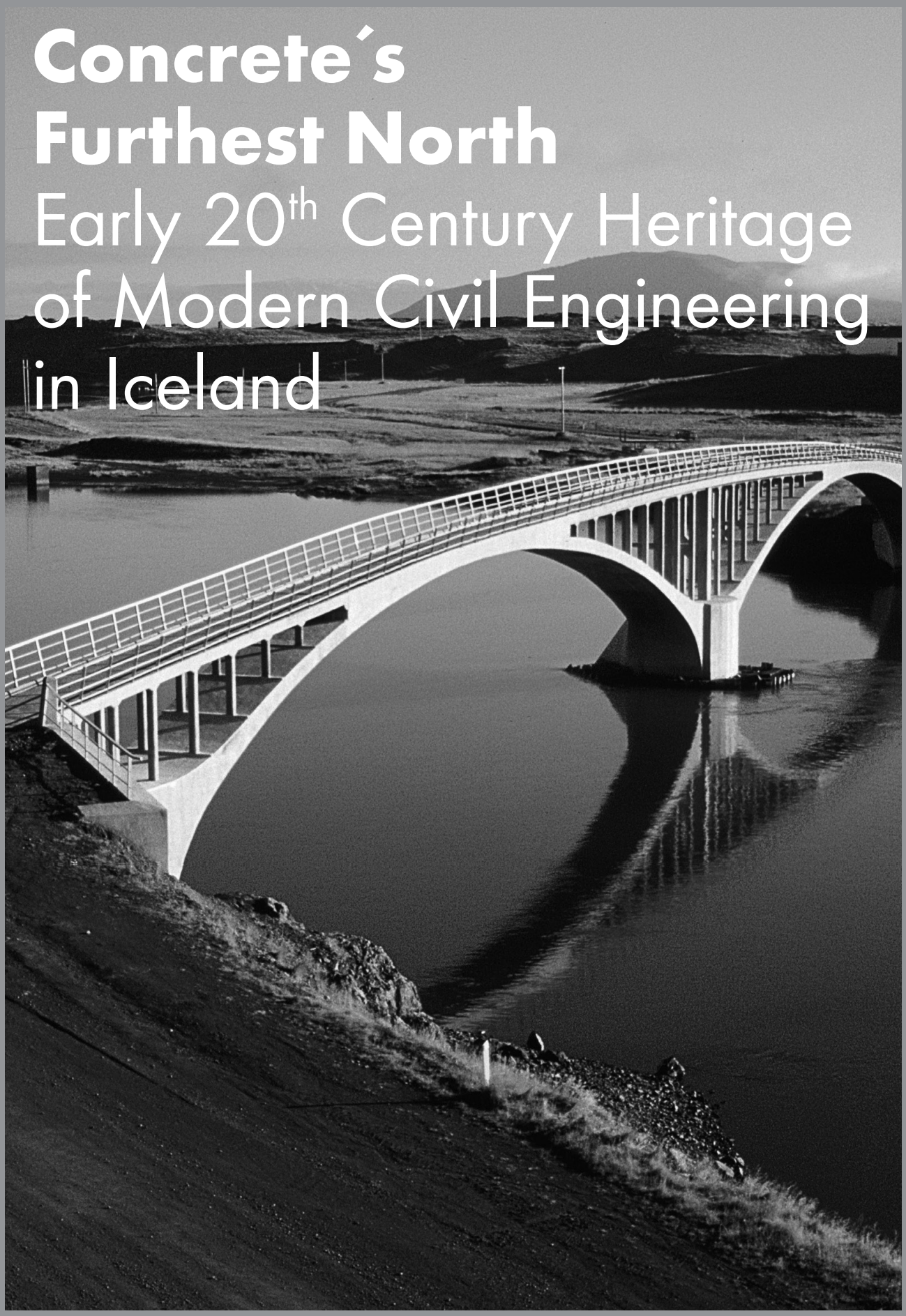
# **Concrete´s Furthest North**

## Early 20th Century Heritage of Modern Civil Engineering in Iceland



**IN 1935–36, the English writer and design critic Philip Morton Shand (1888–1960), proponent of Modernism, translator of Walter Gropius and founder of MARS group (Modern Architectural Research Group) published two articles in the magazine "The Concrete Way". The first one was entitled "Concrete´s furthest north", highlighting the advanced and wide–ranging use of concrete construction in Iceland.[1] With the second article were photographs of newly built public buildings by architect Sigurdur Gudmundsson (1885–1958) as well as bridges designed in the 1920s and 1930s by the engineers of the Icelandic State Highways Department.[2] Shand was impressed by the work of the "gifted and thoroughly modern minded architect such as any country might be proud of" as well as the work of "first rate–engineers" of this "geographically remote island which at that time had only 100,000 inhabitants and 2,000 motorcars. He also points at the photos "as evidence of the wonderful clearness of the air which is characteristic of Iceland´s brief Arctic summers."**

By Pétur H. Ármannsson

TODAY, the concrete buildings and engineering constructions praised for their modern spirit by the well–known English critic have become a part of Icelandic history. Some examples have vanished, others are still standing as ruins or have been modified beyond recognition, some are being restored and a few have even accquired a status as heritage landmarks.

For centuries, Iceland was without roads and bridges. Transportation on land was restricted to narrow horse-paths during the summer and ice and snow during winter. Countless lifes were lost while passing the many dangerous rivers that dissected the island and which in many cases determined its division into regions. One can really say that the wheel was not "discovered" as a means of transfortation in Iceland until the late 19th century. Around that same time was the beginning of the modern era of bridge buildings. In 1891, the first large steel suspension brigde over the Olfusa River, South–Iceland, was inaugurated. It was 115 m long, produced in Newcastle, England. Four years later, the other large glacial river in South–Iceland, Thjorsa, was bridged with a similar type of supension bridge. Several large rivers were bridged with steel suspension bridges in and around 1900. Of those early steel bridges, only one has survived, that of Ornolfsdalsa, West–Iceland, built in 1899. An extensive restauration of that bridge, sponsored by the Icelandic Road Administration (ICERA), is just about complete.

The introduction of concrete construction around 1900 was a turning point in Icelandic architecture and engineering. For the first time, an economical method was found to make long–lasting construction out of local materials. Early on, concrete was used for technically advanced structures. About the time that concrete made its appearance, the first professional engineers and architects came to practice in Iceland. The country was at that time one of Europe´s least advanced in terms of economy and technology. All basic infrastructure was missing: roads, bridges, harbours, water and sewage. Public buildings were needed: schools, churches, hospitals and last but not least, new dwellings and farmhouses. The art of making buildings was very much seen as part of a general technical reform.[3]

Cement was first used in building construction in Iceland as part of the renovation and extension of Reykjavik Cathedral in 1845, a stone building from the late 18th century.[4] The first complete concrete building in the country, a farmhouse at Sveinatunga, West–Iceland, was built in 1895. In 1897, the first concrete lighthouse was built at the tip of Gardskagi peninsula, West–Iceland. It was a rectilinear tower standing on a stone pier, designed by the Royal Danish Lighthouse Authority.[5] This historic lighthouse is still standing and well maintained. During the first half of the 20th century, a series of lighthouses were built along the entire coast of Iceland, most of them in reinforced concrete.

One of the first civil engineers to practice in Iceland was Jón Thorláksson (1877–1935). During his studies at the Polytechnic School in Copenhagen from 1897–1903, the new concrete technology was still not part of the curriculum.[6] After graduation, Thorláksson conducted a research on suitable building materials for the construction of permanent buildings in Iceland. His conclusion was that concrete was by far the best choice, given the scarcity of wood, clay (for brickmaking) and suitable building stone.

In 1905, Thorláksson became State engineer in charge of road and bridge construction. Two years later,

< Two-span arched concrete bridge over the Hvítá River, West Iceland (1928). Photo courtesy of ICERA Road Museum.

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Figure 1. Restored bridge over the Fnjóská River, North–Iceland (1908). The longest span of a reinforced concrete arch in Scandinavia at the time of construction (55 m). Photo by Pétur H. Ármannsson

Figure 2. Restored steel-truss bridge over Skálfandafljót, North–Iceland (1930). Photo by Pétur H. Ármannsson.

Figure 3. Restored bridge over the Bláskeggsá River, West–Iceland (1907). Earliest use of concrete in bridge construction. Photo courtesy of ICERA Road Museum.

Figure 4. Abandoned reinforced concrete arch bridge over the Hamarsá River, East–Iceland (1915). Photo by Pétur H. Ármannsson.

Figure 5. Abandoned reinforced concrete arch bridge over the Midfjardará River, East–Iceland (1914). Photo by Pétur H. Ármannsson.

Figure 6. Inauguration of concrete bridge over glacial River Markarfjót, South–Iceland, July 1934. The brigde is abandoned but survived without damage the flood caused by the eruption of Eyjafjallajokull in 2010. It served as a temporary bridge while damages to the current road were fixed. Photo courtesy of ICERA Road Museum.

Figure 7. Recently restored bridge over the Örnólfsdalsá River, West–Iceland (1899). The oldest suspension bridge and only surviving 19th century bridge. Photo courtesy of ICERA (ICElandic Road Administration) Road Museum.

Figure 8. Restored concrete bridge at the west mouth of the Héradsvötn River, North–Iceland (1926). Photo courtesy of ICERA Road Museum.

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he designed a small concrete arch bridge at Bláskeggsá W.–Iceland, the first one of its kind in Iceland. His calculations showed that concrete construction for bridges was considerably less expensive than steel, since sand and gravel was easily availalbe at most sites and the only imported material that needed to be transported to the site was cement.[7] In Thorlákssons estimates, maintainance cost was lower with concrete than in bridges of steel.

In 1908, concrete with steel reinforcement was used for the first time in an arch bridge over the Fnjóská River in North–Iceland, designed by the Danish engineers Christiani and Nielsen. It was a very advanced structure for its time. The concrete arch, measuring 54.8 meters, was considered the longest of its kind in the Nordic countries. The completed bridge was praised for its beauty and appeared in international advertisments for the engineering firm.[7] It was used for automobile traffic until 1968. In 1993, it was restored to its original appearance by the Icelandic Road Administration (ICERA).

During the subsequent years after 1908, concrete was used for the construction of several arch bridges. Some of these arches are still standing as ruins in the landscape, like the ones at Hamarsá, Southeast–Iceland from 1914 and Midfjardará in Bakkafjördur, Northeast–Iceland from 1915. Other types of concrete bridges were also tried out. Most common were flat–arch bridges of several spans, with piers having cut–waters on the side facing the stream. The bridges of Héradsvötn, Skagafjördur, North–Iceland from 1926 and over Markarfjot, South–Iceland, are good examples of the flat–arch type. Both of them are still standing and the former was restored as a historic landmark in 1995.

In 1925, engineer Árni Pálsson (1897–1967) started working for the national road administration. For many years he was in charge of brigde construction and design. Today, he may be considered to be one the greatest architect of bridges in Iceland in the 20th century. One of his greatest achievements was the two arched concrete bridge over the Hvítá River at Ferjukot, Borgarfjördur, West–Iceland, completed in 1928. In an article of 1934, Philip Morton Shand praised the design of the Hvítá bridge in the following manner:

> *This lovely little, two–span arched concrete bridge is a paragon of Modern design. Without aspiring to do anything more than cross a river in the simplest and cheapest way consistent with solidity it triumphantly achieves architecture with a capital "A". An English engineer might object that it is almost as hump–backed in the middle as a medieval masonry pack–bridge. In Iceland, however, speed matters little for the commonest means of transport is the sure–footed, shaggy–haired native ponies that are accustomed to climb almost precipitous mountain slopes. So the designer could not plead the same practical justification for incurring the additional expense involved by flattening out its gradient as engineers of countries whose roads carry heavy motor traffic. There is another reason why this design is interesting: two–spanned bridges are comparatively rare. The writer of an article which recently appeared in a Paris newspaper, who claimed there were not half a dozen in the whole of France, would probably agree that one might search the world without finding a modern example that fits into its surroundings more perfectly and naturally than this one.*[8]



**Notes**


1. Morton Shand, Philip, "Concrete´s Furthest North", The Concrete Way, vol. 7, n° 6, 1935, 330–335.
2. Morton Shand, Philip, "Three New Concrete buildings in Iceland", The Concrete Way, vol. 9, n° 2, 1936, 104–7.
3. Thórdarson, Sveinn, *Frumherjar í verkfræði a Islandi*, Reykjavík, 2002, 1–10.
4. Sigurdsson, Gylfi, "Foreword", *Work along the way*, Reykjavík, 2002, 4.
5. Hafsteinsson, L., Gudmundur, *Vitar a Islandi: leidarljós á landsins ströndum 1878–2002*, Kópavogur, 2002, 215.
6. Thórdarson, Sveinn, *Brýr að baki: brýr á Íslandi í 1100 ár*, Reykjavík, 2006, 178.
7. Thórdarson, Sveinn, F*rumherjar í verkfraedi á Íslandi*, Reykjavík, 2002, 52.
8. "Concrete Third Series–XIII: Bridge at Borgarfjord, Iceland, over river Hvita", The Concrete Way: Incorporating the Roadmaker, vol. 7, n° 1, July/August 1932, 32.



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Graduated in Architecture at the University of Toronto, Canada in 1986 and postgraduated at Cornell University, Ithaca, New York in 1988–1990. He worked in the studio of Dagný Helgadóttir and Guðni Pálsson in Reykjavik and between 1993 and 2005 he was the Curator of Architecture at the Reykjavik Art Museum. Since 2006 he is part of the Gláma–Kím Architects team and is the author of several publications and articles on 20th century architecture in Iceland.