

PART 4

Historic Preservation

Finland's Highway and Traffic Museum: Preserving the Nation's Transportation Legacy

PENTTI ELONIEMI AND ANTTI TALVITIE

The Road Museum in the Finnish National Road Administration (FINNRA) is described. The Road Museum is a museum that preserves culturally, socially, or technically important historical bridges, road sections, and ferries in their natural settings. The Road Museum at FINNRA celebrated its 175-year anniversary in 1974. So far, 54 road and bridge sites have been selected as museum displays. The number of sites will be increased slowly. The sites are marked on highway maps, and there is a short history on display in four languages at the location. A museum building will be erected to exhibit road construction and maintenance equipment and to feature culturally important road-related events. It is shown that keeping historically significant road sections and bridges in original form as objects for historical study is a concrete way of preserving a country's historical memory. The paper briefly relates the modest history of road transportation in Finland to her history. Finland's written history is young, and writings surviving from before the 12th century are scarce, even though people have lived there for at least 9,000 years. The history of road transportation in Finland should not be looked at in comparison with the accomplishments of ancient civilizations.

On the 175th anniversary of the Finnish National Road Administration (FINNRA) in 1974, a motion was made to create a Road Museum in Finland. Since then sections of roads and old bridges have been preserved or restored, and machines, implements used in road construction or maintenance, and historically interesting highway materials have been set aside for road museum use. The museum building will be opened in Kangasala near the city of Tampere on June 12, 1992. A plan has been made for future buildings in the area. The main idea is to create a road and traffic museum with enough room to add a car museum later.

At present the Road Museum has a small staff. In 1988 a foundation was formed to support the project financially. The Road Museum has a small permanent show in FINNRA's central administration building in Helsinki. The museum has published studies about its mission to preserve the history of road and bridge construction in Finland.

So far 34 bridges and 20 road sections have been selected as museum display sites. The number of displays will be increased gradually. The displays will be marked on highway maps and with signs along the roads on which there will be a short history of the display in four languages.

P. Eloniemi, Department of Highway Construction Maintenance, Finnish Highway Administration, Helsinki, Finland SF-00521. A. Talvitie, Viatek Group, Pohjantie 3, Espoo, Finland 02100.

DEVELOPMENT OF ROADS AND ROAD NETWORK IN FINLAND

"The road, be it a stony path, a dirt road or a multilane freeway, is a part of the landscape where nature and culture meet" (P. Fogelberg, poet).

Before 1100

There is a common misconception that waterways were the only prehistoric traffic routes. But, according to new research, traffic routes by land are much older than previously thought. The first roads appear to have developed from simple paths that were cleared to make traveling easier. Heavier loads were pulled on a litter or a sled. Ancient burial grounds show some signs that horses were ridden and used as beasts of burden as early as the fourth century (about 300 A.D.) in Finland.

The oldest and most famous ancient road in Finland is the Giant's Road in Pohjanmaa, a county in western Finland. The Giant's Road dates to about 600 A.D. It is a ritual road 540 m long that is paved with large stones. The road connects two hills, both of which are ancient burial grounds (Figure 1).

The oldest prehistoric road still in use is the so-called Häme Ox Road, which connects the cities Turku and Hämeenlinna (Figure 2). It dates to approximately 800 A.D. and is roughly 170 km long. Most of the road is still in use, though basically as a private road. The Ox Road kept the same basic direction from the Middle Ages up until last century. Its alignment is not the shortest path between the two cities, but because of the terrain it is the best route. During the Middle Ages the road also connected many economic and government centers. The road was built specifically for long-distance travel. Another road branches off the Ox Road at its southwest end; this road is called the Devil Road.

Swedish Period, 1100–1809

At the end of the prehistoric period, roads were beginning to be built to suit the needs of the Sweden-Finland government. Bridges were also built over some of the more important waterways. The rivers in the southwestern part of Finland were rough and full of rapids, making them difficult to travel by. Therefore, by the time of the Middle Ages, roads had



FIGURE 2 Häme Ox Road.

become more important than waterways. The roads were divided into highways and local roads (using modern terms). The medieval road network connected forts (or castles), which were the government centers. According to a list made in 1556, eight roads formed the trunk road network. These roads were used basically for government and military purposes.

The most important medieval road was the Uusimaa Coastal Road, which went from Turku along the coast all the way to Viborg, now a Russian city. The road was in use during the 14th century, but it was not firmly established until the 16th century. This road already had a great deal of traffic during the Middle Ages. A 35-km section of the road near the eastern border has been selected as a museum display site. This section of the road is also culturally important, because a noted Finnish composer, U. Klami (1900–1961), lived on it. Another section, Fagervik Road, has also been selected as a museum site.

By the end of the 16th century, at the latest, there were more roads than what was on the historic list. A good example is the route from Turku to Sweden over the Finnish archipelago. This very important route was named the Great Mail Route or the Archipelago Route. In 1638 it became Finland's first mail route.

Duke Juhana, who ruled from 1568 to 1592, made a trip by horse-drawn carriage in 1562 in returning to Turku from his honeymoon in Poland. Duke Juhana was the first of the Swedish kings to give orders, in 1587, to make the roads good enough for carriages. The long wars in which Sweden-Finland

was involved in the 16th century slowed the development of the roads.

In the 17th century, when Sweden-Finland was a major power, the road network in northern, inner, and eastern Finland was expanded. The new roads were necessary because the population began spreading, and the kingdom gained more land in Karelia. It was during this period that the coastal road from Korsholma Castle to northern Sweden was built. When the Kajaani Castle was being built, it caused the need for a road from a northern city of Oulu east to Kajaani. In the beginning of the 17th century the government gave numerous orders to make roads fit for travel by carriage.

At the turn of the 17th century, there were many wars and many bad harvests; horses almost became extinct. Traffic growth retarded dramatically. During the Russian occupation in 1741–1743, the building of the Karelia Road was ordered; a section of this so-called Vorna Road has been selected as a museum site.

Toward the end of the 18th century many new roads were built in inner and eastern Finland. An example of a road from this period is the scenic Ruovesi Road in northern Häme. According to maps this road has existed since the 1790s or earlier. The 26-km road is still beautiful with all its hills and curves. The older parts of the road used to be a part of and complete a waterway system. These roads in inner Finland were primarily church roads. A four-layer stone structure has been found through archeological excavations in a swampy section of the Ruovesi Road. The unusual structure has been determined to be some sort of bridge.

Much Finnish cultural history is a part of the Ruovesi Road. A famous 19th-century Finnish painter, W. Holmberg (1830–1860), has painted many pictures about this road; Finland's national poet, J. L. Runeberg (1804–1877), wrote poems about this road when he worked as a private tutor in Ruovesi. The road has been proposed as a museum display site, but it has not been decided how much of the road will be left untouched when its reconstruction begins. Fewer than 9000 km of roads were built during the entire Swedish period. In 1807 the length of the road network was 9060 km.

Russian Period, 1809–1917

Road construction became important again when Finland became an autonomous Grand Duchy of the Russian empire in 1808. During this time, decisions about roads were made in Finland, and most of the taxes that were collected in Finland also stayed in Finland. A budget was given by the state to be used for building roads.

Because there were many famine years in the previous century, roads were built for pay in food. This was called relief work, and it sped up the construction of roads in Finland. Hunger and disease killed many relief road builders, and group graves were built along the roadside. Most of these roads were built in Lapland and northern Finland, though some roads were also built in southern Finland. Without this relief work road construction, it would have been almost impossible to connect traffic from northern Finland to the rest of the country.

The Royal Rapid Clearing Administration (RRCA) was formed toward the end of the Swedish period in 1799. After

several name changes it finally became the present FINNRA. During the 1800s its offices were organized in a military fashion. At first FINNRA concentrated on waterways, but it was also responsible for government-funded road design and construction. One of the RRCA responsibilities included training foremen for general construction work.

During the early years of autonomy, reconstructing old roads was RRCA's main job. Roads were straightened, ditches were dug, and road surfaces were leveled. Following the rehabilitation work, but still in the early part of autonomy, roads that helped road traffic and traffic from inland to coastal cities were built. A boom in road construction occurred between 1826 to 1835. Altogether 1500 km of new roads were built, or about one-sixth of the length of the entire road network in 1809. This brought about a new stage to social development, especially in Pohjanmaa, the coastal area of the Gulf of Bothnia. Before this traffic had traveled along the riverside, or on the river, to the sea.

Toward the end of autonomy and with the arrival of the railroad, most of the new roads were built to reach the railroad stations. In northern Finland some long relief work roads were built. During autonomy, information about winter roads—that is, roads opened only during winter on ice or frozen ground—was available in travel guides. The marked winter roads were usually more direct and much shorter than the normal roads.

During the 1890s Finland saw its first automobile, and bus service began in 1905. The quality of the roads became quite important toward the end of the Russian period. In 1915 there were 31 190 km of roads of Finland. Thus, more than 20 000 km of roads has been built during autonomy.

Early Independence, 1918–1939

Soon after Finland gained its independence in 1917, the number of cars increased dramatically. Long-distance traveling was shifting more and more to the roads, away from railroads and waterways. This shift was, of course, hampered by the fact that most of the roads were curvy, hilly, and bumpy. In the beginning road development was slow because the transportation ministry favored railroads. In the 1920s the government was a little more favorably disposed toward automobiles, though it was thought that cars were good only for the local transportation of goods and people. Even still, the roads in southern and central Finland were upgraded and made more suitable for automobile travel in the 1920s and early 1930s.

During the early years of independence, two major plans were made by committees for the development of automobile traffic. The plans were made by the North Finland and Karelia Committee in 1928 and the Ministry of Transportation in 1933. Both plans were completed with surprising accuracy, despite the fact that the unemployment problem was still being handled as a relief work. This meant that roads were built where there were serious unemployment problems.

According to the plans of the latter committee, 29 truck highways were to be built in Finland. These roads became the basis for a strong trunk highway network. Military strategy was also taken into account in planning of these roads. One of the more interesting relief work roads was the 20-km Raat-

tee Road (Figure 1), which goes from an eastern community of Suomusalmi to the Russian border. During the famous Winter War of 1939–1940, a Finnish division totally destroyed two Russian divisions that had reached Suomusalmi by means of this road. The Raattee Road has been chosen as a museum display.

The Arctic Ocean Road was constructed between 1916 and 1933. Because of the importance of this road to Finland at that time, the level of service of the first section of this road had to be upgraded already in 1939. This 531-km road was considered to be the most gallant road of northern Europe. It connected Rovaniemi with Petsamo's Liinahamari port. During a brief period of peace in the Second World War, the armistice from 1940 to 1941, the Arctic Ocean Road was Finland's only access point to the rest of the world. The road was built so well that it resisted extreme arctic weather; after the war it did not even experience freeze and thaw problems like most of the other roads in Lapland did. The exploitation of the resources in Barents Sea has made this road important once again.

World War II, 1940–1945

World War II, which began in 1939 for Finland, seriously interrupted the growth of traffic and the development of traffic conditions. The war put FINNRA through a new test—FINNRA was responsible for keeping the transports moving—that it passed with honors despite its small budget. The bad shape of many roads seriously affected warfare in some areas.

Most new road construction took place in northern Finland. During the war only 667 km of new roads were built. The Germans built the 157-km so-called Arm Road, which connected Finland and Norway. FINNRA was occupied mainly with maintaining and rehabilitating roads. Most of the reconstruction took place in war areas and Karelia, which Finland had captured from Russia in the beginning of the war.

During the "continuation war" (1941–1945) the road network was hit hard, especially in areas in which there was much military activity and evacuation of population. When the Germans pulled out of northern Finland, they destroyed almost 5500 km of roads. When the war was over, Finland's roads were in sad shape. During the spring thaw some large centers of population were left practically isolated from the rest of Finland. Almost the entire highway budget had to be used to rebuild the road network in northern Finland. Most of the road construction was also done there. The Germans had placed mines extensively when they left, which made the reconstruction very dangerous business: more than 30 people were killed and more than 60 were injured during the reconstruction.

ROAD SERVICES

The inn system dates to the Middle Ages, when churches took care of the inns. According to the 1347 land law of Mauno Eerikinpoika (Mauno Erik's son, who ruled 1319–1374), there had to be taverns and inns along public roads. The distance between inns was 10 to 20 km. In 1649 came an additional

order to build separate rooms for royalty. Until now the houses had been peasants' houses, and people from higher classes usually stayed in churches and the like when they traveled. The innkeeper was to have good bedding, a decent kitchen, and plenty of horses and equipment. He could usually hire local peasants to be drivers.

The inn system functioned well and was in good order at the end of the Swedish period in 1808. Steady improvements were made. At the beginning of the 18th century Finland switched to a stagecoach system. This meant that there had to be a certain number of stage horses and drivers ready every day, even if there were no travelers. After 1766 inns had to keep a diary into which travelers wrote their names and any other notes. This diary was then sent monthly to the governor of the land for inspection. Inns were built at the same time a road was built. A few old inns serve currently as museum cafes, a typical Arctic Ocean Road Inn in Nautsi is also still in existence.

The transport service hit its peak in 1916–1917, but the automobile signaled the end of an era. According to the transport law of 1918, the new, independent state took over the system and begin to use automobiles. The last information on the transport service is from 1944. The old transport law was abolished as late as 1955.

ADMINISTRATIVE DEVELOPMENT OF ROAD MAINTENANCE

According to Mauno Eerikinpoika's Land Law of 1347, the construction and maintenance of roads was the responsibility of the land owner. Long roads were often the responsibility of communities. During the Middle Ages circuit judges inspected roads. In the 16th century this job was transferred to special boards, and a special institution called bridge ombudsman was created in the 1800s. In 1892 road maintenance was given to the sheriff's office, which was given the "road master" as a technical helper in 1920. Even today the person responsible of a FINNRA's maintenance area is called road master.

In 1921 all highway (state and county roads) maintenance was transferred to FINNRA. The upkeep of local roads was left to their users. Because of insufficient resources FINNRA often maintained only the more important highways. All other roads were left to be maintained by county governments, which, in reality, maintained the roads through the boards of rural counties. It wasn't until 1940 that the maintenance of all highways was taken over by FINNRA in fact.

TECHNOLOGICAL DEVELOPMENT OF ROAD CONSTRUCTION AND MAINTENANCE

Road Alignment

According to instructions given in 1619, roads were to be built along ridges and other flat but strong land, and around larger rocks and hills. Being level and not having any hills were the two most important characteristics of roads during the 1800s. The maximum grade allowed was 10 degrees. New instructions were given in 1910, according to which villages, houses,

and waterways were to be considered when planning road alignment. Consequently, roads were built heading straight to the narrowest point of a waterway, where the bridge was built perpendicular to it. Depending on the class of the road and the environment, the maximum grade was supposed to be 5 to 9 degrees. The minimum horizontal curve radius was set at 50 m.

During the 1930s driving speeds began to increase, and the minimum radius was increased to 250 to 500 m; in the 1940s the suggested radius was further increased to 1000 to 2000 m. Aerodynamics and sight distances have been the basis for highway planning since the 1920s.

Road Widths

According to the previously cited land law, highways and bridges were to be 5.9 m wide and local roads were to be between 1.8 and 3 m wide. At the beginning of the New Age most roads in Finland were 3 m wide. FINNRA gave its first general instructions in 1917, according to which the width of a first-class highway had to be at least 5.4 m and of a local road, 3.0 m. Bridges were to be built the same width as the roads.

Road Substructure

On ancient roads, swampy or soft ground was crossed using long wooden planks. During the Middle Ages, twigs were used to make the ground more firm. Later, stones were used—on the Ruovesi Road, for example. During the 1930s the most common way to increase a road's bearing capacity was to lay decks made of logs.

Road Superstructure

Plain dirt was first used as both the superstructure and the wearing surface. According to a law passed in 1734, public roads had to be raised and built in such a manner that water did not gather on the surface. The cross section had to be ridgelike, sloping. When traffic became faster and heavier, the dimensioning of the different structural layers became more accurate: different structural layers were adopted for use in 1910; dimensioning of layers has been done on the basis of the dynamic strain of wheels since the 1920s; and elasticity of earth materials was taken into account in the early 1930s.

Technical advice was also given for materials of structural layers. At first the insulation layer against thaw was made of organic materials, but since the 1940s rough, homogeneous sand has been used. During the 1920s the subbase layer was made of materials that could freeze in the winter; during the 1940s that was changed and nonfreezing materials were ordered to be used. In the 1920s a bearing course was built on trunk roads.

Cars have had, of course, the greatest effect on the development of wearing surfaces and pavements. In 1926 a short test road was made with a concrete pavement. At the end of the 1920s bitumen binding agents were being used; in the 1930s Finland switched to light asphalt (a cold-mix cut back asphalt) pavement.

Road Construction

As late as the 1930s the road construction equipment consisted of manual lift equipment, block and pulley, water pumps, and cement mixers. Most freighting was done with horse-drawn carriages, even though trucks were already used for moving earth in the 1920s.

Meticulous records were kept on input usage showing the man, horse, and car labor hours used in building roads. It wasn't until the end of the 1930s that trucks finally replaced horses. Steam rollers were put into use toward the end of the 1800s. Pneumatic drills became common in the 1930s.

Water was poured on heated rocks to split them. The use of gun powder on rocks dates to at least 1652. Dynamite was not used until the end of the 19th century; it was replaced by safer explosive materials in the 1920s.

Summer Maintenance

Road maintenance was done as needed early on, but the initiation of the "relay" service and the inn system led to regularly performed road maintenance. Roads were to be inspected twice a year, according to land laws dating to 1347 and 1442. Roads and bridges were to be inspected regularly starting in 1635.

A law passed in 1883 gave general instructions for the maintenance of public roads. An instruction book from 1920 said that spring and fall maintenance was still enough but that damage that affected traffic had to be repaired immediately. Special road guards were hired for this job. Maintenance was handled as a contract job, according to laws passed in 1918 and 1927. The contractors were usually persons who formerly were responsible for "roadkeep" so the quality of the work was the best possible. The road law of 1927 made it possible to give up the contract work system, but it was not until 1948 that road maintenance was transferred entirely to the road administration.

The growth of automobile traffic caused the dirt roads to become washboard very quickly. To prevent this, the wearing surface was usually made of clay-gravel mixture, which was bound with calcium chloride. The drawback of this new road surface was that it caused the roads to freeze; still a major problem in gravel road maintenance. Trucks were used in road maintenance already during the 1920s. In 1925 domestically manufactured road graders were taken into use. Before that roads were planned with horse drawn wooden or metal planes.

Winter Maintenance

Finland has had several types of winter roads, which were cleared and marked, since the beginning of time. "Normal" roads were not used for winter traffic until about the 17th century. In 1786 a law was passed stating that the person responsible for "roadkeep" had to also keep roads open during the winter.

A new stage in the development of winter maintenance began in 1920s. In 1925 some highways were ordered kept open for auto traffic year-round. A 1927 law made it man-

datory to keep all the highways open during the winter. Snow fences were used to protect the roads from snow drifts. Manufacturing of snowplows was started in 1926. With plows developed in Finland and with powerful enough trucks it was possible to throw the snow off from the road. Scientific evaluation of snow plows evolved also; the first test plowing was done in 1924.

In 1939 a third of the highway network was kept open with motor vehicles and the rest by horses. When necessary some important maintenance connections were kept open with snow scooters as in the case of the Pallastunturi hotel. Keeping all public roads open for autos during the winter became standard procedure during the 1940s.

Keeping highway lanes in good condition has been central to winter maintenance from the very beginning. During the first few years of the automobile, a 10- to 12-cm layer of snow was left on roads for sleds, but this was cut down to about 3 cm in the 1940s. In addition to leveling the road surface, sanding hills was started in the 1930s. At first sanding was done by shovel from a truck, but during the war sanding machines replaced manpower.

BRIDGE DEVELOPMENT

"Two types of constructions, temples and bridges, show the technical and artistic skill of man from the beginning of time until this very day" (B. Kivisalo, professor of bridge design, Helsinki).

Bridges in Finland are short, because of the terrain and shallow bodies of water. The largest bridge span in Finland is only 220 m long, and the longest bridge is only about 800 m long. On the other hand, reasons of appearance have been pushing the bridge length upward.

Swedish Period, 1100–1808

The first regulations for building bridges were given in the Land Law of 1347. The more important bridges from the middle ages were connected with the castles and forts but also elsewhere there were important bridges. All of these bridges were made of wood. Bridges for carriage wagons were made by laying a few logs across the water, and then a few smaller pieces of wood across these. This is how modern composite timber deck bridges got their start.

In Pohjanmaa, where the ground was soft, piers and supports were log-formed stone-filled foundations. In order to get longer spans, king and queen posts and A-frame supports were developed. A man from Pohjanmaa was said to have built a suspension bridge over a river in 1682. A king-post bridge was most likely what was built. The road museum has selected a pile girder, a king-post, and several A-frame bridges as museum sites.

During the 1600s bridges were built over the great rivers of Pohjanmaa. The floods are still a problem there today, but back in those days the bridges had to be taken down during the flood season for them not to be ruined. Because of this the bridges were mostly pile girder bridges. They were taken apart before the ice on the rivers melted and rebuilt after the

flood season was over. During the 1700s floating bridges attached to the shore were often built.

Finnish bridge builders did not learn how to make stone arches until a large sea fortress in front of Helsinki was built. Arched bridges were made out of unshaped stones of different size, and without mortar. The bridge experts of that time period were officers who worked out of a special office. The oldest of these bridges is the Espoo mansion bridge, built on the Uusimaa Coastal Road in 1777, now a museum site.

Russian Period, 1809–1917

An intendent's office was created to design large bridges to replace the old ones destroyed by the 1808 war. The persons or agencies responsible for road construction did not always use these services; instead, they often had their bridges made by self-taught bridge master builders. A major problem with that was that usually the foundations were built poorly. In the beginning of the 20th century, foreign construction companies arrived in Finland.

Timber was the main material used in bridge construction, even though stone pier supports became very common. The use of A-frame and king-post bridges increased. Finland's oldest remaining original wood bridge, the Eteläkylä Big Bridge (a museum site), was built in 1837. Its span measurements are $18 \times 18 \times 19 \times 18.5$ m.

During the 1800s two large arch bridges were built, whose arches were made out of bent boards. The older of the two, with span measurements $37.5 \times 45 \times 37.5$ m, was finished in 1896. In the early 1900s, the Kuorikoski family, which was well known for building churches, built covered bridges in Pohjanmaa. The bearing structure of these bridges was a cross between A-frame and truss type structures. The church builder's bridges were based on intuitive technical skills. No bridge drawings were made—the master builder *explained* how each part of the job was to be done.

During the late 1800s, small stone arch bridges became common because of cement mortar. There were stone master builders all over Finland. The best-looking stone arch bridge is the Aunes bridge in Tampere, which was built in 1899, it has a span width of 19 m. Stone beam techniques were used in Pohjanmaa. In 1870 the 8-m Möykky bridge, planned by a vicar, was built. It resembles an A-frame bridge.

Finland's first cast iron bridges were made during the construction of the Saimaa Canal in 1853. Two of these rolling bridges are still standing in the canal zone, rented by Finland from the former Soviet Union. With the railroad construction, Finland got its first "cooked iron" bridges. The Korja Bridge, which was built in England and meant for the Helsinki–St. Petersburg track, was taken into use as a road bridge in 1924.

Carpenters from northern Finland had been working in Norway near the end of the century where they learned to build suspension bridges. The oldest suspension bridge is in Pohjanmaa, built in 1909 with a span width of 81.45 m. It took the village blacksmith a whole year to make the steel parts of the bridge. The bridge has been repaired, and is now a museum bridge.

Finland's first cement factory was founded in 1877. Shortly afterwards the first concrete bridge, an unreinforced concrete arch bridge over the harbor railroad tracks, was built. The

oldest reinforced concrete bridge was built in 1911 in southern Finland. It is an arch bridge with a stiffened deck and has a span of 22.5 m.

Early Independence, 1918–1939

At first, most bridge construction was aimed at repairing bridges that were destroyed during the war. New bridges were not built until 1924. During the 1920s there was tough competition between choosing the timber and reinforced concrete bridges. Not until the end of the 1930s did concrete gain the upper hand, and the use of timber was almost discontinued. The number of stone bridges grew until the mid-1930s. Bridges with stone piers and supports were also considered stone bridges.

Many reinforced concrete bridges were built during the beginning years of independence. An arch bridge over the Kokemäki river was built in 1918, using timber truss bridge supports left over from the war. Its free spans measured $24.9 \times 24.7 \times 23.8$ m. The Savukoski Bridge was built in 1926–1927; it is the first cantilevered, one jointed arch bridge in the world. During the construction of the bridge a rope lift was made to help the transportation of building materials and scaffoldings. Both of these bridges are road museum sites. The Hessund bridge on the Archipelago Road was built in 1937. Presumably it is still the largest stiffened reinforced concrete arch bridge of that type in the world. The main arch is 81.6 m long. No scaffoldings were needed to build this bridge.

World War II, 1940–1945

During the war, bridge construction was almost at a standstill. When the Germans pulled out of northern Finland, they destroyed almost 1,000 bridges. Because there was a shortage of building materials, and only timber was available, they had to be replaced with temporary bridges. In order to replace large steel and reinforced concrete bridges, a "nailed board beam" became a standard, with span measurements of 8 to 24 m. Supports were made as elements in five prefab factories. One of these is a museum site.

Timber also had to be used elsewhere as bridge material. As a curiosity, it may be mentioned that the Russians built the 139-m timber bridge in Porkkala, an area that they rented from Finland at that time. The bridge is also a museum site.

FERRY DEVELOPMENT

Finland is known as the land of thousands of lakes, and ferries have been used since the 1500s. The rivers of Pohjanmaa got their ferries around the 1600s. The ferryman got his salary from the persons or instances responsible for the ferry, and he also had the right to collect a ferry fee.

The development of ferries in Finland has gone through many different stages. When horse traffic was common, ferries were like large rowboats. In 1924 a new type of ferry, consisting of steel cylinders with wooden decks on top of them, was built. They moved by pulling the ferry line with

wooden dowels and could carry up to 6 to 12 tons. One of these has been chosen as a museum ferry. In 1931 this kind of ferry was given a motorized winch and a few years later 12-ton propeller ferries came into use. The propeller powered ferries were useful during the winter, because they kept the route open much longer. Ferries made on pontoons covered with a deck and powered by a PT-boat motor replaced some of the bigger bridges which were destroyed in northern Finland during the war. They crossed large, strong rivers without the use of a cable.

CONCLUSION

“*Historia vitae magistra.*” History is life’s teacher. History is a show of how something has evolved through the ages, its development and associated research. Everything which makes development clearer is historical. Age is not a factor. The written history of Finland is relatively young; nothing written before the middle of the 12th century has survived. But according to archeological diggings, there has been life in Finland for at least 9,000 years.

Even though road and bridge building techniques and skills are thousands of years old, their history in Finland is short and modest; this is especially true for bridges. Diggings done near roads have not been of very much help. This is because only wood was used until the end of the 18th century to build bridges, although stone churches were built in Finland during the 13th century. The history of road and bridge design, construction and maintenance in Finland should not be looked at by comparing it to the accomplishments of ancient civilizations.

Historically significant road sections and bridges can and should be kept in original form if possible; they should be objects of historical studies. This is a concrete way of preserving a country’s historical memory—similar to the eagles, which are said to have led the Hungarians from the Ural mountains to present-day Hungary, in the pylons of old Donau bridges in Budapest. The road museum also shows future generations the history in its social setting and how roads have evolved from little paths in the woods to freeways, how bridges have evolved from chopped down trees to suspension bridges, and how highways have throughout the ages been an integral part of a country’s social development.

The road museum also gives a new, humanistic dimension to the highway agency. It relates the highways and the highway agency directly with the history of the country. Appreciation of history and culture enables the highway agency to face today’s issues and accomplish today’s tasks better because it is seen to stand also for other goals besides relieving congestion and improving traffic safety and to represent also other values than the narrow economic issues and interest groups of today.

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