

DOM HANS VAN DER LAAN'S ARCHITECTONIC SPACE

as a contemporary interpretation of *connaissance poetique* within sacred architecture  
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'A church is an architectonic space, but without a specific purpose. It is merely a space to be in, to move and speak, a room for living in the most general sense of the word: the space that we naturally need to situate ourselves in the space of nature and to feel at home'<sup>1</sup>.

Western religious architecture in the 21<sup>st</sup> Century is not primordially defined by fixed liturgical codes, symbols and typologies. A shift took place towards an architecture that achieves its 'sacredness' through its affects, and where spirituality is achieved through the direct bodily and tactile experience. Spirituality in this sense is evoked by the materiality and corporeality of space.

The *Herz Jesu Kirche* by architects Allmann, Sattler, Wappner, built in 2000 in Munich, consists out of a rectangular volume with two different layers: on the inside wooden slats with different densities, on the outside a glass shell with differing degrees of opaqueness. The space is defined through its shell, a gradually changing relation to the outside, a range of shifting atmospheres and lighting conditions.

This type of contemporary churches is not built as expressions of personal religious conviction of the architect. It is built as a *house*, in the sense that it wants to be a spiritual communal space for gathering and contemplation. In the book *Thinking Architecture*, Peter Zumthor, the architect of the *Veldkapel Bruder Klaus*, defends his *poetics of space* as an architecture that deals with the form and the explicit making of that form, the beauty of form relying on its sensuous use of materials and an inherently appropriate order<sup>2</sup>. 'Architecture has a specific *bodily relation* with life, expressed through the relation between a person and *matter*'<sup>3</sup>.

Already in 1948 the Dutch architect and Benedictine monk Dom Hans van der Laan (1903-1991) wrote about *objective fundamentals of the form of a church*, away from the symbolic expression of a supernatural reality, or the architect's personality<sup>4</sup>. He defined the church as a *house*, an intermediate between a human being and nature, in the same way as a spoon made the transition between water and mouth. Unlike his con-

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<sup>1</sup> Laan, Dom Hans van der, *Het vormenspel der liturgie*, 1985, p. 89.

<sup>2</sup> In 2007, the architect Peter Zumthor built the *Veldkapel Bruder Klaus* in Mechernich, Germany as a closed parallelogram of rough concrete, wearing the black traces of the burnt formwork. One opening at the top diffuses light from above.

<sup>3</sup> Zumthor, Peter, *Does Beauty have a form*, Revised version of the lecture *Venustas*, given at the Department of Architecture of the Federal Institute of Technology, Zurich, November 1998, published in: *Thinking Architecture*, Lars Müller Publishers, Baden Switzerland, expanded reprint by Birkhäuser, Basel, Switzerland, 2006, pág. 78.

<sup>4</sup> Laan, Dom Hans van der, *Brieven uit Oosterhout*; brief aan A. V. Kranendonk van 27 Nov. 1948, in *Katholiek Bouwblad jgl6*, 16 oktober 1948, pág. 55-56.

temporaries, he translated these objectives into a design process focused on formal, compositional and material qualities. Architecture's main task was to express its function, to make space readable for the intellect through the senses. In contrast to the contemporary examples described above, Van der Laan's motives grew from his Benedictine background, looking for a balance between *form* and *matter*.

To understand it's meaning today, this article retraces how Van der Laan engaged in the religious and architectural discourse of its own time. Hereby, essential underlying motives and interconnections between his Benedictine background and architectural theory can be revealed, giving a fundament to spatial ideas inherently present in contemporary religious architecture<sup>5</sup>.

## 1. ORA & LABORA

Already from childhood Hans Van der Laan was searching for fundamental principles in nature and the built environment. He was fascinated by how things are made<sup>6</sup>. Born in a catholic architects family, he became acquainted at an early age with the writings of for example Dionysios the Areopagite, a neo-Platonist philosopher who introduced the idea of *Imma Summis*, where the smallest directly is in a cyclical relation the highest and vice versa. The human intellect could only rise to the contemplation of the spiritual by means of the material things that lie within its reach. Before he entered the Benedictine Abbey of Saint-Paul in Oosterhout (The Netherlands), he studied three years of architecture in Delft<sup>7</sup>. There, he criticised the design practice as characterised by free interpretation and the copying of neo-styles. He was looking for a design process that would be closer to *the reality of making*, in the way he 'had seen the making of window sills with their 'plug and hole connection' and how the plugs of the sills were fitted into the holes of the upper threshold and then marked with a cross so that both parts were as it were paired and from then on belonged together'<sup>8</sup>. Initially influenced by his mentor-architects Granpré Molière and Dom Paul Bellot, Van der Laan found answers in Jacques Maritain's neo-thomist vision on art, beauty and ethics<sup>9</sup>.

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<sup>5</sup> Laan, Dom Hans van der, *De architectonische ruimte*. Leiden: Brill, 1977; Laan, Dom Hans van der, *Architectonic Space*, translated by Richard Padovan. Leiden: Brill, 1983; Laan, Dom Hans van der, *L'Espace architectonique*, vertaald door Dom Xavier Botte. Leiden: Brill, 1989; Laan, Dom Hans van der, *Der architektonische Raum*, translated by Ulrich Hahn, Anne Tebartz-Van Elst en Kees den Biesen. Leiden: Brill, 1992; Laan, Dom Hans van der, *Lo Spazio Architectonico*, translated by Luigi Filipetto. Milano: Sinai Edizioni, 2000. This book replaced the earlier book *Het Plastisch Getal* from 1960, that was more focused on the system of proportion.

<sup>6</sup> Laan, Dom Hans van der, *Het liturgisch kader van de abdij van Vaals*, biographical text for the occasion of a television interview with Antoine Bodar, 30st of June 1986.

<sup>7</sup> In the summer of 1926, Hans van der Laan interrupted his architectural studies at Delft. He studied a year of Latin and Greek at the Schola Carolina in Den Hague under the guidance of the Jesuit Karel de Wilde before his inauguration on the 12th of September 1927. His ordination took place on the 2nd of September 1934.

<sup>8</sup> Laan, Dom Hans van der, *Het liturgisch kader van de abdij van Vaals*, 30 juni 1986, pág. 7.

<sup>9</sup> Prof. Granpré Molière (1883-1972) was Van der Laan's teacher in Delft. He gave rise to the 'Delftse School', the most important movement within Dutch traditionalism. Dom Bellot (1976-1944) is the architect of the Saint-Paul abbey, introducing Van der Laan to the practice of religious architecture and the use of his proportional system. He worked according to the concept of 'innover selon la tradition'.

But he would soon dissociate himself from Maritain's moral emphasis on religious art and architecture, referring more towards his background as a Benedictine monk. This proved to be an essential aspect for the further development of his own architectural thoughts. Inherent to life in the abbey was the balance between *ora & labora*, a conscious contemplation through a combination of study and manual work. This was reflected in a strict general order in all the actions and objects, from the daily time-schedule to the clothing, resulting in specific rhythms in time, music, sent, but also space. Van der Laan was employed in the vestment workshop, where he put the emphasis on craftsmanship through the designing and making of liturgical vestments (Fig. 1). Already then he rationalised this *process of making*, unravelling the origins of clothing analysing traditional Greek models. Later he became responsible for the sacristy, where he redesigned all the liturgical objects before the end of WO II according to his own system of proportion, what he called the ground ratio or the *plastic number*<sup>10</sup>. This ratio (3:4) differed from the golden section as it was explicitly linked to perception on the base of ones ability to distinguish differences in size<sup>11</sup>.

As part of the Benedictine education, Van der Laan copied fragments from the old Church Fathers and from other Benedictines, through which he tried to gain insights in the acquisition of knowledge and the relation between *matter* and *form*.

## 2. VAN DER LAAN'S PROFILATION BEFORE 1957

Van der Laan applied these ideas to architecture, aiming to translate the deeply rooted ideas of *matter* and *form* into the more concrete interrelation between the rational and the sensual, between the spiritual and the material.

For Van der Laan, the task or function of architecture was to make space intelligible through its underlying order, the material informing the spiritual. A church had to express its function. Although his first series of lectures from 1939<sup>12</sup> mainly focused on the definition of the ground ratio, Van der Laan briefly attempted to establish an argument informed by his theological insights on the idea of *con-naître*. He situated designing as *the act of making* between a *rational ideal* and the

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<sup>10</sup> In 1930, Van der Laan was employed in the vestment workshop, where he was appointed as the responsible on the 1st of February 1933. In 1936 he became the responsible for the sacristy until he moved to the abbey Saint Benedictusberg in Vaals in 1968.

<sup>11</sup> The plastic number, approximately 3:4, is the solution to the equation  $x^3=x+1$ , making a sequence of ratios. It can be compared to the golden section  $x^2=x+1$ , which is used in the Fibonacci sequence. Le Corbusier used the Fibonacci series to define his blue and red series of the Modulor system. Van der Laan defined an order of size, a series of eight numbers from  $x$  to  $x^7$ . This is then 1 4:3 7:4 7:3 3 4 16/3 7. Its basic ratios, approximately 3:4 and 1:7, are determined by our normal ability to perceive differences of size. The lower limit is the smallest difference perceivable between two sizes. The upper limit is the outer limit in which two sizes can be related and compared through perception. Beyond this border they differ too much and belong to different orders of size.

<sup>12</sup> It was especially through the Course on Religious Architecture [Cursus Kerkelijke Architectuur] in Den Bosch, that Van der Laan's theories became dispersed. Van der Laan would teach many generations of architects in Den Bosch, until 1973. His lectures exercised a great influence on Dutch religious post war architecture, a style that was referred to as the *Bosche School*. They resulted in the publication of the book *The Plastic Number* in 1960.

material form it receives by placing it in the material order, in relation to the problematic of type versus application<sup>13</sup>.

Van der Laan and his students found the fundamental architectural expression in the early Christian basilica, putting it forward as a prototype for religious architecture<sup>14</sup>. Between 1948 and 1956, several new basilica churches were built. They have a classical overall setting and a traditional use of ornamentation (Fig. 2).

Nevertheless, it was this traditional symbolism that he criticised. In a 1952 publication he explains: 'As did Kropholler in joining Berlaages fundamental position, Dom Bellot had formulated a closed theoretical system, in which the through Gothicism isolated building technique again became divided in a matter principle and a form principle, in which the last was seen as something with a mainly mathematical nature. And as with Gothicism, he tried to reunite the separated technique and form principle, but now by assigning mathematics, the form principle, a necessary symbolic content'<sup>15</sup>. At the same time, Van der Laan forcefully rejected the early modernism of *De Nieuwe Zakelijkheid*, focusing on standardisation and repetition. In 1957, he would react radically against Le Corbusier's organic architecture at Ronchamp or the monumental outcome of the Syracuse competition, as for him these were outbursts of the architect's personal taste<sup>16</sup>.

At first, his ideas were welcomed with great interest in Dutch and Belgian catholic circles, in search of rooted values in the post WWII period marked by despair. The lectures at Den Bosch and its realisations were published regularly in magazines as *Katholiek Bouwblad*, *L'Art d'Eglise* or *Schets* and Van der Laan's advice was highly esteemed<sup>17</sup>. After 1952, the criticism grew from a more progressive side, inspired by the possibilities of the new religious architecture in Germany, Switzerland and France. The traditional, static basilica churches did not meet up with the initial expectations<sup>18</sup>. His architecture was regarded as being too rational and theoretically rigid, without any poetic expression or sensitive intuition. Van der Laan's aim to recombine these two elements on a fundamental level was not achieved. His radical rejection of the architecture of his time, did not favour his position. Being unjustly dismissed as a traditionalist or a proportionalist seeking formal

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<sup>13</sup> Laan, Dom Hans van der, 'Eerste van zes bijeenkomsten bij Jan en Nico van der Laan gedurende de oorlog met studiegenoten uit 1923-1927 en Professor Granprè Molière. Eerste uiteenzetting van het plastisch getal', September 1939, Leiden, courtesy Abbey Sint Benedictusberg Vaals.

<sup>14</sup> Butler, Howard Crosby, 'Early Churches in Syria between the 4th and the 7th century', Princeton Press, 1929, was pointed out by several of van der Laan's students as main book of analysis. Van der Laan and his colleagues and students tried to analyse the proportions according to the ground ratio, and transposed this to new designs.

<sup>15</sup> Laan, Dom Hans van der, *Kerkelijke Bouwkunst*, in: *Het Nieuwe Brabant*, Eerste deel: Het Brabantse land, uitgave van het provinciaal genootschap van kunsten en wetenschappen in Noord-Brabant te 's-Hertogenbosch, 1952, pág. 310.

<sup>16</sup> Laan, Dom Hans van der, *Vernieuwing in kerkenbouw te Ronchamp en Syracuse: Architectonische ordenantie en plastische verhoudingen*, in: *De Tijd*, zaterdag 13 juli 1957.

<sup>17</sup> Van der Laan lectured at several art, architectural and even music schools. He gave advice on art education for example on the 13th of September 1948 at Sint-Joost, Breda.

<sup>18</sup> See for example Constantinus, P. (1885-1970), *Terug naar de romantiek*, in *Tijdschrift voor Liturgie*, 36, 1952, pág. 40-43, Br. Urbain, *Kerkelijke architectuur in Nederland*, in: *Schets*, 8, 1955, pág. 68 or redactional article *Dialogue sur l'architecture de Bois-le-Duc*, in *L'Art d'Eglise* nr. 1, 1957, pág. 144.

beauty through perfect proportions, he disappeared from the main architectural discourse for two decades. Neither the architectural scene, nor the religious world did pay any attention to his new approach manifested from 1957 onwards.

### 3. VAN DER LAAN'S ARCHITECTONIC SPACE: TOWARDS A PHENOMENOLOGY OF SPACE

Van der Laan was not only criticised by the general architectural scene, also his own congregation did not support his architectural quest. His design for the church at Oosterhout was rejected in 1953<sup>19</sup>.

Due to this impasse, he started to focus on a wider reference field, looking for more general and secular expressions of space. He made analysis of Roman houses, but also the Aya Sophia and later of Scottish tartans or Stonehenge, defining them as readable spatial patterns. He became deeply interested in the relation between inside and outside, or the way in which smaller spaces could be composed into layered bigger spatial conglomerates<sup>20</sup>. In 1957, he was granted the opportunity to explore these ideas in a new project for the extension at the Abbey of Saint-Benedictus at Vaals, the Netherlands<sup>21</sup>. In the design process for the crypt, he gradually moved away from any form of ornamentation towards a more ascetic space<sup>22</sup> (Fig. 3,4,5). Architectural elements were defined as sober cubic building blocks of brick and concrete with minimal detailing, drawing attention through their rhythm. The space was still arranged following the plastic number, but the focus was no longer on a two dimensional composition of plan and facade, but on a three dimensional relation between mass and space. As a result, the space of the crypt was defined by a dynamic layered effect of shifting rhythms in between building elements and intensities of light. The use of simple material finishing, wood, paint or roughcast with plaster in complementary grey colours, enhances the sensorial qualities of the materials, rendering the space extremely tangible (Fig. 6,7,8,9).

To motivate this architecture of affects, Van der Laan felt the need to use a different architectural language. Again, it were his ontological and theological insights that enabled him to move away from the concept of a prototypical architecture, leading the way for a more phenomenological form making process. His main insights came through copying texts from Dom Talma<sup>23</sup>, reinterpreting knowledge on *form* and *matter* through the eyes of Thomas of Aquinas<sup>24</sup>. In a search for an objective

<sup>19</sup> Especially the older Benedictines as Dom C. Coebergh, Dom R.P. Bergeson or Dom A. Vermeulen were very critical on the whole lay out, the not oriented church. In 1953, architect Sluymer was assigned for the project.

<sup>20</sup> Laan, Dom Hans van der, Over een schotse tartan, algemene lesdag Cursus Kerkelijke Architectuur 6, 23 november 1968. A model of Stonehenge, according to the proportions of the plastic number was part of the study material at the Bossche School from 1971 onwards.

<sup>21</sup> Van der Laan was commissioned a series of extensions at the Saint-Benedictus monastery at Mamelis, Vaals, The Netherlands in 1957. Realisation: 1961: crypt, 1967: church, atrium and guest quarter, 1986: library wing and gallery. Van der Laan would live here from 1968 until his death in 1991. In 1989, as a result of the realisation of the library, Van der Laan receives the Architectuurprijs Limburg.

<sup>22</sup> Under the influence of his student Jan de Jong (1917-2001); De Jong, part of the second generation Bossche School architects, was Van der Laan's best student.

<sup>23</sup> Dom Talma (1885-1979), mathematician and philosopher at Oosterhout.

<sup>24</sup> This rethinking of Plato's *connaissance poétique* was under the impulse of a general shift in neo-

process of cognition, the emphasis was put on *connaissance poetique* or an intuitive knowledge guided by the senses. It was this understanding that enabled Van der Laan to redefine spatial concepts that drew upon a direct relation between the intellect and the senses. In this regard, the emphasis moved from a more Platonic idea of *Form* towards the Aristotelian emphasis on *matter*, from a rational ideal towards an intertwined relation between *intellect* and *senses*.

From this, he developed models that translated this phenomenological relation into concrete spatial ideas. In 1962, Van der Laan introduced the concept of *nearness* [nabijheid], engaging building with the experience of space<sup>25</sup>. He translated it in the concrete idea of a spatial cell, which he later called *cella*. This basic spatial unit was linked to the experience space of a person<sup>26</sup>. It was this subjective reference field that defined the boundary between space and mass. A building grew from the *cella* to the *court* and to the *domain* (Fig. 10).

#### 4. RELIGIOUS SPACE IN THE 21<sup>ST</sup> CENTURY - MATTER AND FORM IN ARCHITECTURE

The concepts that Van der Laan focused on were different than the ongoing tendencies followed by his contemporaries. It did not only differ from the opposed early modernist and traditionalist approaches. Also Van der Laan's phenomenology had different motives than the existential phenomenology of social structuralism during the sixties and seventies. His aim was to define an objective phenomenological approach, away from any subjectivism<sup>27</sup>. As the prominent Belgian architectural critic Geert Bekaert puts it in 1987, '*the human being remains Van der Laan's central focus. But that being is for him the eternal human being, a human being with essential unchanging needs, without desires*'<sup>28</sup>. From this, one can conclude that his ideas accord more directly with the spatial theories from the end of the nineteenth century; Wölfflin's phenomenology of space and Semper's rethinking on surface and ornamentation through dressing. These spatial theories are recently being reread to formulate a fundament for the architecture of Adolf Loos and from there Herzog & de Meuron<sup>29</sup>. Van der Laan's approach accords well with this background. Already in 1950, he links

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thomist thought; Most influential were the writings of Klubertanz, for example: Klubertanz, George P.S.J., *St. Thomas and the Knowledge of the Singular*, in: *The new Scholasticism XXVI*, 1952, 135-166.

<sup>25</sup> Nearness defined the relation between mass and space, concretely translated into the thickness of the wall in relation to the space it borders. According to the limits of the order of size, this relation ideally was 1:7.

<sup>26</sup> Laan, Dom Hans van der, *Vijfde les over de architectonische dispositie*, Lezing voor de werkgroep Kerkelijke Architectuur, 3 september 1966, VDLA.

<sup>27</sup> Van der Laan here partially joined the undoing Christian existentialism of Gabriel Marcel (1889-1973) or the writings of Albert Dondeyne (1901-1985). See for example: Dondeyne, Albert, *Geloof en Wereld*, Uitgeverij Patmos, Antwerpen, 1961 and Gabriel, Marcel, *Le Mystère de l'otre*. Paris, Aubier, 1951. 2 vol.

<sup>28</sup> Bekert, Geert, *Een beginsel van altijd en overal*, in: *Landschap van kerken, 10 eeuwen bouwen in Vlaanderen*, Davidsfonds, Leuven en Standaard Uitgeverij, Antwerpen, 1987, pág. 278-285.

<sup>29</sup> This line of thought, to go beyond the 20th century thinking on functionalism and structure by linking 19th century thinking on space and surface with contemporary ideas of space on materiality, time and movement, is explained from the phenomenological point of view in: Bordeleau, Anne, *An Indexical Approach to Architecture*, in: *Architecture and Phenomenology, Footprint*, Delft University Press, Autumn 2008, pág. 79-96.

his ideas on clothing with those on architecture, through Aristoteles' idea of *habitus*<sup>30</sup>. He wrote about an architecture that would define space as the folds and seams of a garment. It was the design for the crypt at Vaals that met this expectation. This architecture as skin or dressing is not defined through its mass, but through its spatial qualities. Devote from any structural symmetry, the seams between the building elements define a spatial matrix that comes to life as one moves through it. The focus is on a tension field that emerges from a direct engagement of the surface between mass and void, and the boundaries of ones experience.

Van der Laan succeeded at defining form as an expression of *matter*, matter being intrinsically linked to ones experience, and through that to the process of cognition. With this final approach, he went beyond any religious symbolism. He introduced a formal focus, but one that drew upon ones physicality or corporeality of space. The emphasis lied on the spatial *affect*, or emotional effect inflicted by material qualities. Van der Laan's *architectonic space*, with its ability to incorporate concepts as *Imma Summis* and *connaissance poetique*, offers a fundament for contemporary religious architecture beyond a building programme or agenda defined by profane architects<sup>31</sup>. But also, it offers a ground for all contemporary architecture that focuses on *emphatic immersion* through materiality and proportion, in other words; an architecture in search for an inherent *sacredness*<sup>32</sup>.

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<sup>30</sup> Report of a talk between Father Talma and Father van der Laan, 7th of July 1950, pág. 2, VDLA.

<sup>31</sup> This incorporation is exploited further in Van der Laan's latest book: *Het vormenspel der liturgie*, Brill, Leiden, 1985, translated into Laan, D. H. van der, *La Forma: natura, cultura e liturgia nella vita umana*, translated by Kees den Biesen, Sinai Edizioni, Milano, 2000, translated into: Laan, Dom Hans van der, *The play of forms*, by Richard Padovan, Brill, Leiden, 2005.

<sup>32</sup> Stegers Rudolf, *Sacred Buildings, a Design Manual*, Birkhäuser, Basel, 2008, pág. 33: 'their explorations of space, emancipated from functional requisites, produce forms that operate using religious phenomena (...) Extreme materiality in solid, heavy, opaque chthonic objects on the one hand, or extreme immateriality as loose, light, lucid, spheroid objects on the other: both with the intend of emphatic immersion rather than distanced reception, for engaging with rather than comprehending.' He reefer to spatial artists whose work is attributed to Minimal Art, Arte Povera an Land Art, but also to the quasi-sacral museums by for example Peter Märkli (La Congiunta Museum and Foundation in Giornico, Switzerland, 1992) or Tadao Ando (Langen Foundation Museum near to Insel Hombroich, Germany, 2004). I also reefer to the more recent museums of Sanaa (New Museum of Contemporary Art, New York, 2007) or Peter Zumthor (Archdiocese Museum, Cologne, Germany, 2007).

## IMAGES

- Fig. 01. The vestment workshop in Oosterhout around 1935, in the middle Hans van der Laan, courtesy Van der Laan Archives Sint-Benedictusberg, Vaals.
- Fig. 02. Sint-Martinus church, Gennep, The Netherlands, architect Nico van der Laan, 1952-1954, courtesy Van der Laan Archives Sint-Benedictusberg, Vaals.
- Fig. 03. The crypt, Abbey Sint-Benedictusberg, Mamelis, Vaals, The Netherlands, 1957-1961 (Abbey alterations as library extension until 1986), photograph Caroline Voet.
- Fig. 04. Isometric view of the atrium, church, tower and entrance. Second extension at Abbey Sint-Benedictusberg, Mamelis, Vaals, 1962-1968, courtesy Van der Laan Archives Sint-Benedictusberg, Vaals.
- Fig. 05. The atrium, Abbey Sint-Benedictusberg, Mamelis, Vaals, photograph Caroline Voet.
- Fig. 06. Roosenberg Abbey, Waasmunster, Belgium, 1972-1975, photograph Caroline Voet.
- Fig. 07. Convent hall, Roosenberg Abbey, Waasmunster, Belgium, 1972-1975, photograph Caroline Voet.
- Fig. 08. View from the hall towards the bell tower, Roosenberg Abbey, Waasmunster, Belgium, 1972-1975, photograph Caroline Voet.
- Fig. 09. Stair towards *cellas*, Roosenberg Abbey, Waasmunster, Belgium, 1972-1975, photograph Caroline Voet.
- Fig. 10. Models: Personal experience-space: *handelsruimte* (workspace)-*loopruimte* (walking space)-*gezichtsveld* (visual field). Translation into *architectonic space*: dispositions of *cella-court-domain*, courtesy Van der Laan Archives Sint-Benedictusberg, Vaals.



Fig. 01



Fig. 02



Fig. 03

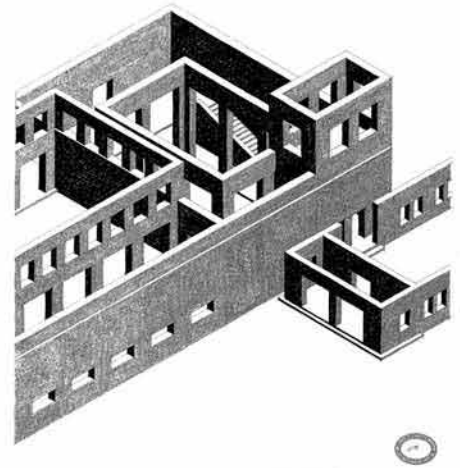


Fig. 04



Fig. 05



Fig. 06



Fig. 07



Fig. 08



Fig. 09

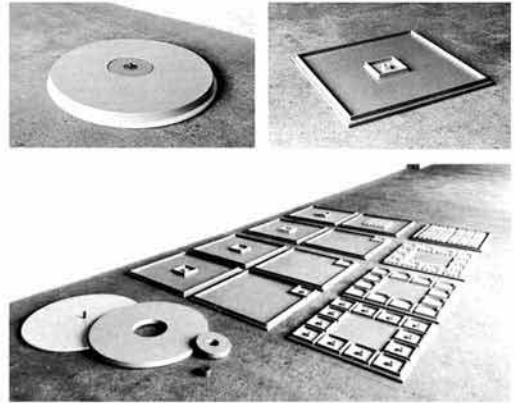


Fig. 10