Icelandic Concrete Surfaces: Guðjon Samuelsson’s Steining (1930–50)

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Introduction

When concrete started spreading to the remote country of Iceland around the last decades of the nineteenth century, the first builders welcomed it as the most suitable technique with which to take advantage of the most common natural resources that Iceland offered: fresh water and a great variety of rocks and pebbles. The only exception was cement, praised as a *töfralyf* [magic cure] for Icelandic development [1], but this is another history of import trade and a twenty-year long struggle for a cement factory [2]. In a few decades, concrete became "the first durable building material of the Icelanders" [3]. It was simultaneously an upgrade from the one-thousand year old tradition of turf houses, and an amazing tool of expression for a country that boasted no proper history of architecture in its past of poverty and isolation.

The first experiments with concrete were nothing more than trials on farmhouses in the countryside. The Icelandic *steinsteypa* [from the verb "to cast", and "stone", thus concrete] was taken to a political level after Iceland's recognition as a sovereign state in union with Denmark (1918), until the declaration of independence (1944). In 1919, the State Architect's Office was created. Guðjón Samúelsson (1887–1950), Iceland's first architecture graduate, was appointed to the role of *húsameistari ríkisins* [State Architect] until his death. Not only did Guðjón Samúelsson struggle with the construction of public services for a modern country, but he also set out to create a national architectural style. He slowly started experimenting with a building language that merged Nordic and expressionist influences, together with a very local and specific issue: how to represent Iceland's ultimate natural symbols – its mountains and rocks – within the forms of a national architecture. At the same time, he sought to discover what techniques could be used in order to transform concrete into a fully Icelandic material.

Concerning the architectural forms, Guðjón Samúelsson was influenced by the volcanic rock formations of his country, and transformed his own public projects into monumental imitations of the typical Icelandic basaltic columns [4]. This similarity was even made evident on the book cover of the monograph dedicated to the works of the State Architect [5]. (Fig.1)

Figure 1. Jónas Jónsson, Íslenzk Bygging. Brautryðjandastarf Guðjóns Samúelssonar [Icelandic Architecture. The Pioneer Work of Guðjón Samúelsson]. Reykjavík: Norðri, 1957. Copy available at the National and University Library of Iceland.

Many examples of what was defined as *stuðlabergstíll* – translated to 'basaltic style' – can still be found in Reykjavík. Among them are the Catholic church *Landakotskirkja* and the Lutheran church *Hallgrímskirkja*, together with the National Theatre [*Þjóðleikhúsið*] and the main building of the University of Iceland [*Háskóli Íslands*]. (Figs 2–3)

Figure 2. Left, Landakotskirkja (1925–29); right, Hallgrímskirkja (1937–86). Reykjavík. Photos by Sofia Nannini.

Figure 3. Left, the National Theatre (1928–50); right, the main building of the University of Iceland (1934–40). Reykjavík. Photos by Sofia Nannini.

From a construction point of view, however, the Icelandic geological resources had never been suitable for large-scale building. Because of their hardness, rocks cut into ashlars with difficulty, and therefore they could not be directly employed for extensive public projects. For this reason, Guðjón Samúelsson selected concrete as the primary building material for his architecture, from the beginning of his career. If imitating the basaltic formations was basically a matter of architectural design and proper placement of the formworks, how did the Icelandic builders achieve a truthful metamorphosis of cast concrete into Icelandic natural stones?

By the early 1930s, Guðjón Samúelsson arrived at a solution: turning a common pebbledash render into *Steining*, his own patented, all-Icelandic, and largely debated finishing technique.

Economic crisis and Icelandic winters: The origins of *Steining* (1930–33)

According to the sources, Guðjón Samúelsson first experimented with concrete finishing in 1930, when he was supervising the works for the National Theatre in Reykjavík (1928–50) [6]. The theatre was by far the most expensive project which the Icelandic government had ever funded. In the words of the architect, the building had to be a true "fairytale castle" [7], able to represent the whole Icelandic population and an inherently national architecture [8].

This project was indeed majestic for Icelandic standards. The building process, however, mirrored the low-skilled labour that characterised Icelandic construction industry until the post-war years. In fact, the vertical structures were all made of unreinforced concrete, resulting in very thick wall sections of approximately 70 centimetres. In addition, wooden formworks were not precisely crafted, and perhaps even less meticulously utilised, leaving behind uneven concrete surfaces [9].

Within this context, the birth of *Steining* was due to two unrelated factors. On the one hand, the worldwide economic downturn had struck Iceland, causing a halt in construction. On the other, the severe climate conditions of the Icelandic winters exposed the concrete structures to the risk of snow and strong winds. By 1933, the building was completed, but it remained empty of furniture and finishing (Fig.4).

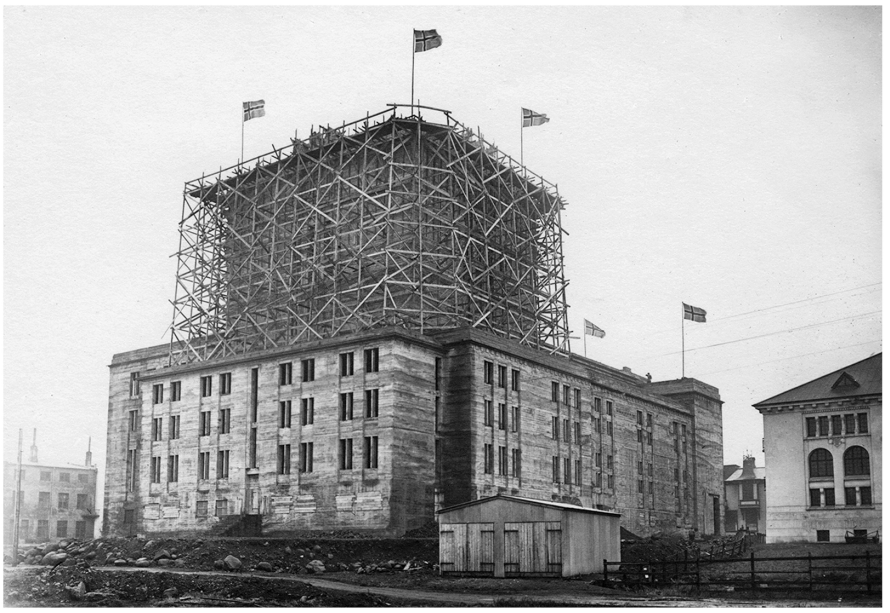


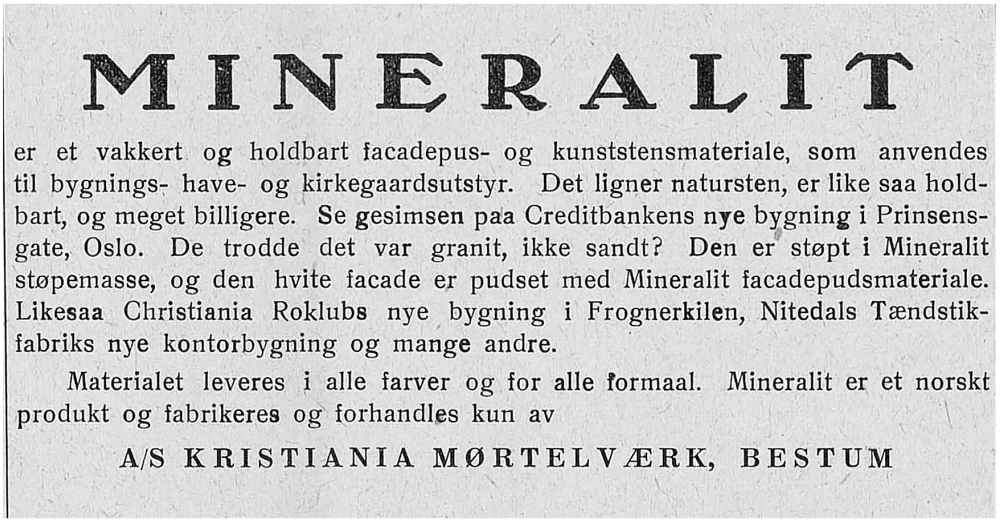
Figure 4. The National Theatre in construction, 1932. Photo by Loftur Guðmundsson. Courtesy of Þjóðminjasafn Íslands / Iceland National Museum.

Fearing permanent damage, the engineer Jón Þorláksson (1877–1935) suggested that rough concrete surfaces be protected by cement and gravel render. Concrete finishings had already been in use in Iceland since the early 1920s, as the outer surfaces had always been "the greatest trouble" with Icelandic concrete construction [10]. On the one hand, plaster tended to come off from the concrete walls, which were often subject to cracks due to the cold temperatures. At the same time, leaving the concrete surface unfinished was not considered aesthetically pleasing. As early as 1903, Þorláksson suggested the use of sand "of different colours" to decorate concrete cast stones [11]. In 1926, the artist Guðmundur Einarsson (1895–1963) proposed the coating of concrete buildings with white quartz powder, "as if they were made of light grey marble [12]". Later, in 1942, the building expert Guðmundur Hannesson (1866–1946) claimed that the colour of concrete was "unusually ugly", and the builders had to prevent the "drowned rat effect [13]".

When it came to protecting and decorating the surfaces of the theatre, in order to avoid a bleak grey layer on the whole building, Guðjón Samúelsson first proposed employing the Norwegian *Mineralit* render, known in Iceland as *Mineralpuss* [14]. Due to the economic downturn, by 1933 importing foreign materials was too expensive, and this additional restriction inspired Guðjón Samúelsson's experiments with local geological resources [15]. The theatre was entirely rendered with a selection of Icelandic rocks, such as obsidian, quartz, rhyolite, and the particularly precious Iceland spar, or Iceland crystal. If, at first, the decision was triggered by economic and structural reasons, the final result pointed in a completely different direction: transforming a cheap, yet necessary finishing technique into an ode to the Icelandic landscape and a precious enrichment of the new Icelandic architecture.

The architect and the mastermasons: A debated patent

What was *Steining* made of and where did it originate? The Icelandic history of construction has always been a history of foreign import, from timber to corrugated iron, imported respectively from the Scandinavian countries [16] and from the United Kingdom [17]. As far as concrete surfaces were concerned, the custom of coating the outside walls might have originated from the similar Norwegian *Mineralit*, used in Iceland since the early 1930s [18], and also from the largely widespread British pebbledash technique in use since the 1920s, known in Iceland as *perluákast* [19]. The Norwegian *Mineralit* consisted in a mix of ground granit and mortar, applied on the outer walls and cleaned with hydrochloric acid – it was thus a local version of roughcast. *Mineralit* was well advertised on the Norwegian press, especially for its similarity to real, granit ashlars (Fig.5).


MINERALIT

er et vakkert og holdbart facadepus- og kunststensmateriale, som anvendes til bygnings- have- og kirkegaardsutstyr. Det ligner natursten, er like saa holdbart, og meget billigere. Se gesimsen paa Creditbankens nye bygning i Prinsensgate, Oslo. De trodde det var granit, ikke sandt? Den er støpt i Mineralit støpemasse, og den hvite facade er pudset med Mineralit facadepudsmateriale. Likesaa Christiania Roklubs nye bygning i Frognerkilen, Nitedals Tændstikfabriks nye kontorbygning og mange andre.

Materialet leveres i alle farver og for alle formaal. Mineralit er et norskt produkt og fabrikeres og forhandles kun av

A/S KRISTIANIA MØRTELVÆRK, BESTUM

Figure 5. Mineralit advertisement on the Norwegian newspaper Akers-Posten, vol.20, no.47, 29 Sept. 1925, p.5. Courtesy of the National Library of Norway.

Compared to roughcast, pebbledash is slightly different, because the pebbles are not directly mixed with the mortar. First, a thin layer of mortar is spread on a limited area of the wall, then the ground stones are quickly applied with the help of a trowel. Generally, pebbledash does not require washing with acid, as the stone fragments are already visible on the surface. Guðjón Samúelsson's *Steining* did bear a strong resemblance to ordinary pebbledash, which was already common and in widespread use among the Icelandic mastermasons.

As early as 1934, Guðjón Samúelsson desperately tried to patent this technique in Iceland, by sending his documentation to the Ministry of Industry. In particular, he highlighted a few characteristics that would make his *Steining* different from other renders [20].

He insisted that the binding agent for the underlayers should be only cement, in order to make it as resistant as possible against the Icelandic climate. A first layer had to be applied to the whole surface, and its mortar had to be composed of 1 part cement, 2 ½ parts hard sand. The second layer was spread on to one small area at a time, its mixing ratio had to be 1:2, and around 4mm thick. Hard stones had to be chosen for the final layer, ground and

applied by hand with a trowel. After a few days, the whole surface could be washed with normal or slightly acid water.

In May 1935, the Ministry refused filing the patent [21]. By 1939, however, the architect managed to file patents in both Denmark (1937) [22] and in the UK (1939) [23], and afterwards he resubmitted the patent documents to his own country. He was supported by some of Iceland's most influential figures, such as the politicians Jónas Jónsson (1885–1968), former minister of Justice and chairman of the Progressive Party, and Þorsteinn Briem (1885–1949), former minister of Industry and Transport, and member of the Parliament [24].

However, Guðjón Samúelsson's patent proposal was strongly opposed by the Reykjavík Mastermasons' Society [*Múrarmeistarafélag Reykjavíkur*], founded in 1933. The Society refused to see such a common surface render under a private patent. By the end of the 1930s, *Steining* had become very widespread in Reykjavík, and the adoption of a patent would have much increased its price, already at least twice as expensive in comparison to an ordinary cement plaster [25].

Thanks to political support, the architect filed the Icelandic patent in 1941, but the property issue was later brought to court and the patent was revoked by the Icelandic government in 1945 [26]. This was followed by the annulment of the Danish and British versions [27].

This argument was eventually resolved by letting the techinique fall again into the realm of the common finishing methods available for the Icelandic builders. Indeed, the argument reflected the complex relationship between a low-skilled, but experienced, working class and the few educated technicians, who were struggling to leave their own mark on the development of architecture.

A stone symphony: The main building of the University of Iceland (1934–40)

Despite the failure of the patent and its similarities to pebbledash, Guðjón Samúelsson's *Steining* did have a different characteristic if compared to common and unsophisticated finishing techniques. It was "uniquely Icelandic [28]", and this Icelandicness originated from the selection of rocks decorating the buildings' surfaces. These very rocks could transform an ordinarily rendered surface into a rhetorical architecture praising the geological richness of the country.

While struggling to file his patent, the State architect claimed that "Iceland seemed to be the poorest among all countries when it comes to building materials". The situation changed with the arrival of concrete, but concrete was 'unartistic' and did not match as perfectly with the Icelandic landscape as the traditional turf houses did [29]. Therefore, by coating the surfaces with obsidian, quartz, and several other local geological resources, a plain and dull material was transformed into the Icelandic landscape itself.

Obsidan (*hrantinna* in Icelandic) was mainly mined near the Törfajökull glacier in the south, or in the Þingeyjarsýsla county, north-east Iceland. It was then transferred to Reykjavík by ship [30]. The presence of pointed obsidian fragments in the *Steining* mixture resulted in very dark shades on the concrete surface, as it was in the case of the National Theatre. (Fig.6)

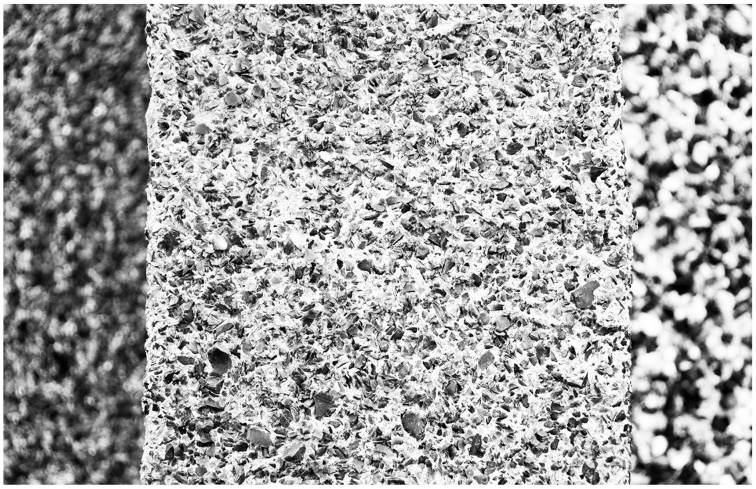


Figure 6. Obsidian fragments in the Steining render of the National Theatre. Photo by Sofia Nannini.

Quartz (*kvars*) was mined in the Mosfellsbær area, near Reykjavík. Its presence was discovered mostly in the vicinity of some gold mines which had been active since 1909 [31]. An interesting application of both obsidian and quartz can be seen on the façade of the church in Akureyri, northern Iceland, designed and built by Guðjón Samúelsson in 1934–40. Dark obsidian splinters were used to mark the edges of the structure, while pale quartz pieces covered the rest of the surface (Fig.7).

Figure 7. Steining on the church of Akureyri. Detail on the right. Photos by Sofia Nannini.

The most precious material to be found in the *Steining* render is ground Iceland spar (*silfurberg*), also known as Iceland crystal. This particular kind of calcite had been mined in Helgustaðir, eastern Iceland, since the mid-nineteenth century, and it had been pivotal in the development of modern studies on light polarisation [32]. Indeed, only the cheapest and most opaque fragments of Iceland spar were used for building purposes [33]. Today, a few buildings still boast the original *Steining* render and their first pebble mix. One of them is the modern villa commissioned by the chemist Trausti Ólafsson in 1934, whose *Steining*-rendered walls include Iceland spar, obsidian, and other volcanic rocks (Fig.8).

Figure 8. The villa in Eiríksgata 6, Reykjavík, designed by Guttormur Andrésson and commissioned by Trausti Ólafsson. Detail of Steining on the right. Photos by Sofia Nannini.

Since 1937, ground seashells (*skeljamulning*) also became a part of the *Steining* tradition. They were introduced in order to substitute the rocks and produce a cheaper, yet still shiny blend.

The utmost synthesis of this geological variety can be seen in the main building of the University of Iceland, part of the University campus designed and built by Guðjón Samúelsson in Reykjavík between 1934 and 1940 [34]. "In no other building on Earth can be found a similar beauty", claimed the politician Jónas Jónsson, particularly referring to the diversified application of *Steining* both on the outside and inside [35]. The concrete render itself was a main topic of the rector's inauguration speech, proudly asserting that the building was a symbol of Iceland's building materials [36]. Also, Guðjón Samúelsson's specific interest in the surface renders was well reported in the daily construction report. The decoration of the concrete surface was achieved both with regular *Steining*, for the outer walls and the ceilings, and by cladding the inner walls with precast slabs. The rendering of the whole building took more than one year, and it absorbed much of the State architect's energy. Guðjón Samúelsson personally supervised all trials on the renders, and even located the precise spot on the Reykjanes peninsula from where to collect seashells for the *Steining* blend [37]. If the stones were usually ground with the help of grinders, seashells had to be first separated from shingles, and this process was done by hand by "three girls" on the working site [38].

The vestibule's walls were covered with seashell-rendered slabs, and the ceiling coated with ground, shiny Iceland spar. The main doorway was rendered with a mixture of ground obsidian together with greenish rhyolite. The floor was covered with dolerite, whereas the main hall's vestibule was clad with red rhyolite slabs. The altar of the University's chapel was decorated with clear Iceland crystals. The whole outer façade was rendered with a quartz-based *Steining* blend, for which approximately 7 tons of quartz were imported [39] (Figs.9-10).

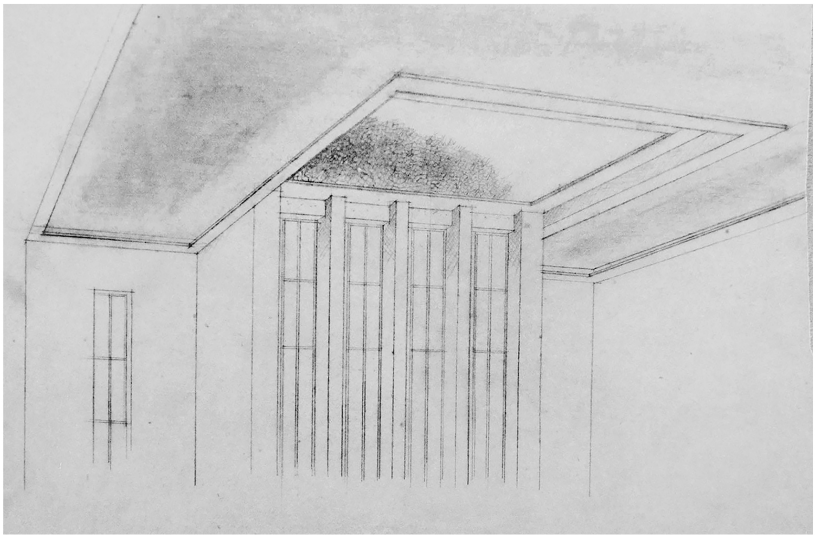


Figure 9. Sketch for the Steining render on the ceiling above the main entrance of the University of Iceland. Húsameistari ríkisins. Bréfa- og teikningasafn. [Collection of the State Architect. Letters and Drawings]. Safn A(D). Flokkur 42, Örk 181. 1930–1939. Háskóli Íslands. Sérteikningar. Courtesy of Þjóðskjalasafn Íslands / National Archives of Iceland.

Figure 10. Steining on the ceiling of the main entrance of the University of Iceland. The central vault is rendered with calcite fragments, the surrounding portion with obsidian on a blue-cement field. Photos by Sofia Nannini.

The final result had a very powerful visual effect. Not only did the local aggregates generate a polychromy able to elegantly decorate a somber and austere building, but this symphony of stone fragments became an architectural mirror of the Icelandic geology and, consequently, a built eulogy to the island's natural landscape. In the hectic years moving towards Iceland's declaration of independence, *Steining* was not limited to technical matters anymore, but it also acquired political and rhetorical meanings.

Conclusions

Iceland's independence from Denmark in 1944 and the Second World War completely changed the country's economy, which strenghtened its commercial and political bonds with the United States during the Cold War. As Iceland's wealth was rapidly increasing, the Postwar years allowed more imports of foreign building materials, and subsequently altered the building traditions of the early twientieth century. At first, some builders experimented with imported rocks to be added to the *Steining* blend. One example is the Reykjavík Health Center (*Heilsuverndarstöð Reykjavíkur*) by the architect Einar Sveinsson (1906–73), built in 1949–55. The reddish façade is entirely rendered with a *Steining* mix of German red marble and Icelandic calcite [40].

By the beginning of the 1960s, however, *Steining* was eventually abandoned and replaced by plastered pre-cast structures, or by cast concrete treated with chemical retarders, allowing the concrete aggregates to emerge on the surface [41]. Only during the 1990s was the technique resumed, with the aim of restoring most of the architectural heritage dating back to the 1930s and 1940s. The main building of the University of Iceland was wholly restored in 1995, and so was the National Theatre in 2006–08, both under the supervision of the National Architectural Heritage Board (*Minjastofnun Íslands*). For these occasions, some closed mines were re-opened for the collection of quartz and Iceland spar [42].

In the United Kingdom, pebbledash has been associated either with the experiments of the arts and crafts movement, or with the dull and grey legacy of Postwar housing [43]. Despite the technical similarities, the Icelandic *Steining* stemmed from a distinct history and was granted a completely different future. When it was first employed in the 1930s, it physically reflected the country's material shortage and the national pride for the development of Icelandic architecture. When it was rediscovered in the 1990s, *Steining* was not treated as a burden from the past, but as key quality of Iceland's twentieth-century built heritage. Indeed, *Steining* can be placed on the thin line that divides nature and artificiality, once again highlighting one of the many dichotomies characterising concrete as a building material and method [44]. Although his invention did not differ enough from other render techniques to be granted a patent, Guðjón Samúlsson was able to project a variety of meanings that could change the way one would look at his *Steining* surfaces. Icelandic economic struggle, resource scarcity, geology, nationalism, and architectural experimentations were all condensed into a single, yet expressive, layer of concrete render.

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