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Tectonics of facades designed by Alvar Aalto

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Introduction

Alvar Aalto's works shaped the identity of the centre of Helsinki in the 1950s and 1960s, even though the architect was not able to realise his greatest vision, the reorganisation of the Töölö Bay and Kamppi areas. This article analyses the facades of four buildings: Rautatalo office building, the main office building of the Social Insurance Institution of Finland (Kela), the Enso Gutzeit headquarters and Finlandia Hall. Three of these are free-standing buildings on their plots, two in accordance with their original plans and one deviating from its original plan. The fourth is part of a block in the city centre. The primary material of the facade is white marble for two of the buildings, red brick for one and copper sheet for the other. The white buildings – the Enso Gutzeit headquarters and Finlandia Hall – play a particularly significant role in the cityscape. The design elements used in their facades include ribbon windows, webbed structures and solid surfaces. All of the four buildings were built completely on-site. The purpose of this article is to understand what type of design principles Aalto applied to the facades of these buildings and how he considered the urban environment – as individual stories or evolving themes.

	Year of completion	Developer	Placement	Typology
Rautatalo office building	1954	Company	Part of a block	Commercial building
National Pensions Institution	1956	State of Finland	Free-standing	Office building
Enso Gutzeit headquarters	1962	State-owned company	Free-standing	Office building
Finlandia Hall	1971	City of Helsinki	Free-standing	Concert hall and congress centre

	Facade structure	Composition	Primary material of facade	Primary material of representative facilities
Rautatalo office building	Curtain wall	Web, ribbon-like in the yard	Copper	Marble atrium, marble and travertine
National Pensions Institution	Curtain wall	Ribbon and solid	Red brick	Abundant use of materials, e.g. marble and glazed porcelain
Enso Gutzeit headquarters	The facade is a load-carrying structure	Web	White marble	Travertine
Finlandia Hall	The facade is a load-carrying structure	Solid	White marble	Marble and travertine

Cityscape

Rautatalo office building emerged on Keskuskatu as the result of an architectural competition. The building is part of a block. The competition jury praised Aalto for a facade that matched its surrounding environment.¹ The area had been under discussion in the 1910s, when a solution had been sought for a new shopping street. A street had eventually been built in 1921, in line with designs by Eliel Saarinen. Aalto found the implementation of the street to be “slightly brutal”, but it epitomised Helsinki city centre for him.² The web-like facade of Rautatalo office building is mainly covered with copper and is bordered with red-brick motifs. It pays homage to the

¹ Editors, 1952.

² Aalto 1955, p. 129.

adjacent building, which was designed by Saarinen and was completed in 1921.³ The web-like facade designed by Aalto was a neutral addition to an environment with significant buildings with vertical structures. In his project presentation, Aalto considered the seamless integration of the building into an urban environment to be equally difficult as its integration into a natural environment would be.⁴ Aalto aimed for harmony with his web-like facade that was surrounded by buildings with facades with vertical compositions. Around 40 years earlier, Saarinen had sought to create a consistent cityscape. In his opinion, such a cityscape could have been created by reproducing facades of a similar type in the Keskuskatu area.⁵

The main office building of the National Pensions Institution of Finland (Kela) is a free-standing building on a triangular plot in the Taka-Töölö district of Helsinki, amidst buildings of equal height that were built between the wars. Its plot is located on the top of a hill, at one end of a park. The building is a composition surrounding a square. The differences in height on the plot have been highlighted by building the yard on a platform that is one storey above street level. The route running through the yard reveals various structures, such as a wing standing on columns, with a view into an exercise hall that is located one storey lower. From the outside, the whole appears to consist of separate elements and the spaces between them. The urban, multifaceted nature of the exterior spaces may be a reflection of the earlier phases of the project, when the building was located in a different spot⁶, was larger and was to be constructed around squares. The interior of the building constitutes a functional whole.

The Kela building has two high facades, which face Mannerheimintie. In the direction of the park, its scale is smaller. The materials used in the facade include red brick, grey granite and copper. The building has open, ribbon-like facades with red brick, as well

³ The commercial building was completed in 1921, the year that the street was opened in the existing city structure. The developer was O/Y Kino-Palats A/B. Antman 1999, pp. 7–9.

⁴ Aalto 1955, p. 129.

⁵ In his design from 1916, Saarinen sought to harmonise the facades on Keskuskatu. Antman 1999, pp. 7–9.

⁶ An architectural contest for the design of the Kela main office building was held in 1948. The intended location was the block bordering on Mannerheimintie, Kivelänkatu, Töölönkatu and Duncker in Taka-Töölö in Helsinki.

as solid surfaces covered with copper. The open parts have offices. The library and dining hall have solid stone facades, although the dining hall has a glass wall and faces the garden inside the block. The metallic surface hides technical facilities at the Messeniuksenkatu end, as well as secondary stairs and access routes. In relation to its surroundings, the Kela building has a dark, even stern, presence.

The Enso Gutzeit headquarters marks the end of Esplanadi park and Market Square – that is, the main axle of Empire Helsinki. Along Pohjoisesplanadi, the light facades of the merchant houses from the early nineteenth century constitute a consistent cityscape. The Enso Gutzeit headquarters was built as an extension to this cityscape in the early 1960s. Aalto successfully negotiated changes to the shape of the plot, to enable the end of the new building to be at the correct angle in relation to city's Neoclassical main axle. He studied the dimensions of the Empire centre of Helsinki. In the planning stage, he convinced the client to make the building lower than the town plan would have originally allowed. Reasons related to the cityscape were used as justification for the changes.⁷ The office building is a free-standing building, and the even, plastic grid on its facade is covered with white Carrara marble. Greyer slabs were used to highlight the vertical lines. The western end of the building faces Market Square. Its ground-level storey has an arcade that some researchers have seen as a reference to ruins, while others have interpreted it as a poetic element.⁸ The white colour of the building serves as a visual link to the Empire centre, even though the building was constructed in an area that used to be part of the goods harbour. Some have seen this marble building designed by Aalto as the beginning of a reinvented Katajanokka district. The building was supposed to be extended to create a twin palace the size of the entire block, in accordance with designs prepared by Aalto in the late 1960s. These plans never came to fruition.

Finlandia Hall was completed by Töölö Bay in 1971. It was part of the string of cultural buildings included in Aalto's plan for the city centre (1959–1964). A solution for the design of the area had been actively sought for half a century, by organising

⁷ Heikinheimo et al. 2007, p. 21.

⁸ Griffiths 1997, pp. 68–69.

competitions, for example. Aalto felt that he was designing a new centre in the Töölö Bay area – a centre akin to Senate Square.⁹ He saw the openness of the area as a resource, as it enabled the city to grow from the inside. Although the City of Helsinki had approved Aalto's plan to be used as a starting point for the town plan in 1966, it was never implemented because of disputes related to political decision-making.¹⁰ In Aalto's plan, cultural buildings located in Hesperia park were reflected in the water, and a pedestrian route ran near the water. Finlandia Hall was built in an area that used to be part of a railway yard. It was the only part of the plan that was implemented as intended¹¹, although the park plan has gone through many phases. The main facade of Finlandia Hall faces Töölö Bay. The volume of the concert hall is its crown. Its linearity is highlighted by the ground-level and balcony floors, which are recessed in the marble wall. The architect has also highlighted their role in the facade by means of the materials used. The protruding staircase and the wedge-shaped stairs leading from the terrace to ground level make the composition more dynamic. The sharp northern edge of the balcony floor creates a sense of direction. Seen from Mannerheimintie, Finlandia Hall is a low, horizontal building located in a valley. The volume of the concert hall grows as an attractive, fan-like shape that leads towards the entrance under a low, linear canopy. In terms of topography, the carefully thought-out location of Finlandia Hall reflects Aalto's vision for the area.

Structure and facade composition

Aalto saw the load-bearing structure of the eight-storey Rautatalo office building as a double frame: the actual load-bearing frame is inside the facade, and the facade forms a secondary frame that constitutes the window and heat insulation systems and withstands the pressure of the wind.¹² In the street-level wing, the pillars are placed more densely than elsewhere in the building. The row of pillars is located slightly inside the facade, and its rhythm reveals itself on the second storey. The secondary structure

⁹ Aalto 1974, p. 29.

¹⁰ Hedman 1998, pp. 55–68.

¹¹ Completed in 1991, the Opera House at the northern end of Töölö Bay is not directly linked to the shoreline.

¹² Aalto 1955, p. 129.

– or the non-load-bearing facade – is an even web, with the exception of the two bottom storeys and the top storey. In the implementation stage, the rhythm of the facade was changed from a pattern of threes to a pattern of twos.¹³ The windows were made wider. The pattern of threes may have been a reflection of the facade designed by Saarinen. In the Rautatalo office building project, the facade was designed very carefully, as its composition and functionality affected the appearance of the entire building. In one of the drafts, the metallic window composition was interpreted as armour.¹⁴

The actual load-bearing structure is not based on a modular system. Instead, it has a customised, heterogeneous nature. The open space on the second floor resembles an outdoor space and is the core of the composition. Its shape varies from one floor to another, which is also reflected in the structure. This open space has an illuminated ceiling.

The rising, projected parts of the intermediate floors connected to the facade constitute a special structural feature. The facade rests on these projected parts, which climb towards the external wall. The purpose of the structure was to maximise daylight in the offices – this was something Aalto had been developing since the dining hall and patient rooms in the Paimio Sanatorium, where the aim was to bring as much daylight as possible inside the frame of the building. In Rautatalo, the architect integrates the load-bearing structure, cladding of the facade, windows, ventilation, heating and fixtures into the same system. In the offices, the windows emerge directly from the slanting floor, in the same manner as in the Paimio Sanatorium.

In the Kela main office building, the intermediate floor slabs also climb as projections towards the facade at the ribbon windows. The external wall is built on a projection in the same manner as in Rautatalo. This was Aalto's interpretation of a non-load-bearing curtain wall structure. It was used to bring daylight into the office facilities. The solid parts of the facade are covered with copper and hide the secondary facilities. The relief of the red-brick strings in the facade is repeated here in a shadow-like manner.

¹³ There were at least three intentional options, judging from undated drawings 60-917 and 60-918. AAM.

¹⁴ Drawing 60-1413. AAM.

The Kela building also has solid parts, such as the library walls, which are covered with granite slabs.

The load-bearing system of the eight-storey Kela building is not based on modular dimensions. The appearance of the building is highly varied, with its piloti motifs and roof terraces. When the building permit was granted in 1953, the ribbon windows were divided at regular intervals. The actual implementation, however, is more multiform, with more harmonious, square-like window frames, narrower windows and surfaces covered with copper.

The reinforced concrete frame of the Enso Gutzeit building was cast in situ. It is based on a dimension system with regular intervals, with the exception of the end facing Market Square and its opposite end. Three of the facades have a web-like composition, and one is solid, as it was left waiting for an extension. The main facades are straight and harmonious in shape. The northern facade meanders and an illuminated ceiling is formed inside the basic volume. Aalto built many of his compositions by combining motifs that were opposite on some level and articulating these junctions carefully both indoors and outdoors. The Vyborg Library, completed in 1935, is one of the first examples of this. The Enso Gutzeit facade combines a large, unbroken shape with a smaller, more multiform shape, with the material remaining unchanged.

The intermediate floor slabs are straight, and the web-like facades have a load-bearing line of pillars. The concrete facade was insulated using cork and plastering on the outside. The bearers of the marble slabs were soldered in holes left in the cast. A ventilation gap of at least two centimetres was left behind the marble slab. The plastered facade was covered with marble.

The building looks prefabricated, as the web-like facade looks even, and systemic construction was a new, topical phenomenon in the 1960s. The facade communicates a systematic approach. Indoors, however, Aalto broke the myth of regularity by means of overlapping spaces – for example, the illuminated ceiling does not reveal the shape or division of the facilities under it.

Finlandia Hall is a reinforced concrete building constructed in situ, with the pillars, beams and external walls being the load-bearing parts of the frame. The special

features of this rather ordinary structure include the pre-stressed wall-like pillars carrying the back part of the concert hall and the separation of the main halls from the rest of the frame for acoustic reasons.¹⁵ The concrete wall was insulated on the outside.¹⁶ In the Töölö Bay landscape, the facades and the entire building appear to be solid.¹⁷ Pilaster motifs lend a rhythm to the main floors of the eastern facade, with the vertical windows hiding between them. The cladding of the facade originally had a varied rhythm, with vertical zones consisting of narrower and wider sheets. The current marble facade was renovated in the late 1990s. It is similar to the original, but the slabs are 20 per cent smaller.

In appearance, Finlandia Hall is a sculpture-like structure. This appearance is supported by facades that seem solid and by strong contrasts between light and shadows, white and dark tones. It has a heterogeneous structural system.

Aalto used various structural engineers. However, the motif of intermediate floor slabs climbing towards the external wall is repeated in several buildings, which implies that the structural solution originated from the architect.

Structural engineers

Rautatalo office building	Magnus Malmberg Engineering Office
Kela main office building	Engineer Martti Veikko Hagman
Enso Gutzeit headquarters	Ilmari Packalén Engineering Office
Finlandia Hall	Magnus Malmberg Engineering Office

Material

¹⁵ Lukander & Mannervaara 2005, p. 15.

¹⁶ A 100-millimetre layer of hard insulation wool was attached directly to the cast surface, with a 45-millimetre ventilation gap between the marble slab and the insulation. The slab was 30 millimetres thick. Mounting of facades in the unprofiled part. RAK drawing R-55. City environment sector. City of Helsinki.

¹⁷ The marble grids intended for the main facade were abandoned during the construction phase. Lukander & Mannervaara 2005, p. 62.

The metallic facade of Rautatalo office building was the first of its kind in Finland. Even though the jury did not publically make a stand for a metallic facade, Aalto implied his selection of material in his suggested solution. The building was a metal merchants' project, and the facade served as something of a business card for the developer. The selection of material was in line with the international trends of that time. For example, Mies van der Rohe designed web-like facades that highlighted the load-bearing metal structure.¹⁸ The vertical lines in Rautatalo office building are not highlighted in a similar manner, but Aalto's web-like design aroused great admiration in Finland. Rautatalo office building made the cover of a publication showcasing contemporary business architecture.¹⁹

Aalto also applied a facade solution similar to Rautatalo office building to the Academic Bookstore (1969), which is located in the same block, and the extension of the Nordic Union Bank building (1962) on Fabianinkatu. These three buildings are part of a block, and their dark, metallic facades appear neutral. On the Pohjoisesplanadi side of the Academic Bookstore, white marble lines the windows, indicating the hierarchy of the facades.

Marble Hall, the key indoor facility in Rautatalo, was named after its marble floor. In his project presentation from 1955, Aalto describes the floor material as "ordinary Carrara marble imported to Finland" and the nature of travertine for the wall surfaces as "exceptional, porous". He also says that he highlighted its porous nature by means of sandblasting. But why did Aalto speak of "ordinary marble"? I will discuss this towards the end of my article. In contrast to its interior, the facade of Rautatalo office building is made from copper and bronze, and the roof is made from copper.

The metallic sheet cladding communicated a modern structure, as metal was not typically used in facades. The facade of the Kela building combines traditional brick with a modern structure. Brick is a heavy aggregate material, whereas the structural system used by Aalto would have allowed for a lighter solution – the facade no longer

¹⁸ The Promontory Apartments (1947) in Chicago were Mies van der Rohe's first tall building to exhibit its construction materials. In addition, the 860–880 Lake Shore Apartments are renowned for their structural clarity and composition. miessociety.org/mies/projects/

¹⁹ Jaatinen et. al. 1959.

needed to be made of brick. In the Kela building, Aalto seems to be playing with gravity. The glass main entrance, combined with a metal grid and metal doors with no windows, is another modern motif that defies gravity.

The lobby facilities and central hall constitute the functional centre of the building. Aalto used white marble slabs in the floor surrounding the hall and created a rhythm with grey marble stripes. He also developed special rod-shaped glazed ceramic slabs – a new version of a traditional building material. Much like the exterior materials, the interior materials of the Kela building can be described as rich, even though the selection differs from the exterior materials.

The white, prestigious marble on the facades of the Enso Gutzeit building can be compared to the glory of private Renaissance palaces. The slanted window recesses reflect light from the water. The bright white building creates a contrast with the red-brick Orthodox church standing behind it and with the harbour buildings. The facade solutions attracted a great deal of attention at the time. It is evident that Aalto wanted to create a worthy end point to the city's axle. In addition to the white colour, the use of marble can be taken as a reference to the classical period, as can the mathematically divided facade composition.

The ground floor and top floor of the commercial building differ from the other floors in terms of their space arrangements. The flag hall on the ground floor is in line with the open cores of Aalto's other designs, even though it is more private in nature in this building. The floors and staircases of the more public spaces in the building are covered with yellow travertine. White marble is not used inside the building. The management's cabinet facilities on the sixth floor have wooden surfaces, rugs and carefully designed furniture. The materials used in the interior and exterior also differ from one another in the Enso Gutzeit building.

The primary material of the facades of Finlandia Hall is white marble, which is combined with grey granite and with glazed ceramic rod-shaped slabs, which are also used in the Kela building. Such dark-blue slabs are found on the ground floor on the Töölö Bay side – the building faces this direction. Aalto had hoped for a marble surface with bluish grey stripes rather than spots. In reality, however, the appearance of the

marble could not be chosen. It was determined by the supplier and by chance, as the quality of the stone varied.²⁰ The crown is covered with dark grey and white marble. For this reason, part of the facade stands out, while part of it seems to disappear. Both the lights and shadows are strong. A piazza is located between the main halls of Finlandia Hall. Together with the main stairs, which are covered with travertine, the piazza is the primary meeting place in the building. In this space, marble is used in the balconies, which meander around the main hall. The main hall combines white marble with motifs made from bent timber that is painted blue. The colour scheme is dominated by the bluish-grey wall-to-wall carpet, the black furniture and the black doors of the concert hall. The doors are upholstered with fabric made from horsehair, and the white walls are made of stone and wood. In Finlandia Hall, the Carrara marble serves a link between the exterior and interior more clearly than in the other buildings.

Conclusions

Aalto's modernism took the urban environment into account as something of a landscape. In Rautatalo office building, the facade solution is based on a neutral composition in an environment of vertical lines. In this environment, on Keskuskatu, Aalto did not want to apply a similar or opposite approach. He did not primarily want his building to stand out from the older buildings. The careful topographic placement and white colour of Finlandia Hall constituted part of the new Töölö Bay landscape. In terms of cityscape, the Enso Gutzeit and Kela main buildings are the most polemical of the four buildings, with regard to the selection of materials. The nature of the Kela building, in particular, is a contrast to the more subdued, relatively light, plastered buildings – it is not so easy to find an immediate justification for the selection of materials as it is with the Enso Gutzeit building. The Kela building is located a little further away from the centre, and its location is not particularly significant in terms of the city structure, unlike that of the Enso Gutzeit headquarters. Traditional red brick was suitable for the Taka-Töölö district. The material did not need to be fancier, as the construction programme was impressive in itself. Inside the building, its users – that is, ordinary Finns benefitting from social security – were treated to a richness of valuable

²⁰ Hannukkala 1998, p. 115.

materials inside the building. Through his selection of materials, Aalto sought to attract attention and perhaps also appreciation towards support structures – in this case, the state.

The street facade of Rautatalo, its only facade that is visible in the cityscape, is even, whereas the structure behind it is heterogeneous. The structural solution applied to the Kela building is adapted to requirements related to functions and location, and its appearance reflects these differences. The Enso Gutzeit building wants to appear prefabricated, even though it is not. The shapes and forms of this in-situ building were quite plastic in a decade when architects favoured constructivist trends. The structure of Finlandia Hall was customised to its location, and its complex forms were challenging to implement using reinforced concrete, in terms of its dimensions. Finlandia Hall does not even try to look modular. Considering its time of construction, it is exceptional in terms of its construction methods and ideals.

Aalto used materials quite consistently throughout his career: the facades of the primary buildings of his Turku period were plastered and painted white.²¹ After the wars, he started to use traditional, highly durable materials, mainly red brick, grey granite and copper. At the time, there was a shortage of building materials, including red brick. His use of tried-and-tested building materials is related to his search for sustainable solutions. Towards the end of his career, he also used white marble, which has commonly been regarded as a reference to the classical period and its building heritage. In his Rautatalo office building project presentation²², Aalto spoke of “ordinary” limestone. He was probably saying that it is a tried-and-tested material commonly used in Italy. In this context, he referred to marble as limestone. In Finland, grey limestone excavated from the Baltic Sea region has been used for centuries, but mainly in staircase floors in high-end stone buildings in large cities and public buildings. His comment about ordinary limestone is left unfounded.

²¹ I am referring to the main works of his Turku period, which are the Turun Sanomat building, the Southwestern Finland Agricultural Cooperative Building (Maalaistentalo) and the Paimio Sanatorium.

²² Aalto 1955.

Of the buildings with marble facades discussed in this article, the first was built for a state-owned company and the second for public use. Assuming that an architect's selections of materials are symbolic, how can the facades of an office building and a significant cultural building be made from the same material? The Enso Gutzeit project is also comparable to post-war commercial buildings, which were seen as business cards for companies and needed to be impressive for that reason. In addition, Enso Gutzeit was one of the major and most successful state-owned companies of that time. In the Töölö Bay area, Aalto intended to design a new centre for Helsinki – a centre comparable to Senate Square. He chose the materials accordingly. Of the four buildings discussed in this article, Finlandia Hall has the greatest symbolic significance. In terms of cultural history, its significance is further enhanced by the fact that it served as the venue for the Conference on Security and Co-operation in Europe (CSCE) in 1976.

In an interview conducted by Göran Schildt for Finnish television in 1972, Aalto explained that the question of materials was not significant and that it was determined by the quality of the function, such as the effects of the climate, and by how it relates to people. Aalto pointed out that the material should be mature for the purpose of the building, meaning that it should have a long useful life. This comment was an attack against new commercial products: Aalto found their sustainability to be uncertain. Apparently, he could not imagine that marble would not be a durable material: "It is not important how much a building costs on its day of completion. What is important is how much its costs over a period of fifty years, including heating and maintenance. Losses incurred later may be many times larger than the cost savings achieved through cheap construction."²³ Aalto thought marble would be as durable as granite. For this reason, he felt he could safely use this exceptionally expensive material.

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²³ Schildt 1997 [ed.], pp. 269–275.

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Fig 1. Rautatalo office building has a grid façade made mainly of copper sheets. Photo AAM.



Fig. 2. The marble hall of Rautatalo office building has white marble on the floor and travertine on the balcony walls. Photo AAM.

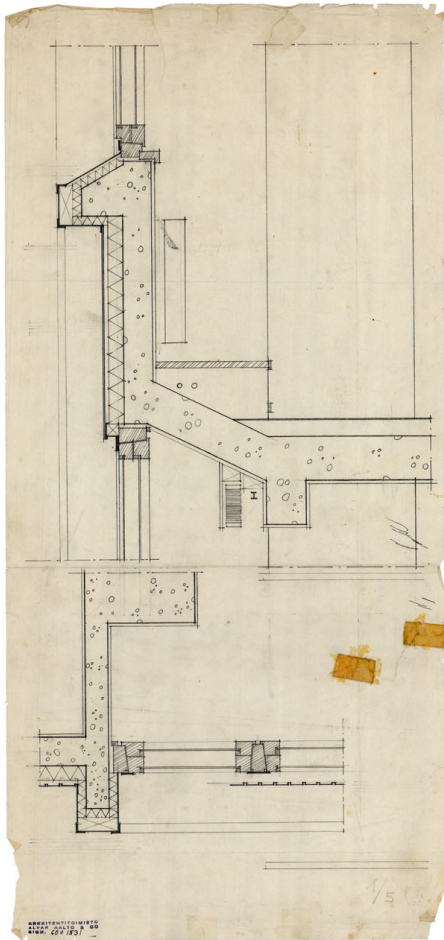


Fig 3. Rautatalo façade structure. Drawing AAM.



Fig 4. National Pensions Institution in red brick differs from the surrounding buildings. The building is a composition surrounding a square. Photo AAM.

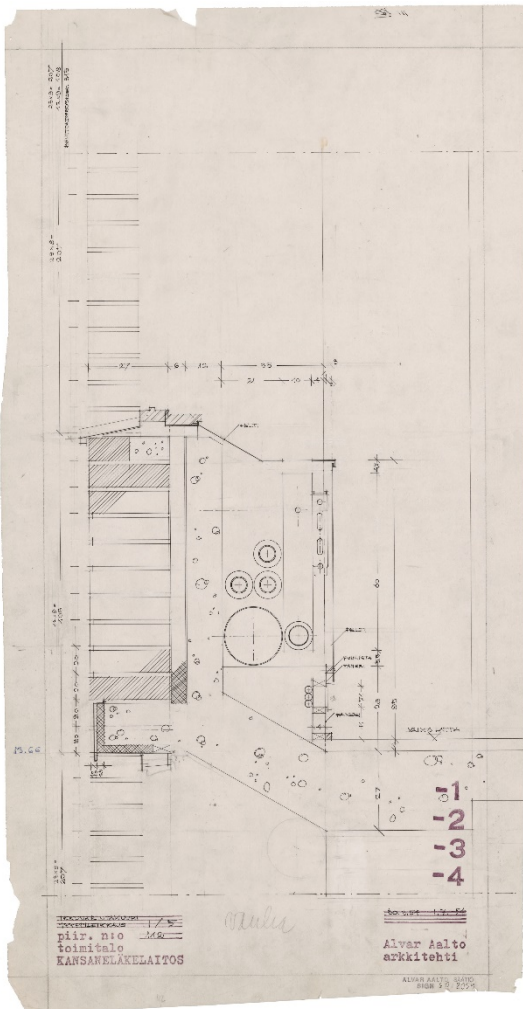


Fig 5. National Pensions Institution, the façade structure is cantilevered and floor slabs climb as projections toward the facade. Drawing AAM.



Fig 6. Enso Gutzeit HQ forms an ending to a compositional axle, which is lined by Neoclassical merchant's houses. Photo AAM.



Fig 7. The northern façade of Enso Gutzeit HQ. Photo Sami Heikinheimo, ark-byroo.



Fig 8. Finlandia Hall, exterior of white marble. Photo AAM.



Fig 9. Finlandia Hall, white marble was used in the interior. Photo AAM.



Fig 10. Alvar Aalto's general plan for the Töölö Bay area, scale model of the first phase. Buildings are reflected to the water. Photo AAM.