finnish Road Administration and its predecessors have carried out notable archaeological inventories and studies, and from 1970s through the 1990s, they have published extensive road histories, spanning from the early years to recent times. The first comprehensive history of bridges was published by the Association of Finnish Civil Engineers in 2004 [6].

There are other organisations involved in bridge heritage work besides the Road Administration. For example, the Finnish Railway Museum is responsible for collecting and recording historic data related to railway bridges. The Finnish Canal Museum has declared some of the oldest canal bridges as museum sites, and it is responsible for collecting and recording data on these sites. The following examples illustrate where the Road Administration's museum bridges fit in the timeline of Finnish road transport history, from early bridge sites to the concrete bridges of the 1930s.

The earliest written references to bridge sites appear in medieval documents. Some of the current museum bridges are at these old bridge sites, such as the *Old Halikko Bridge* (1866, Halikko). It is a wooden bridge with an A-frame supporting a horizontal beam, located along the Great Coastal Road that ran from Turku to Vyborg.

Until the 16th century, transport routes were mainly horse paths that connected castles, the administrative centres of the time. The oldest comprehensive list of common roads and routes in Finland dates to 1555-1556. The list mentions the important roads of the time and what bridges were located along these roads. According to surviving records, the bridges were mainly strut-frame bridges. In addition to bridges, ferries were also used to cross the waterways.

Finland is known for its abundant waterways, and water transport has both advantages and disadvantages. As the lakes freeze, they form smooth natural causeways, and winter roads combining land and water routes were typical at the time.

New roads were built in the 16th century, and the work continued in the 17th century, when roads were needed by the postal service, army and various authorities. In the 17th century, the development of the transport network depended on military priorities, but by the late 18th century, financial and socio-political motives became dominant. More new highways were built or started than in over a century prior to that. There is little information about what types of bridges were built. The majority of bridges were still wooden structures built over a timber crib filled with rocks, or floating and movable ferry bridges. Experts of bridge construction were military architects and local carpenters. The Intendant's Office in Stockholm also provided assistance in construction.

In Finland, the first stone bridges were built in late 18th century, and they became common at the turn of the 19th century. Of the museum sites, the oldest arched stone bridges are crudely constructed dry stone walls made from natural stones without mortar. The *Tuovila Bridge* from 1781 (Mustasaari) was the first major stone bridge project in Finland.

Until the 1918 road administration reform, landowners were responsible for the construction and maintenance of common roads and bridges according to medieval land

law. Generally, these landowners responsible for road construction built small wooden girder bridges or strut-frame bridges. The oldest wooden museum bridge is the *Isosilta* bridge in Etelänkylä, a bridge with an A-frame supporting a horizontal beam built in 1837 (Pyhäjoki).

The oldest steel bridge is the *Koria truss bridge* from 1870 (Elimäki). As with all early steel bridges, the Koria bridge was originally built for a railway.

As the 20th century approached, the volume of traffic increased and the road network had to be updated. The Road Administration assisted road owners in large bridge projects in accordance with the 1883 Decree on Roads by providing bridge plans and project management. The actual construction work was carried out by private construction companies. Concrete bridges were cheaper and faster to build than stone bridges, and the 1910s was a time of enthusiastic experimentations with new materials and techniques. Road owning entities also built some light suspension bridges at the beginning of the 20th century. Among the museum bridges, these are represented by the *Perttilä bridge* from 1910 (Isokyrö).

Finland's oldest reinforced concrete bridge, the *Tönnö bridge* from 1911 (Orimattila), is one example of the bridges of that period.

In early 1921, highways became entirely the responsibility of the state. There were some 9,500 bridges (70% of these were wooden bridges), and all were found to be in a poor state upon inspection. What is more, the motorisation in Finland around that time set new requirements for bridges which, until then, had been designed for horse loads of only a few tons. Road owners were required to refurbish their bridges or construct new ones before the state took over. This period is illustrated by one of the youngest stone bridges in the collection, the *stone bridge of Heinäjoki* (1924, Pihtipudas). Concrete construction was cheaper and became common, and the construction of stone bridges was abandoned in the 1930s.

Many bridges were still built from timber in the 1920s, but gradually, more durable materials such as steel became more popular in new construction. The Road Administration drew up type drawings for both wooden and steel bridges. *The Virransalmi truss bridge* from 1937 (Mäntyharju) is an example of this period.

In the 1920s, private construction companies were still building bridges. There were also some foreign contractors in Finland. For example, the Danish company Christiani & Nielsen built the *Savukoski bridge* in 1928 (Pyhtää and Ruotsinpyhtää). It was a reinforced concrete bridge with a rare structure: This single arched bridge is believed to be the first highway bridge of its kind in the whole world.

The use of reinforced concrete developed rapidly in the 1930s. The Road Administration had grown to manage the planning and construction of bridges on its own, and contractors were used only rarely. By 1925, the Road Administration had a bridge department and much more extensive knowledge on bridge construction. In addition, it had started using type drawings. This period is represented by the *Tervasalmi bridge*, a reinforced concrete bridge completed in 1935 (Kuhmo).

2. HERITAGE WORK AT THE ROAD ADMINISTRATION

2.1. The early stages of heritage work, museum roads and museum bridges

At the Finnish Road Administration, the roots of heritage work go back to the early 1930s, when the first objects, drawings and photographs were collected and catalogued. The initial stages of the actual Road Museum and museum roads and bridges began in the 1970s. The idea for the museum crystallised in 1972, when the Finnish Road Association and the Association of Finnish Civil Engineers proposed the founding of the Road Museum.

The museum committee was then established. In addition, each of the then 13 road districts nominated their own museum liaison officer who was involved in regional museological work in addition to his/her day job (these officers are now called "heritage contact persons"). The trade in and transfer of objects and machines of museological value was banned, and authorities began preservation work and started collecting oral histories. The training of museum liaison officers began in 1978.

The Road Museum agenda was adopted in 1979. The districts proposed 60 roads and 101 bridges for museum status in late 1979 and early 1980. The Road Museum was founded in August 1980, and 30 roads and 45 bridges were chosen in a pre-selection of museological sites that took place at the end of the year. The sites represented all the different regions of Finland, and each road administration district had 1-3 road sites and 2-6 bridge sites.

Presentation forms were filled in for museum roads and bridges, and sites were evaluated on the basis of the gathered data. Selection criteria included historic value, environmental

value and potential for tourism. The structural and aesthetic features of bridges were also assessed. Sites were classified into three categories: sites of national, regional and local importance.

On the basis of reports, negotiations and statements, the museum committee selected the first museum sites in 1982. The bulk of the collection was established that year, and it was supplemented with individual roads and bridges from 1983-1998.

The museum committee provided the road administration districts with common guidelines for museum sites' signposting and maintenance. Districts were required to draw up signposting plans and to organise the signposting, information boards, parking, maintenance and repair for the sites, as well as any necessary traffic safety devices such as railings. When possible, original style kilometre posts were acquired for museum roads. Plans were approved by the museum committee.

The information board, which was to be erected in a suitable place on the roadside or near the bridge, had to include the name of the site, a drawing, the scale and the site history in Finnish, Swedish, English and German.

In the maintenance and restoration work, the museum committee emphasized the conservation of original features and recommended the use of traditional working methods and original materials. Any modifications at the sites - such as changing the appearance of a bridge, resurfacing a road or modifying the site layout - had to be negotiated with the museum committee.

Historic data has been collected on museum roads and bridges, and they were photographed in 1985. The “Tie yhdistää” (The Connecting Road) publication promoting these museum sites was produced in the following year.

2.2. Cooperation between the Road Administration and Mobilia

Cooperation between the Road Administration and Mobilia began back in the early 1990s. The Road Administration, the Finnish Vehicle Administration, the Kangasala Municipality and the Ministry of Defence founded the Mobilia museum in 1992 in Kangasala.

The organisational restructuring of the Road Administration in early 1998 led it to hand over practical tasks, such as the management and maintenance of collections, to Mobilia. The museological work of the Road Administration became a heritage operation run by Mobilia and controlled and funded by the Road Administration. In terms of the practical tasks, the Road Administration currently only handles the management and maintenance of museum bridges and roads. The sites are maintained as part of regular highway maintenance.

Mobilia assessed the state of heritage objects in 1998, and an action programme was subsequently drawn up and implemented. Collections and supporting materials were assessed, sorted and catalogued by the road administration districts under Mobilia's supervision. The Road Administration and Mobilia have a cooperation agreement for 2000-2025 that makes Mobilia responsible for the management, care and conservation of heritage objects and supporting materials, such as drawings and photographs [3]. In addition, a handbook on heritage work was produced as a tool.

3. CURRENT STATE OF THE MANAGEMENT OF HISTORIC BRIDGES

3.1. Project background, tasks and objectives

In early 2006, the Road Administration transferred the responsibility for the museum operation to another unit. The task was transferred from the central administration in Helsinki to the Häme District of Road Administration in Tampere. Conserving historic roads as part of built cultural environments of national value is one of the tasks and objectives of the Road Administration. As the responsibility for the museum operation was transferred, it became evident that there was a clear need for developing the management of museum roads and bridges:

- A holistic assessment of the representativeness, current state and threats to the collection was lacking
- Associated materials and data were incoherent
- There were inconsistencies and deficiencies in the historic data and its documentation

A project was launched to establish the current state, history, significance and originality of the 59 museum roads and bridges; to determine the prerequisites of long-term conservation, and to ensure that all associated documents are duly recorded. The enquiry included collecting research material, visiting and photographing the sites and reporting the results [5]. The project was launched in June 2006 and concluded in December of the same year.

3.2. Collection policy and evaluation

The enquiry assessed the representativeness of the collection. A specific collection policy was developed as a tool for evaluation. The significance and need for preservation was first determined by evaluating the sites in order to separate the materials that were significant from the point of view of the heritage collection. Sites were evaluated using three criteria:

- Information value: how much the site has been researched and whether further research is required.
- Value in terms of road transport history: whether the site is relevant to a period and/or construction technique that is/are important in terms of the history of road transport in Finland.
- Preservation value: whether the site retains any structural and/or functional features of historic importance (related to a significant period or tendency.)

On the basis of the total score from the evaluation, the sites were classified into permanent conservation, interim conservation or to be excluded. Permanently conserved museum sites have long-term conservation, and a development plan is drawn up to secure the prerequisites for conservation and operation as an active museum exhibit. For sites classified as interim conservation, existing data are insufficient and further research and investigations are required. Excluded sites do not meet the criteria for museum sites.

The aim is to conserve key pieces of each period and tendency of road history, avoiding variations and duplicates. Some of the sites also belong to environments of cultural historic value, which was taken into consideration in the overall evaluation.

3.3. Museum bridges in light of the enquiry

The key finding of the enquiry is that there is less research data on the museum sites than expected. Increasing the information value was found to be essential, since only five bridges have been the subject of scientific research. There is limited information on the other museum bridges. The information value should be increased, as the data could then be used to more closely determine the value of the sites from the point of view of road transport history.

The collection of historic bridges includes stone, wooden, steel and concrete bridges from different eras of the history of road transport. The main focus is on 19th century stone bridges and reinforced concrete bridges of the early 20th century. 30% of bridges were built in the 19th century, approximately 50% in the first three decades of the 20th century and less than 20% from the 1940s through the 1960s. Only one bridge, an arched stone bridge, dates back to the 1780s. The key parts of road transport history in terms of museum bridges, from the 1780s through the 1950s, are well-represented in the collection. There are some variations of the same bridge types, as well as sites that are not typical of their period. The collection does not include later developments. All bridges are waterway bridges, and they are evenly distributed across Finland.

The Road Administration owns the majority of the museum bridges. Other owners include municipalities and private bodies. The majority of the museum bridges are located in environments of cultural historic value and national significance as determined by the National Board of Antiquities (part of the Ministry of Education).

Most of the bridge sites do not show signs of specific threats and they have preserved well. Bridges and their surroundings have been repaired and maintained in accordance with the general guidelines for bridge repairs, taking into account the protection of original features, among other things. Some bridges are used for motorised and/or non-motorised traffic, and some are completely excluded from traffic.

Nearly all sites have signposting, information boards and parking spaces.

4. OBJECTIVE: WELL-MANAGED COLLECTION OF HISTORIC BRIDGES

The Road Administration has a valuable and representative collection of historic bridges. On the basis of the assessment of their value and of the need for conservation, six bridge sites were selected to be removed from the collection due to close similarity to other sites or low significance in terms of road transport history.

Research has been minimal in the case of many bridges. In the future, the focus will be on further research as well as expanding the collection, as the collection currently does not include any bridges from recent decades.

The bridge sites form a geographically dispersed exhibition, and their tourism potential should also be developed. A long-term development programme should be drawn up to facilitate the management of the bridges. Increased cooperation between infrastructure administrations will be considered for all museum sites, in order to create a collection that has the right resources and covers all types of infrastructure.

REFERENCES

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