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THE DISSOLUTION OF BOUNDARIES: LANDSCAPE STRATEGIES APPLIED TO THE DIPOLI CASE

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Abstract. The relationship between architecture and nature has always been one of the key topics of interest in architectural debate, even more so in the present day. Among the architectural approaches commonly described as "natural" and "landscape-oriented," the work of Raili and Reima Pietilä stands out for the radical nature of its proposals in pursuit of an architecture that could be understood as inspired by natural forms in a specifically balanced manner, avoiding both the mere imitation of natural shapes, bordering on caricature, and illegible abstract interpretations. This article is based on the analysis of the design and construction of the Dipoli Centre (1961–66) as a paradigmatic example of this way of generating architecture inspired by the landscape or, in the words of the architects themselves, as an "extension of the landscape". Through a detailed exploration of the graphic documents produced by the architects during the design and construction process of Dipoli, preserved in the archives of Arkkitehtuurimuseum, Museum of Finnish Architecture (MFA), as well as their conceptual descriptions and project reports, and an analysis of the built work itself, this article reveals the strategies and formal mechanisms through which the architects manage to present their architecture as a clear 'continuation' of nature, as a cultured extension of the Finnish landscape. These strategies can be encompassed within the concept of "dissolution of boundaries," which manifests both in the architects' metaphorical descriptions of the project and in the morphology of the building itself. The building is presented in such a way that no clear perimeter can be defined, but rather a diffuse, ambiguous territory of fragmented exchanges between exterior and interior. This idea is also reflected in the selection of construction components and basic materials —stone, concrete, wood, and copper— arranged in an innovative manner for its time, still unmatched today. In this approach, it becomes difficult to clearly define the boundary between the natural and the artificial, the preexisting and the superimposed, the interior and the exterior, and between the environment and the architectural artefact.
Keywords: Pietilä, landscape design, nature, materiality, Finland

Introduction

One of the most significant challenges faced by architects in recent decades has been the pursuit of a dissolution of the physical limits of landscape architecture in relation to its site. On numerous occasions, these architectural designs have based their design strategies on achieving the dissolution of their limits through the disappearance of their envelope. This has involved resorting to the condition of the absolute transparency of the material (Maruenda et al., 2024), as well as camouflage techniques that accurately reproduce the surroundings or even reflect them through games of fictitious dualities.

The research presented here is based on the premise that the layout and geometry are no longer sufficient to complete the visual metaphor of nature. It is essential to conduct a more thorough investigation into the material composition of the constructed elements. By employing a precise alchemy of available construction materials, it is possible to achieve a balance between accurately reproducing the natural environment and avoiding the pitfalls of either a simplistic caricature or an illegible abstraction. At this juncture that the selection of materials and the oversight of the construction methodology are of paramount importance. This is a process in which the geological substratum or the forest is transformed into a building with discernible precision.

Therefore, the article looks for previous architectural experiences in which the strategy used to achieve this dissolution of boundaries in the landscape has its origin in a reinterpretation of the landscape, and not in a mere immediate camouflage. In this context, the article draws on the work of Finnish architects Raili and Reima Pietilä, who made a unique contribution to the dissolution of the boundary between landscape and architecture. They transformed the latter into a "continuation" of the former (Pietilä, 1966). The position that Pietiläs adopted in the development and execution of the Dipoli project (1961-1966) differs from what had been attempted to date. In this context, the article considers the notion of an architectural approach that is inextricably linked to the surrounding landscape, presenting itself as an extension of the natural environment. The metaphor is not merely a diffuse representation of geometry; rather, it involves the recreation of the landscape of caves and forests on the site through architectural means, thus creating a new element within the existing Finnish landscape, which is characterised by birch and pine forests and granite efflorescences (Fig. 1).

It is difficult to find contemporary architects of the Pietiläs who, under these conditions, have worked on the dissolution of boundaries in the landscape. For example, the window in Louis Kahn's Fisher House (1960-1967) creates a unique space within the living area from which to view the outside, but It does not attempt to recreate nature through architecture. By contrast, some twenty years later, in the 1980s, Alison

Fig. 1. Aerial photograph of Dipoli, ca. 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

and Peter Smithson designed the Hexenhaus extension (1985-2001) with a sensibility similar to that defined by Pietilä in Dipoli. In particular, the intervention known as Axel's Porch (1986) incorporated an intermediate space that reinterpreted natural geometries in its carpentry (Fernández Villalobos & Jiménez Sanz, 2020), demonstrating a similar intention of integration with the landscape.

The implementation strategy of the building in Otaniemi (Finland) has been the subject of general analysis in previous research, which has identified the particular cavernous character of the building. This character, which Raili and Reima Pietilä explicitly referenced, conceptualises the building as a raised incision into the rocky mound on which it is situated. In his studies on excavated architecture, researcher Mario Algarín highlights the unusual condition of the project (Algarín Comino, 2006). However, this cavernous condition contains nothing beyond the underlying idea of understanding Dipoli, in the words of Reima Pietilä himself, as an "extension of the landscape" (Pietilä & Norri, 1985).

It is therefore imperative to consider not only its status as a cavern but also the definition of its envelope, which supports this identification. The dissolution of boundaries that arises from the reinterpretation of the concept of the 'building as a continuation of the landscape' has not been sufficiently explored, despite its significance as a pivotal aspect of the work. This highlights a gap in research that has primarily focused on the strategies shaping the envelope. The objective of this article is to examine this issue in greater detail and to determine how this transformation of the theory of boundaries into a constructed reality takes place. Therefore, the question that must be addressed is: How should the envelope enclosing a space intended as an extension of the surrounding landscape be materialised? The answer to this question will provide the foundation for the building design, which is the focus of this research.

To answer the research question, it was essential to devise a customised methodology that would guide the direction of the research. The methodology used to identify the design components that result in the unique relationship between architecture and nature achieved by the Pietiläs is based on the simultaneous analysis of three sources: the compilation of the authors' own descriptions of the work—largely metaphorical in nature—the systematic and chronological analysis of the graphic documents produced during the design and construction process (drawing on the extensive collection of drawings and plans held at the Arkkitehtuurimuseum - Museum of Finnish Architecture (MFA), examined for the first time for this purpose by the authors of this article during their research stay at Aalto University in 2024), and finally, the detailed exploration of the construction systems and materials used in the building, investigating how their arrangement aligns with the intentions anticipated in the prior literature and graphic documentation.

Context and Approach to the Otaniemi landscape

The equipped landscape status of the Otaniemi peninsula did not begin to develop until the second half of the twentieth century. Before the construction of the university campus, the land surrounding the area was mainly used for agriculture. The thawing process during the glacial period, thousands of years ago, shaped a landscape characterised by a combination of water-eroded rocky outcrops, bay inlets and ancient river valleys, which have since been used as fertile farmland. For a long time, cereal fields, especially, stretched across numerous hectares, building the image of Otaniemi's cultural landscape for a long time (Livady OY & Maisema-arkkitehtuuri MM, 2014). In contrast, extensive coniferous

Fig. 2. Photograph of the Otaniemi site area. Documentation provided to the architects during the competition. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

forest patches emerged from areas with larger topographic features, where the rock guaranteed the character of unexplored space (Nikula & Binham, 1993) (Fig. 2).

The earliest known occupation of the Otaniemi area dates back to the 13th century, when small Swedish colonies settled the region. The location of the historic village of Hakalehdo coincides with the large open space adjacent to the main building of the Helsinki University of Technology, designed by Alvar Aalto. The archaeological character of the site has been elucidated through research, which has also shown that it is inventoried by the National Board of Antiquities and protected by the Archaeological Heritage Act. It has been posited that the area around Dipoli, which was not exploited by cultivation due to its rocky and wooded condition, may have preserved layers and sediments associated with settlement (Livady OY & Maisema-arkkitehtuuri MM, 2014). Otaniemi's agricultural past dates back to the 16th century, but it did not undergo major urban transformation until the 20th century, when land was purchased for the new campus of the University of Technology (TKK) and the State Institute of Technological Research (VTT).

The extensive damage to the principal edifices of the Finnish University of Technology at its original location in Hietaniemi during the bombings of the Winter War in 1939 and the Continuation War in 1944 gave rise to a debate on the necessity of relocating the headquarters (Liesto, 1988). In the period between 1939 and 1948, the decision was taken to relocate the University of Technology (TKK) and the State Research Institute of Technology (VTT) to a site in the vicinity of Helsinki. The priority was to find a location offering a natural and spacious environment, given the perception that urban centres were unhealthy after the war. The relationship with nature became the primary tenet upon which the new ideal of the university campus was established. Following an evaluation of potential locations, including Vartiokylä, Munkkiniemi, and Otaniemi, a committee chaired by Professor Otto-Iivari Meurman recommended the purchase of the Otaniemi estate in 1948. This site offered 108.5 hectares of land in close proximity to the original location in Hietaniemi, facilitating proximity to the original campus while maintaining contact with nature. The proposal was approved by parliament in December of the same year (Harki, 1977) (Harki, 1977; Liesto, 1988).

In 1949, following the acquisition of the Otaniemi area, an architectural competition was organised with the objective of developing a detailed master plan for the Technical University campus and research centre. The competition was open to all members of the Finnish Association of Architects and required

detailed proposals for the location of buildings, roads, and open spaces, as well as a substantial number of housing units for both workers and students. Ultimately, ten proposals were submitted, and the winning entry was Aino and Alvar Aalto's 'Ave Alma Mater, morituri te salutant', which was selected on the basis of its comprehensive design and its suitability for the development of the area. The competition committee issued the judging report on 6 September 1949, in which they set forth their vision of the search for an appropriate design for the Otaniemi area. It was emphasised that the natural landscape should be integrated into the project, with the university and research buildings located to the south, and the residential areas located to the north and east. The committee underscored the necessity of preserving the natural beauty of the landscape, emphasising the protection of the distinctive linden path and landforms as essential elements for the winning proposal. The winning design was commended for its effective integration of landscape features, which facilitated the segregation of pedestrian and motorised traffic. Additionally, the valley and lime paths were lauded for their seamless integration with the main buildings and residential areas, thus creating a substantial central green space. Conversely, the other non-winning entries were critiqued for their failure to capitalise on the natural opportunities presented by the area, the superfluous road design, and the positioning of the main building in a manner that deviated from the natural centre of the area ("Otaniemen Asemakaavakilpailu," 1949) (Fig. 3).

In the words of Elissa Aalto, Alvar Aalto's second wife and architectural partner, the architect considered that his primary objective throughout his career was to integrate vegetation in a natural manner into his designs, eschewing the construction of such elements artificially. Instead, his approach was to integrate the city into the natural environment, taking into account the existing topography, trees, and light (Livady OY & Maisema-arkkitehtuuri MM, 2014). In this regard, Aalto's proposal is based on this premise, comprising a series of dispersed volumes on the site. The primary interaction with nature is achieved through the low density of the proposal and the formal arrangement of the volumes, which create a series of courtyards that open up to the natural environment and 'embrace' it. Antón Capitel emphasises this perspective through his description of the implementation of the general campus building as a constructed ensemble, whose layout is articulated in such a way that each of its component parts seems to embrace the exterior space in a kind of courtyard sequence (Capitel, 1999).

In the layout proposed by Aalto, both the original design that won the competition and the subsequent modifications, there is a volumetric proposal for the Student Union building, the future Dipoli. Aalto had taken into account the geographical characteristics of the peninsula. Despite the absence of significant constraints, the duality between the flatness of the crops and the mounds resulting from the rocky flora populated by trees, which had been previously present, helped to define and situate the buildings on the university campus.

Aalto decided to locate the trade union building on one of the main mounds on the site, on the other side of a major motorway. It was a large volume consisting of four parts, two of which, arranged in an elongated form, formed the arms that generated an asymmetric U-shape. In this case, one can recognise how the open courtyard sequence, characteristic of the plan, which opens up and incorporates outside nature with an orientation towards the main building of the TKK, was used once again. It is worth noting that there are numerous pedestrian paths that connect campus buildings, in contrast

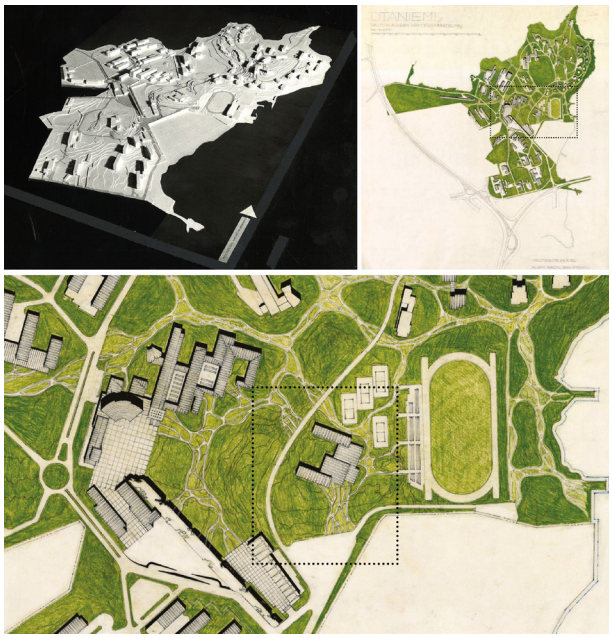

Fig. 3. Top left: Photograph of the model of Aalto's proposal for the campus, 1949. Above right and below: Aalto's plan of the university campus during the development phase, 1960. Suomen rakennustaiteen museo - Museum of Finnish Architecture - MFA and Aalvar Aalto Museum

to the limited presence of motorised roads. Aalto wanted to promote pedestrian routes that would bring people closer to nature. There are no other buildings in the vicinity of the building, but open sports areas.

The landscape reality of the reserved plot was significantly characterised by the presence of dense vegetation and topographical features, which posed a considerable challenge to intervention. However, these conditions, along with the existence of these elements, transformed the complexity of the site into a valuable asset (Fig. 4).

Topographical Transmutations as design strategies: Dipoli

In 1961, a competition was held for the design of a building to house the Helsinki University of Technology Student Union. After a long process, as the first prize was not awarded in the first round, the project was finally awarded in May 1962 to the architectural couple Raili and Reima Pietilä with the proposal entitled: "Wedding march of the cavemen". (Connah, 1998; Royo Márquez, 2018).

The Pietiläs proposal proposed a completely different design strategy from that of the other participants. Raili and Reima Pietilä opted for a morphological study based on the recognition of forms in the local landscape of the site, which coincided with the top of a large granite hill. In contrast, the other proposals were guided by the rationalist and functionalist principles prevalent at the time (Kari & Fager, 1961). The programme did not specify the explicit character of the future building. However, it did indicate that it should be designed in accordance with the TKK's main building, designed by Aalto. This fact was curious, as the higher elevation of the embankment determined the maximum height of the new design, which could not exceed that of the main building (Vesikansa, 2014). In the documentation submitted by the Pietiläs for the competition, a general section can be seen in which both buildings are shown with an elevation line at roof level, indicating that this altimetric respect was considered. It is noteworthy that despite the relationship to the TKK imposed by the committee, it is known, according to Reima Pietilä himself (Pietilä, 1976)- that Aalto, who was on the jury, asked him why he had not designed

the whole building with the free form that characterises the organic wing. This is paradoxical, since it is precisely the rationalist area that is in dialogue with the TKK and shows its respect for it architecturally, taking its very orientation as a reference (Fig. 1).

The project did not leave anyone indifferent and its effects were very well publicised. Many national and international magazines took up the work, accompanied by critical texts about it, which gave rise to many theories explaining the position taken by Raili and Reima Pietilä. However, the work was not well received or even understood by the rest of their colleagues. Reima Pietilä was very active in this debate, using these interventions to discuss the character of the building and to reveal the interests that had motivated this different and in many ways dissident architecture (Connah, 1994).

Reima Pietilä himself stated that "Dipoli is a "facsimile part", a fragment of the nature-complex of its site" (Pietilä & Norri, 1985). In a way, this was an approach that reflected an interest in conceiving an architecture that would function as a continuation of nature. In an interview with Marja-Riita Norri published in 1985, he explained his position on this matter as follows: "When nature "continues as architecture" it means that natural forms, or more correctly; their morphology, the metamorphoses caused by natural forces, etc. are incorporated into our architectural idiom, parallel to Euclidean form language, or even as a replacement for it." (Pietilä & Norri, 1985). It is not surprising, therefore, that Pietilä took the rocky reality of the site as their starting point, describing Dipoli as the space created by the elevation of a large cut in the terrain, similar to the bedrock characteristic of the site. In the drawings made for this purpose, the 'Euclidean language' is clearly replaced by that of the metamorphoses of natural norms (Fig. 5).

Annotations such as 'luonnonkivi', meaning 'natural stone', can be found in these initial sketches (Fig. 6). Whereas at Suvikumpu (1962-1969) it was the reinterpretation of the surrounding forest that largely determined the character of the building, at Dipoli it was the geological conditions of the site that were most important. Dipoli is the result of a kind of artificial cave, a cavernous space in the middle of the forest. The Finnish cultural concept of forest establishes a relationship between man and nature, in which architecture becomes a catalyst for this relationship (Cortés Sánchez et al., 2024).

From the inside, the cave overlooks the surrounding forest, whereas from the outside the forest seems to be integrated into the façades, which reproduces the density and texture of the forest mass of the landscape. The interaction and definition of these boundaries is therefore one of the fundamental keys to the architectural project: "It is a house that cannot be seen from the air, because it looks as if the rock wall has risen six metres in relief, and because the sides of the house, curved at right angles and tapering to a point, slightly resemble the shape of the rock" (Pietilä, 1966).

From the forest, that is, from outside the cave, it is not easy to see the cave because it wants to stay hidden. As Pietilä put it, "it is a building that cannot be seen": Dipoli is a house on a wooded hill; it is a house that cannot be seen from the sides (Pietilä, 1966). Therefore, the envelope reproduces the forest that hides it. To achieve this, the first point on which this strategy is based is to transfer the material qualities of the forest to the constructive materiality of the building.

The granite of the hillside is transmuted into concrete, and in some cases the granite itself is used directly as a building material. The wood of the tree trunks is reflected in the thick woodwork of the large windows, while the large ridge of the raised roof is clad in copper, alluding to the mass of trees on

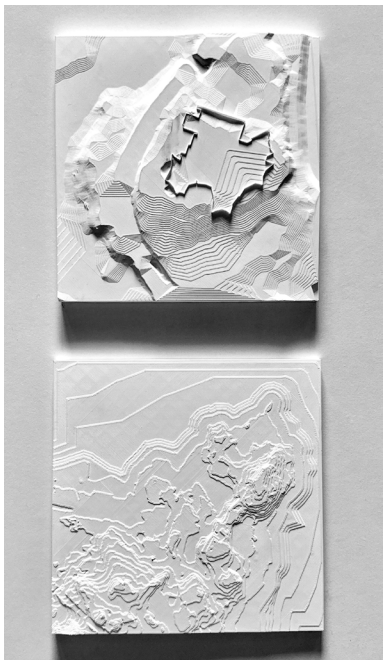

Fig. 4. Top: Model of the topography of the Otaniemi peninsula. Bottom: Model of the topography of the site mound with the footprint of the building. 2024. Own elaboration

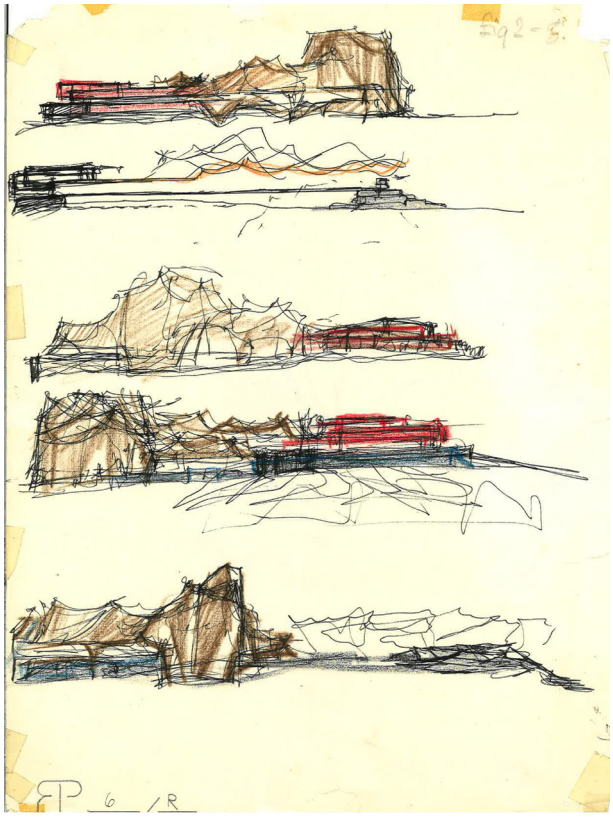

Fig. 5. Sketch of the general volume of the proposal, ca. 1962. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

the upper levels. Concrete, wood and copper, three materials whose ageing has a certain natural character. Julio Cano Lasso reflects on this issue, which directly links architecture and nature, in his text 'The humble details': 'The relationship between architecture and nature, at its most everyday and humble level, is manifested in the action of natural agents on the building materials. [This is a very important aspect of architecture: the behaviour of materials over time, their ageing. [...] There are materials that become more refined as they age. [...] This is also architecture; the architect cannot

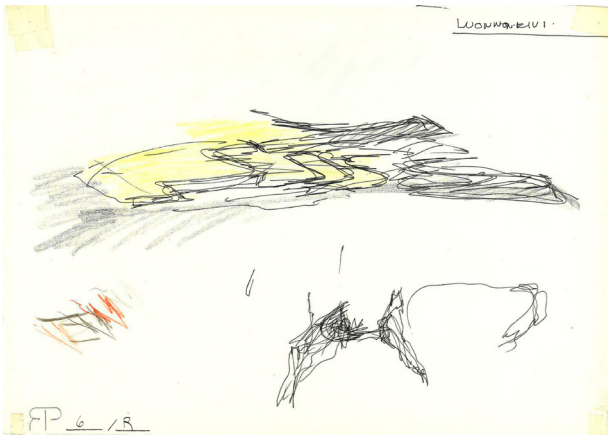

Fig. 6. Early scketch "Luonnonkivi" (Natural stone), ca. 1961. Suomen rakennustaiteen museo - Museum of Finnish Architecture - MFA

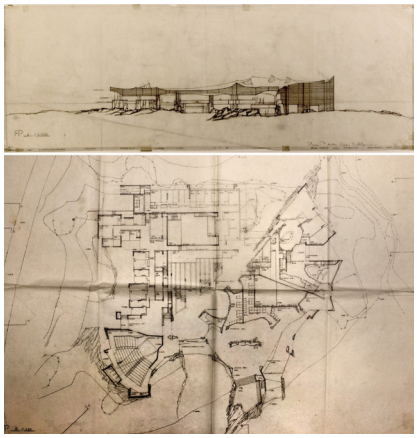

Fig. 7. South elevation and ground floor, proposal 31/06/1962. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

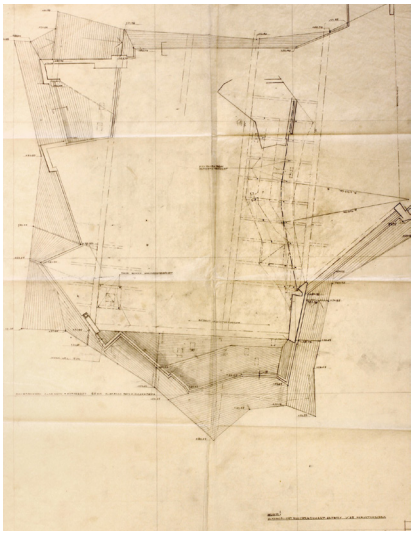

Fig. 8. Plan of the wooden roofs of the eaves of the organic sector. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 9. Floor detail entrance hall. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

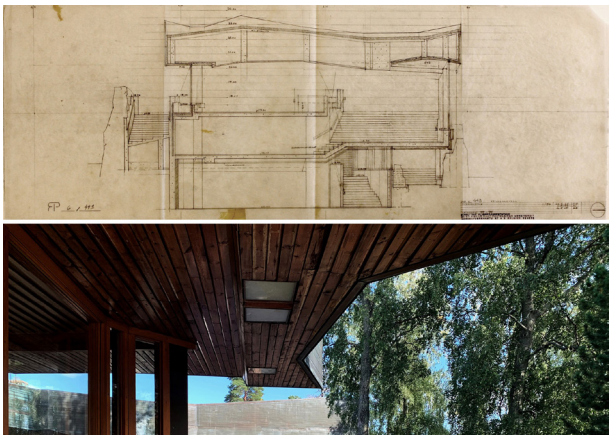

Fig. 10. Top: Section by stairs. Below: Access gallery on the first level. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

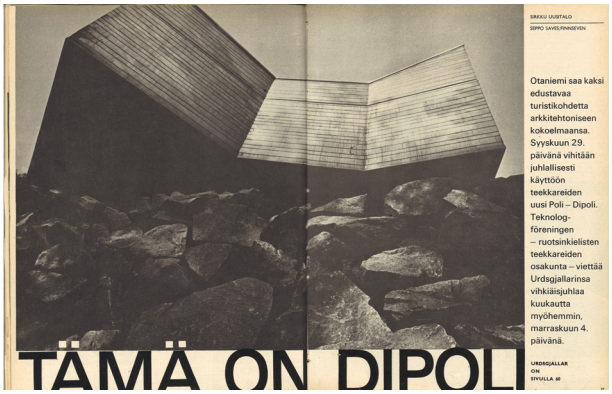

Fig. 11. Photograph of Dipoli published in Suomen Kuvalehti magazine, no. 39 (1966). Author: Seppo Saves - Ffinnseven. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

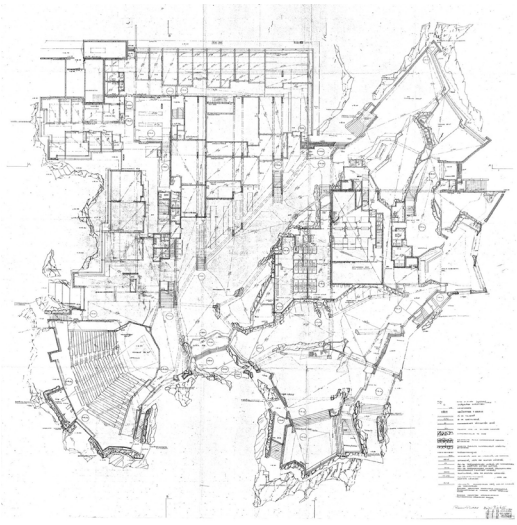

Fig. 12. Plan of the executed proposal, 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

neglect these modest details, he must be observant, attentive and sensitive to this small living world and take it into account when imagining his projects' (Cano Lasso, 2021).

In the case of copper, its natural oxidation produces a changing and uneven greenish tone that allows deeper visual integration into the environment. The use of concrete as a kind of new-born stone in architecture is not new; there have been precedents for this strategy in the modernism (Forty, 2012). However, Pietilä take this concept further by combining it with what could be interpreted as a representation of the different states of matter of the rock. The raw material would correspond to the natural state of the mound and the rest of

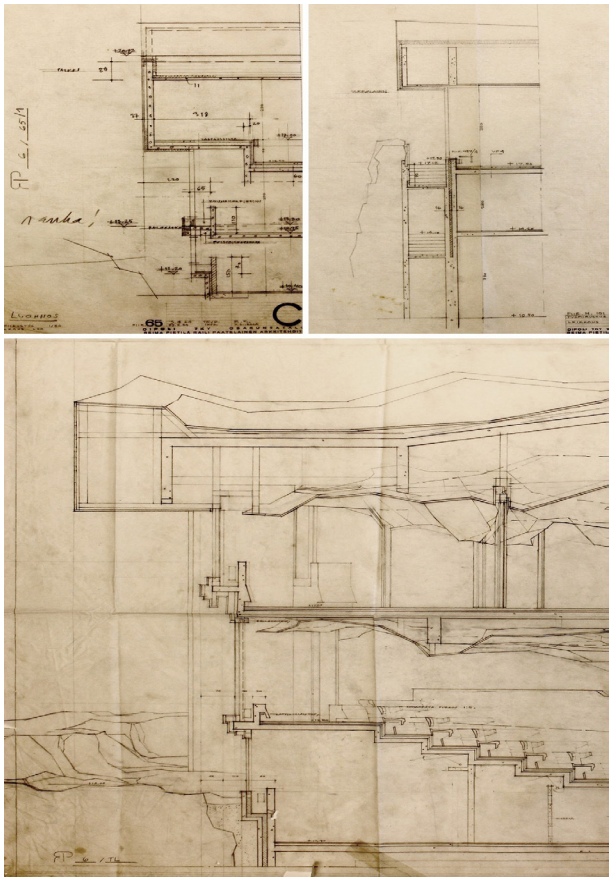

Fig. 13. Detail of the recessing of the vertical wall of the ground floor together with the rocks. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

the preexisting large rock sediments in the landscape. The second state, the result of a transformation process, would be associated with the material broken down into smaller elements during the excavation of the building, which would then be reused as cladding and finishes. Finally, concrete, as the third state, is used in both in its structural function and visible finishes of the building. This interplay between the 'three states' of the stone produces a visual result that enhances the continuity of the landscape. Finally, wood is used as a direct translation of the setting of the trunks of the pine, spruce, and birch trees characteristic of the Otaniemi environment. The designers took this approach to the extreme, translating the rhythmic, modular, and dimensional pattern of the trees into the design of the building envelope. To facilitate this association, the window frames were designed with dimensions visually similar to those of the trunks. Furthermore, modulation based on uniform dimensions was avoided in favour of variability to reproduce the organic richness of the forest.

This is the starting point from which Raili and Reima Pietilä blur the boundaries of the project. The reinterpretation of the forest's own materials becomes a constructive palette that allows them to begin to define the architectural envelope. The architects themselves describe this reinterpretation of the materiality of the forest as follows: "The dark copper of the broad upper part combines perfectly with the height of the pine and spruce branches. The freestanding vertical window frames follow the rhythm of the pine trunks. On the ground floor, the natural stone of the plinth walls gradually grows towards the bedrock that surrounds the house. The building is an integral part of its site" (Pietilä, 1966).

Pietilä associated this position with an understanding of Otaniemi's genius loci: "Nature-architecture is a concept of multiple ideas still unknown in our language. I myself use it now for the first time to signify the way in which nature and architecture interact as elements of genius loci. The peaceful and even mutually beneficial coexistence of nature and architecture in a state of existence, is genius loci approach. Buildings should, with their whole "being", announce this status quo as the principle. The form language of Dipoli essentially expresses this consensus and context. Otaniemi itself was born in the early '50s in the spirit of this forest-urbanism" (Pietilä & Norri, 1985).

The Dissolution of Boundaries

The concern to achieve the desired extension of the exterior landscape of the forest into the interior of the building is present in the very first drawings of the project, in which the importance of materiality is evident in its graphic representation. However, this was not the only way of relating to the landscape. Both the plans and the elevations show a building deeply rooted in the site, the topography, and the forest (Fig. 7). Although the project underwent many variations throughout its development, this characteristic remained constant until the end. The total volume of the project is structured around a large diagonal that divides the building into two areas with different characters. On the one hand, the rational area (to the north-west) houses the more fragmented programme, made up of offices and small rooms. On the other hand, the organic area (to the south-east) contains the uses that allowed for freer forms, such as the main assembly halls and the large foyers. The floor plans of the proposal show how a constant perimeter is avoided, clearly marking the separation between inside and outside. This approach allows the user to experience a gradual transition from the interior of the forest to the depths of the cavern along the route. The authors took great care in defining the boundaries that would allow for this sense of continuity and connection.

Raili and Reima Pietilä used the play of depths in the composition of the building envelope. In this way, through a series of displacements and recesses, they succeeded in creating a greater sense of ambiguity, in which it was uncertain which reality the spaces around the perimeter belonged to: the inner reality of the cave or the outer reality of the birch forest.

The Decomposition of the Façade

The analysis of the various proposals drawn up by the couple has revealed a series of "rules" or "keys" that organise the composition of the building envelope. Firstly, the roof overhang: the eaves; secondly, the rocky extensions: the rocks; and thirdly, the recessing and displacement of the vertical walls: the walls and joinery.

Among these is the important presence of the eaves, an aspect that Pietilä has already highlighted, which the couple use to extend the building's boundary beyond that defined by the vertical walls alone (Fig. 8). The difference between the limit of the roof and the vertical walls, set back towards the interior, creates these eaves, whose variable extension contributes to blurring what could be perceived as a fixed threshold, in favour of unexpected sequential rhythms that evoke the intrinsic variability of nature. The state of a protected space, sheltered and protected from the outside - an idea to which Pietilä himself alludes - contributes to this state of the project, both conceptually and functionally: "In Dipoli the strongly protruding copper eaves that open out in bay-like forms represent cliffs under which the Caveman builds his abode. ' (Pietilä & Palacios, 1995).

In plan 6.655 (Fig. 8), drawn up during the drafting of the execution project, it can be observed that the lines of the

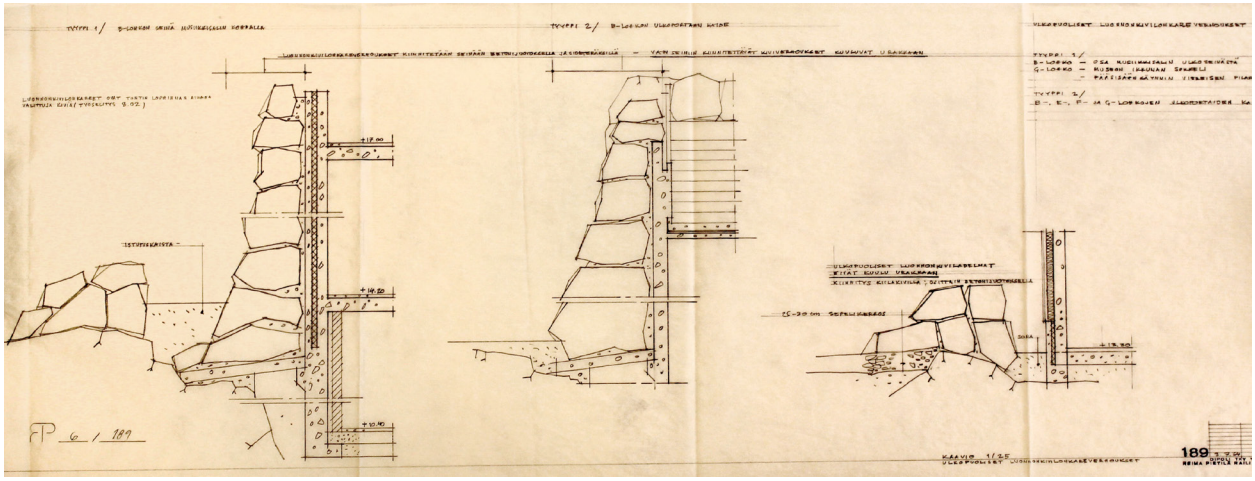

Fig. 14. Detail of the cutting and layout of the rocky covering of the lower walls. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 15. Photograph of the interior space with the large glass windows in the background. 2024. Own elaboration

Fig. 16. Above left: Rationalist area elevation detail. Below and left: Photographs of the exterior. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

vertical walls and the perimeter of the roof are not equidistant, but rather the aim is to create a series of distortions that favour the creation of intermediate spaces, semi-exterior sheltered spaces. The Pietiläs used these spaces, which are somewhat indeterminate, to contribute to the play of the envelope. They acquire the category of 'transitional spaces,' through which the approach to the building implies a journey, not an immediate one. In fact, materiality, which is also reflected in the previous plan, takes on such importance in these spaces that it recreates the shelter that a tree could provide. The underside of the concrete eaves is also clad, but not in copper as on the front, but in wood, in wooden slats that do nothing more than reproduce the branches of the canopy of the tree that protects us.

Plan 6.456 (Fig. 9) shows how the ground floor entrances were designed under the conceptual premise of the cavern. For example, Figure 10, which corresponds to the entrance on the south façade, shows the application of the compositional rules in these spaces. The entrance halls, conceived as transitional spaces, are made up of breaks and irregularities on the walls. In addition, functional elements stand out, such as the steel platforms - marked with striped shading - designed to remove snow and ice from shoes in winter.

The flexibility of use and the variety of spaces required a proposal with carefully designed circulation and multiple accesses that would allow the building to be used in a variety of ways. To this purpose, access was provided not only on the ground floor, but also on the first floor through external porches protected by the roof overhang. These galleries occupied these intermediate spaces and were located only in the organic area of the building, specifically on the south façade. Plan 6.443 (Fig. 10) shows this multiplicity of routes, through the staircases of the external perimeter galleries and the large internal staircase of the vestibule, which gave access to the main rooms on the upper floor.

The large expanse of the eaves, together with the setback of the vertical surfaces, reinforces the perception that the building is perched on the rock (Fig. 11). This design deliberately integrates the rock formations beneath the overhangs, contributing to the sense of "the landscape continuing into the building". The ground floor plans show how the rocks are drawn into the spaces between them (Fig. 12). Furthermore, the fact that there is a difference in height, which decreases toward the interior, means that the view from these spaces to the exterior is dominated by the rock. This technique is used repeatedly (Fig. 13). The rock excavated during the construction of the building was reused in these spaces. Local material was also used to clad the concrete walls that emerged from the ground. Their arrangement was not arbitrary; specific details were worked out for the cutting and layout of their placement. Although these stones did not have structural function, in some cases, they extended to the upper level, where they were used as parapets or cladding to prevent falls from the galleries on the façade (Fig. 14).

The design of the recessed vertical surfaces was intended to help recreate the surrounding tree mass. Most of the windows are large and require special attention in the design of the joinery to not to detract from the variable character of the building. To achieve this, specific details and junctions were designed to allow the geometries proposed by the architects. The graphic documentation of the project shows the trial and

error of the various solutions that evolved until they were incorporated into the final design.

Large windows are combined with blank concrete walls, sometimes left exposed and sometimes covered with copper or wooden slats. The use of exposed concrete is due to the choice of this material as the main structural component, but also reinforces the conceptual appreciation of concrete as an extension of the rock.

In the rationalist area, joinery also plays a fundamental role. The compositional design of the elevations is achieved mainly through structural choices. In most of the panels, the beams are moved inward to finish the panel with an overhang similar to that in the organic area, so that the joinery can be arranged from panel to panel, maximising its size. In the intermediate panels, the beam is also moved inwards, but it is also partially lowered to create the parapet (140 cm), which creates a hidden space behind it and again allows the glazed area to be increased. These shifts in the arrangement of the structural elements free up the composition of the façade, resulting in large windows and different positions for the internal and external joinery. Each section of the façade is resolved in a specific way, giving rise to a wide variety of solutions and geometric compositions, which are reflected in a large graphic production, essential for the materialisation of these designs on the building site (Fig. 16).

In the case of the organic area, the straight and aligned arrangement of the vertical walls is modified in favour of several breaks with different inclinations, which gives a singularity to the design and the constructive solutions used, although they are based on the same conceptual foundation. The southern façade of the building is characterised by an almost entirely glazed envelope on the first floor.

The interest in incorporating the reinterpretation of the natural forms of the forest into the structural elements of the building was such that, during the development of the proposal, carpentry details were proposed in which the frames were fitted with pieces of wood designed from broken contours (Fig. 17). However, this solution was not used in the final design because of the simplification required by the Works Committee, as it was too costly to produce structural solutions that were not standardised in some way.

The study of the design of the vertical surfaces is interesting in any area of the façade, but the south-east corner, where the staircase leading to the foyer on the first floor is located, is particularly unique. This point connects to the main halls and acquires a unique character through its connection to the outside space. This staircase materialises the theoretical reflection on the interior of the cave overlooking the forest outside. The three strategies mentioned above can be seen in it: the overhang of the roof, the extension of the rocks, and the recessing of the vertical walls and their design (Fig. 18).

The double-height space created by the staircase in the vestibule becomes a large window onto the forest, which opens and looks out. The path that invites us to follow it reveals this wooded exterior, which sheds light on the interior of the cave, a space where there is hardly any light due to its location behind the rock. However, as we progress and climb the first stairs, the sky begins to open up above us, revealing the tops and trunks of the trees. The first trunks we see are the artificial ones, those built by the Pietiläs, which form the vertical framework of their carpentry. The flight of stairs, suspended above the outdoor space, brings us closer and deeper into the forest. The continuity of the landscape extending outwards floods the entire interior of the foyer on the first floor. To emphasise this sense of openness and capture even more of the outdoors, the cantilever opens to create a new, even more dramatic slope,

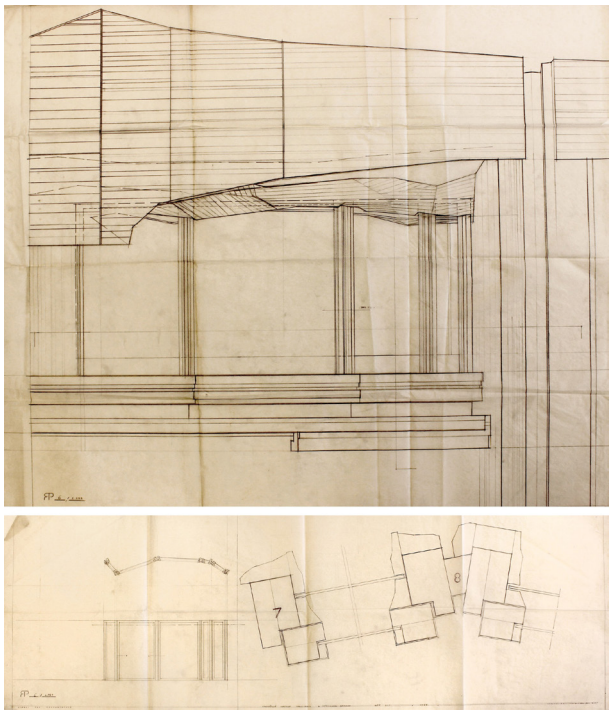

Fig. 17. Detail of the window frames. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

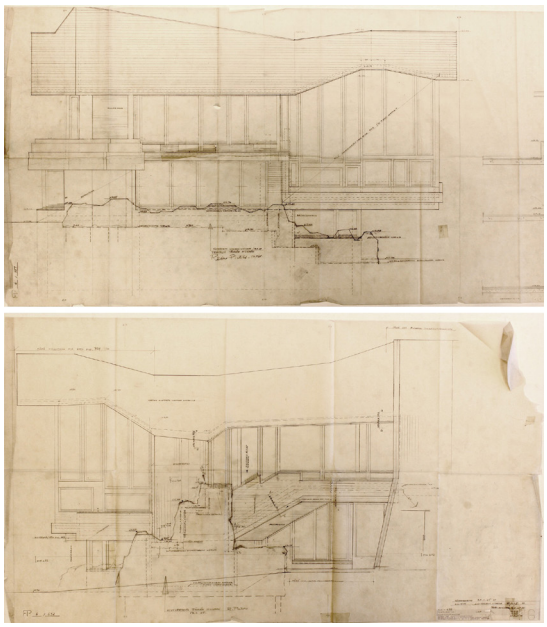

Fig. 18. Southeast corner elevations, 1966. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

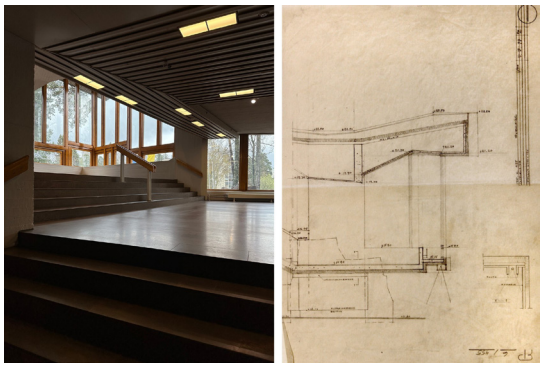

Fig. 19. Left: Staircase leading to the foyer of the main halls on the first level. 2024. Own elaboration. Right: Section through the intermediate plateau of the staircase leading to the foyer on the first level. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

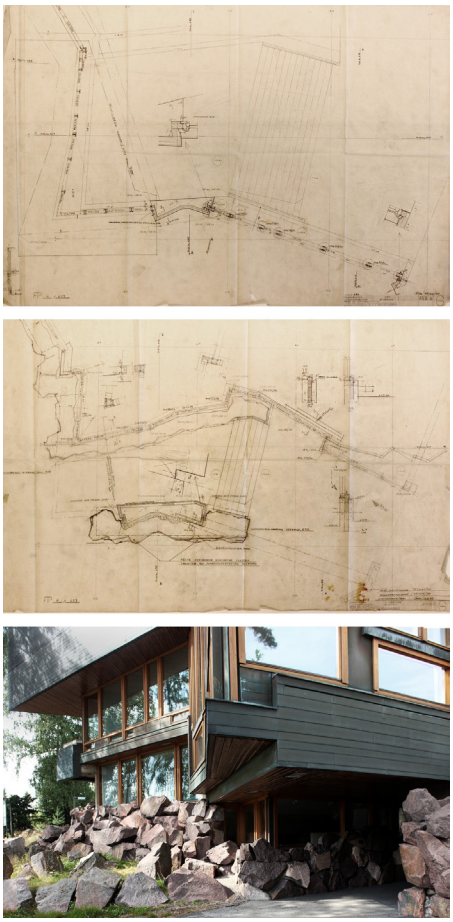

Fig. 20. Planta baja y alta en detalle de la esquina sureste y fotografía exterior. 2024. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA and own elaboration

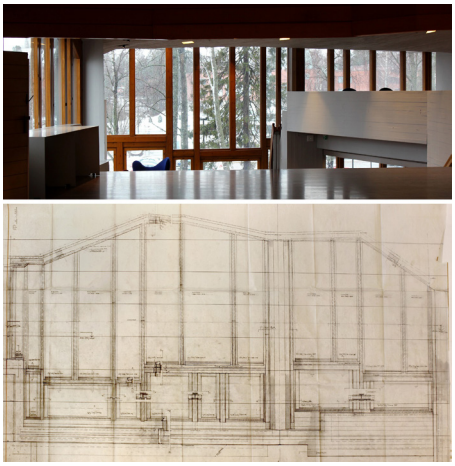

Fig. 21. Above: Photograph of the interior space with the large windows in the background. 2024, Own elaboration. Below: elevation of the window frames. Suomen rakennustaiteen museo - Museum of Finnish Architecture – MFA

Fig. 22. Photographs of the exterior of the building with the shadows of the trees cast on it. 2024. Own elaboration

Fig. 23. Photograph of the exterior of the building with the shadows of the trees cast on it. 2024. Own elaboration

as shown in Figure 19.

The floor plans that define this area of the building show the different treatment of the two levels (Fig. 20). On the one hand, on the ground floor, the corner is broken up with an intermediate step and an overhang that protrudes over the rocky sediments outside. In addition, the concrete walls are covered with irregular and variable stone masonry. On the upper level, the massiveness of the rock disappears and is replaced by the lightness of the large window frames that support the large panes of glass that provide protection from the outside. In the exploded view of each glass panel, the individuality of the dimensions can be seen, and not a single one is repeated (Fig. 21).

Conclusions

The study of architectures whose strategy of insertion into the landscape goes beyond simple conventional strategies based on immediate camouflage or formalism has been the focus of this research, centred on the case of Dipoli. This analysis has revealed an architecture whose design strategy is based on the dissolution of boundaries, based on principles that avoid traditional solutions and seek a balance between the extreme pole of recreating the natural environment through simple caricature and the opposite pole of illegible abstraction. To achieve this, the Pietiläs relied on a reinterpretation of the geological and arboreal materiality of the site to become that of the architecture, which in turn gave it meaning and whose success was achieved by controlling the construction process, in which the geological and arboreal condition of the site was taken into account.

Dipoli, defined by its authors as a continuation of the landscape, materialises this interest in the process of developing and constructing the building. In a context where the rationalisation and systematisation of architectural processes predominated, Raili and Reima Pietilä presented themselves as a counterpoint to the general Finnish scene. The competition and subsequent realisation of Dipoli allowed them to experiment with previously developed theories of landscape, proposing an experimental work that corresponded to their aim of integrating architecture and nature. A feeling of finding refuge in the forest, which is closely linked to Finnish culture and finds its application in this type of architecture that seeks to return to these environments (Cuellar Jaramillo, 2017; Fernández Villalobos & Jiménez Sanz, 2021). The strong geological condition of the site, together with its forested nature, were the starting points of the project, marking the beginning of a process of reinterpreting these elements in an architectural volume. Conceiving the project as a section of the raised granite hill meant creating an architecture strongly rooted in the site. However, while the idea of continuity with the landscape was clear in theory, the challenge lay in how to materialise this connection with the surrounding landscape, blurring the boundaries between exterior and interior to reinforce this sense of continuity.

The facades play a fundamental role in this strategy. On the one hand, it seeks to reinterpret the coniferous forest by integrating with it from the outside; on the other hand, from the inside, it simulates the experience of observing the forest from inside the proposed artificial cave. The materiality is crucial to achieve this effect: the mass of trees, trunks and rocks is transformed into copper, wood, and concrete, materials treated in great detail that reflect this relationship with nature. These materials, alive and worked in detail, can be seen in the structural solutions, where the architects have designed each of these elements with precision.

In addition, the Pietiläs adopted a complementary strategy to materiality, based on three key actions. Firstly, the presence of significant eaves that protrude beyond the limits of the walls, irregularly blurring the internal perimeter and creating semi-outdoor sheltered spaces where, secondly, the rocks of the landscape are extended and reused as cladding for the building. Finally, the recessing of the vertical walls under these eaves allowed the incorporation of large windows whose thick frames reproduce the rhythmic and formal patterns of the external trunks. In this way, the architects succeeded in creating a building that resembles a concreted mass of forest, where the play of shadows and reflections between the landscape and the artifice is such that they merge until they coincide in natural dimensions and rhythms (Fig. 22).

The originality shown by Raili and Reima Pietilä in the 1960s with the Dipoli project only adds to the interest and value of this work. In this project, they developed a way of designing in harmony with nature that has few precedents on this scale and with this intensity (Fig. 23). This is undoubtedly a building that transcends its architectural state to become an element of the Otaniemi landscape.

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Kopsavilkums

Arhitektūras un dabas attiecības vienmēr ir bijušas viena no galvenajām arhitektūras diskusiju tēmām, vēl jo vairāk mūsdienās. Starp arhitektūras pieejām, ko parasti raksturo kā "dabiskas" un "uz ainavu orientētas", *Raili un Reima Pietilä* darbs izceļas ar savu priekšlikumu radikālo raksturu, tiecoties pēc arhitektūras, ko varētu saprast kā iedvesmotu no dabas formām īpaši līdzsvarotā veidā, izvairoties gan no vienkāršas dabas formu imitācijas, kas robežojas ar karikatūru, gan no nesalasāmām abstraktām interpretācijām.

Pētījums ir balstīts uz Dipoli centra (1961–1966) projektēšanas un būvniecības analīzi kā paradigmatisku piemēru šāda veida arhitektūras radīšanai, kas iedvesmota no ainavas. Izpētes procesā detalizēti izpētīti grafiskie dokumenti, ko arhitekti izveidojuši Dipoli projektēšanas un būvniecības procesā. Izvērtēti materiāli, kas saglabājušiem Somijas Arhitektūras muzeja *Arkkitehtuurimuseum* arhīvos, kā arī to konceptuālie apraksti.

Ēka ir attēlota tā, ka nevar definēt skaidru perimetru, bet gan izkliedētu, neskaidru teritoriju ar fragmentētām apmaiņām starp eksterjeru un interjeru. Konkrētā ideja atspoguļojas arī būvniecības komponentu un pamatmateriālu — akmens, betona, koka un vara — izvēlē, kas izvietoti savam laikam inovatīvā veidā, kas mūsdienās joprojām nav salīdzināms. Izmantojot šo pieeju, kļūst grūti skaidri noteikt robežu starp dabisko un mākslīgo, iepriekš pastāvošo un uzlikto, iekšējo un ārējo, kā arī starp vidi un arhitektūras artefaktu.