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## Summary

Jürgen Joedicke

### The Distinctive Features of the Architecture of van den Broek and Bakema (pages 135-137)

Johannes Hendrik van den Broek<sup>1</sup>:

1924: Graduated from the Institute of Technology of Delft, strictly academic course or study (copies of ancient plaster coats), became familiar with the various styles, his training rooted in conservative curriculum. Van den Broek regarded all this as a necessary apprenticeship and took it in his stride (it contributed to his sense for design). He had but a sketchy notion of modern architecture and of his predecessors in the field. He was interested in the Romantic school of architecture in Amsterdam, but he tended by temperament toward an objective and structured style of architecture. During a trip made in 1928 in company with van Tijen to Frankfurt, where he met Ernst May, van den Broek subscribed to the tenets of modern architecture, which did not mean a simple adaptation of a formal idiom but the discovery of himself through the work of others. He came close to his ideal, "to allow the structural method to be expressed in the building"<sup>2</sup>, in his plan for the Vroesenlaan housing scheme in Rotterdam in 1933. By Functionalism van den Broek understood "a more deeply conceived purpose"<sup>3</sup>. In his functional analyses he sought above all the characteristic features of each assignment. (Thus, in the Vroesenlaan scheme, the spatial disposition is correct from the functional point of view, but, in addition, van den Broek grouped the complex around a courtyard which creates the specific atmosphere of the project. It is in this way that his plans differ from the row houses of the Twenties, where only material factors counted: sun, economy, rationalization).

The high-rise apartment house in Rotterdam, 1931, with its simple design, with its rhythmic articulation determining the architecture as a whole, is one of the best things done at that time.

Death of van den Vlugt; association of van den Broek with Andreas Brinkman, who was so ill already that all responsibilities rested on van den Broek's shoulders<sup>4</sup>. In 1947 C. H. van der Leeuw had van den Broek appointed a professor at Delft, where he sought to introduce fresh ideas. In 1948 van den Broek entered into association with Bakema<sup>5</sup>. To explain the relationship between the two architects it should be borne in mind that van den Broek belongs to the second generation of modern architects, while Bakema, born in 1914, is already of the third generation.

In 1942 Bakema decides that the new objectivity will not be a fruitful idea for post-war architecture, for it has to do only with what can be analyzed but cannot be integrated with architecture as an art<sup>6</sup>. In 1948 van den Broek said: at the beginning the new objectivity stuck to the results of analysis, but it came to be thought that it was possible to invest a building with a beautiful design of its own that could be derived directly from its function... What is new about the new objectivity is that it is no longer self-sufficient; it aims at the deeper expression of the building as a functional organism<sup>7</sup>.

Van den Broek's work stems directly from the Twenties, while for Bakema this period already belongs to history.

Van den Broek divides up an assignment according to its analysis, while

Bakema heads straight for a unitary design.

When van den Broek has finished his analysis and his rough plan, the bulk of his job is done; Bakema regards as essential the development of the design. One seeks the organigram, the other the formal expression, and inter-formal relationships. When Bakema speaks of the function of a design, what he implies is the effect made by the design on the human beholder.

To exaggerate somewhat, it could be said that what counts for van den Broek is what eventuates in a design, and for Bakema what function can be expressed by a constructed shape. The analytical spirit of van den Broek and the creative verve of Bakema complement each other very well, for van den Broek acts as a needed brake on Bakema's exuberant imagination. Bakema is filled with a sense of mission. The activity of the architect, he believes, directly influences the behaviour patterns of the individual and of society. The architect by way of his creations participates in the elaboration of a new social structure<sup>8</sup>.

Jacob Berend Bakema<sup>9</sup>, the scion of peasants and seamen, introverted by nature, used to like wandering over the vast polders and building huts there (sharply restricted space in the immensity of the plain)<sup>10</sup>.

Studied at the Institute of Technology of Groningen: acquired fundamental knowledge of detailing and of construction.

Met his future wife, who was a student of the Academy, this introducing him to the world of theological thought, which influences him to this day.

Student project: a dovecote, easily dismantled and assembled elsewhere (typical conception).

Bakema could put his ideas into concrete practice with Mart Stam (Academy of Amsterdam) and owing to his work as a municipal official under van Esteren, where he got to know the architects of CIAM. He was influenced by Rietveld's Schröder house and by the ideas of "Stijl". This can be seen in the t'Veenster cinema, 1947, and in the Montessori school in Rotterdam 1957 to 1958.

It is van den Broek and Bakema who are continuing the tradition of modern architecture in Holland, but thirty years later.

After the war Bakema took part in the meetings of the CIAM, where he met Aalto, Le Corbusier, Rogers, Bill, Roth and Moser.

Owing to Bakema and van Eyck, the CIAM expanded their aim to include: "the creation of a habitat that satisfies the material and emotional needs of man... and that is capable of furthering his cultural development"<sup>11</sup>.

Bakema's social conceptions:

reduction of working hours, increase of leisure; logical result of democracy: to give each individual enhanced opportunities to take responsibility for his acts. "The masses seek to free themselves from their imposed anonymity and to engage in creative activity."

Since the work program dictated by the machine does not permit that, this opportunity resides in activity that is freely chosen, during one's leisure hours, when people seek to give personal expression to their lives<sup>12</sup>. Bakema's childhood memories, his recollections of the individual activities of his neighbours, as contrasted with the deadening monotony of present-day residential areas, so different from the manifold variety of the old slums (despite their lack of elementary comfort), decided him to develop the "growing house".

Since mass production cannot pay heed to individual wishes, a fresh attempt must be made to respect the initiative of the individual. Bakema proposes that mass production take over the fabrication of cores of houses which can be developed individually (cf. ...).

Thus the concept of the "growing house" is no mere utopia.

Bakema hopes that he has discovered a method permitting cities to express the great diversity of life and to cease being a mere juxtaposition of sleek monotonous façades<sup>14</sup>. The conception of the "growing house" is combined with that of a city made up of repeatable neighbourhood units, an idea which he has been elaborating since 1949.

Explanatory Notes:

<sup>1</sup> Johannes Hendrick van den Broek, born October 4, 1898 in Rotterdam; teacher's training college at Nimwegen; teacher's certificate; from 1919, study at the Institute of Technology of Delft; graduated in 1924; from 1927, architect in Rotterdam; in 1937, associated with Brinkman; in 1948 associated with Bakema; in 1947 professor at the Institute of Technology of Delft.

<sup>2</sup> Adapted from a colloquy between the author and van den Broek.

<sup>3</sup> Paul Bratke: Theory of Protestant Church Construction, Stuttgart, 1906, cited following van den Broek: "Creative Forces in Dutch Architecture".

<sup>4</sup> Agency founded by Michel Brinkman, born December 16, 1873, died February 19, 1925; studied at the Academy of Rotterdam; work with the architect Hooykaas (church in Rotterdam, 1903). Responsible for: Spangen housing scheme in Rotterdam, 1919/20; unusual project: two lines of superimposed row houses, the upper line being accessible via a gallery; the whole complex being grouped around a courtyard; other assignments: "De Maas" steam-mill, H.A. Reens shops, various housing projects in Rotterdam. After the death of his father, J.A. Brinkman, born March 22, 1900, died May 6, 1949, assumed the direction of the firm; studied at the Institute of Technology of Delft; became associated in 1925 with van den Vlugt.

Van den Vlugt, born April 13, 1894, died April 25, 1936; studied at the Academy in Rotterdam; worked with Brinkman, then with Buskens (St. Lucia School in Rotterdam, 1917). Own firm: Beukelsdijk housing scheme, Rotterdam, 1921, apartment house at Ermelo and at Nordhorn in 1925; Institute of Technology in Groningen in association with Jan Gerko Wiebenga, 1922. J.A. Brinkman, van der Vlugt and Mart Stam: Plan for the van Nelle factory in Rotterdam, 1926/29: Modern architecture; much credit is due the owner in the case of this project (C.H. van der Leeuw: Studied psychology and medicine in Vienna; active participation in the Theosophical meetings with Krishnamurti at Ommen; meeting hall by Brinkman and van den Vlugt at Ommen, 1926/27, which remains under the influence of the "Stijl").

<sup>5</sup> First meeting of van den Broek and Bakema: during discussions concerning the reconstruction of Rotterdam; which reconstruction they were entrusted with organizing. At the time van den Broek's plans were submitted, Bakema, then a municipal official, even defended them at the Delft school, which was opposed the traditional tendencies; after their visit to a social center (Bakema), the two decided to join forces.

<sup>6</sup> De 8 en Opbouw, 1942, page 125.

<sup>7</sup> J.H. van den Broek: Creative Forces in Dutch Architecture.

<sup>8</sup> De Vrije Kunstenaar. no. 1/1945, page 2ff.

<sup>9</sup> Jacob Berend Bakema, born March 8, 1914 in Groningen; from 1931 to 1936 at the Institute of Technology of Groningen; in 1937/38 associate in the town-planning office of the City of Amsterdam (director: van Esteren); graduated from Academy of Amsterdam in 1941 (Prof.s: Mart Stamm, Gerrit, Rietveld, van Tijen); in 1943: participation with van Tijen and Maaskant on the project: "new housing possibilities in Rotterdam". 1943: attempted flight from occupied Holland; made prisoner; in the housing office of Rotterdam; in 1948 association with van den Broek, who is appointed professor at the Delft school.

<sup>10</sup> Extract from correspondence between Bakema and the author.

<sup>11</sup> CIAM conference, Bridgewater, 1947.

<sup>12</sup> <sup>13</sup> <sup>14</sup> Extract from correspondence between Bakema and the author.

Van den Broek et Bakema

Van Buchen Single-family House in Rotterdam-Hillegersberg

(pages 138-145)

Execution: 1960/61

This low flat house arranged about an interior courtyard cannot be measured by the normal scale, for it is rare for an owner with ample financial means to place himself in the hands of avant-garde architects. The special qualities of this house consist in the great

differentiation of the volumes and in the simple elegance of the design. Nevertheless, this construction follows in the tradition (Bakema's hand being mainly in evidence here) of those architects who tend toward a more subtle development. In comparison with the Wieringa house, the raw shape is refined without for all that becoming merely factitious. The owner, the proprietor of the Ter Meulen department stores, wished to see applied the same architectural principles in his house as in the store which these architects had already built for him.

The entrance on the north is accessible via some steps leading to the vestibule and then into an extended hallway. The interior courtyard opposite the entrance is closed off by the bedroom wing and the living wing; it constitutes a continuity with the roofed over space which is separated from it only by a large sliding glass wall. The living tract is composed of a dining-nook on the same level as the hall in direct contact with the kitchen, of a living-room proper located three steps lower and of the core with the fireplace running across and facing both indoors and outdoors. In front of the narrow sides of the living tract are located verandas, both open and roofed over. The east wing comprises the parents' bedroom, that of the children, of the maid and a guest room. The entrances to these rooms are arranged in a staggered pattern and constitute an organic continuation of the hall. The sleeping tract is very much closed in with its small cubicles, whereas the living tract with large glass panes opens on to the interior courtyard and faces south. The elongated kitchen is well integrated with the cellar, the entrance and the dining-nook.

The passageways from the interior to the outdoors are again accented by the continuity of the flooring in front of the fireplace and by the large roof canopies. Despite the large glass surfaces, the living tract preserves its intimate character in that the walls are solid for their entire height.

The architectural design is very clearly conceived: independent wall panels, large glass surfaces, narrow parapets and wood facing are characteristic elements. The whitewashed concrete parts are the retaining walls by the entrance to the garage and the projecting structure beneath the kitchen; the balustrades at the entrance and that of the garden are likewise of solid concrete.

The architectural variety of this house comes out in the numerous inter-relationships between the volumes and the outdoors, or the open-air areas on the inside and in the harmonious relations among the different volumes. Thus the hall, the dining-nook, the living-room and the fireplace constitute a succession of varied volumes; nevertheless, their penetration causes them to be experienced as an entity.

The delimitations among the rooms are in some way fluid; thus the glass partition separating the hall from the interior courtyard is intended merely to give shelter from the elements, for the covered-over area continues on out and stops only at the end of the three steps where the roof structure terminates in a kind of vertical flap.

The bedroom area is different in atmosphere: each room is closed in, completely cut off from the others and furnished with small windows, which in turn accentuate the feeling of privacy intended.

Van den Broek and Bakema

De Klerk Home in Rotterdam-Hillegersberg

(pages 146-151)

Execution: 1961

The division of the building lots into small sites (7 ares and less), the building code and the obligatory building lines all run counter to any comprehensive study, which would, however, be indispensable owing to the restricted areas of the sites which bar the free disposition of each house.

The de Klerks had at their disposal a corner lot larger than the average offering the possibility of isolating the house at the very edge of the lot and thus obtaining a rather big lawn and maximum distance from the neighbouring house. The architects closed up the two faces on the street sides

and opened the south-east and south-west faces onto the garden. The entrance of this L-shaped house is reached via a little forecourt surrounded by low walls. The main hall is separated from the entryway by some steps and runs at an angle of 180° to the living-room which constitutes one of the wings of the plan with a lower level at the extremity. In this tract there is a fireplace built into a wall of untreated bricks to the left of which there is a view onto an outside terrace and the garden.

Behind the dining-nook are the cloak-room, the descent to the cellar with the garages and a hobby room, the kitchen and the maid's room, as well as the WC (unfortunately the latter is directly opposite the front door).

The other wing of the L constitutes the sleeping tract with the bedrooms in a line and a rather spacious passage-way that can be used as a children's play area. The solid block of the parents' bath projects and thus defines the secluded area which is tied in with the passageway via sliding French doors. A flower trough shields the terrace in front of the living-room from passers-by and so assures privacy.

The plan of this house is characterized by big walls broken at right angles with, in between, glazed sections. To accentuate this part, the architect has allowed the solid fireplace wall to project in order to call attention to its true thickness. The same motif is encountered at the entrance, where the ascent is defined by freely disposed walls having varied proportions. The separation between the dining-nook and the living-room is a similar element in the plan.

Nevertheless, at their junction points these independent walls form a block, contrary to the tenets of Rietveld, who everywhere detaches his wall elements. These junctions give the house a closed-in character, especially when viewed from the street, from where not even the horizontal line of the roof is perceptible; the latter becomes apparent only by the entrance, where it is detached from the vertical element by a narrow glazed panel: at this point the block is articulated in a composition of horizontal and vertical wall sections: this part of the house creates a pleasant effect.

As in the case of all his constructions, Bakema seeks in this house as well to have the functions expressed by way of the corresponding designs: closed walls facing outwards, open faces toward the garden; this rigorous architectural intention is everywhere realized and creates a playful effect; for example, in the composition of the untreated brick wall grouping the fireplace, the television set, flower troughs, where these elements to some extent justify the deliberate formalism of the over-all design.

Jürgen Joedicke

Van den Broek and Bakema

### The Growing House

(page 152-153)

Execution: 1961

On the occasion of the competition for the new town of Wulfen, in the northern Ruhr area, where the problem was to plot densities and sketch in built-over tracts, van den Broek and Bakema caused astonishment with their very complete plan, in which they sought to elaborate a new type of family dwelling according to a growing system.

There is no dearth of ideas or of plans dealing with growing houses which are adaptable to varying families. Usually the idea took the shape of an intermediate flat, sited between two family dwellings in a row, which, as need arises, can be incorporated in one or the other of the adjoining apartments. In this system, necessarily, the bedrooms have to be located on the same level as the living-room; thus the plan becomes uneconomical and financing difficult, especially as the owners are generally very young.

With the aid of recent sociological studies, the architects worked out a type of apartment containing all the elements necessary for a young couple, in the shape of a core offering the possibility of later extensions. From this core to the extreme boundary of the site there will be walls

defining an interior courtyard. Within this space the successive extensions are carried out as needed: bedrooms, work rooms, second living-room, hobby room, garages, etc.

To realize this conception, the architects had recourse to a system of pre-fabricated elements, which can, if need be, be assembled on the site by the residents themselves. These elements of similar design and the rigorously maintained partitions guarantee that the over-all appearance will not change during the various transformations.

Extracts from: "Architecture and Town-Planning; the Work of the Architects van den Broek and Bakema", *Annals of Modern Architecture*, Vol. 3, page 9ff., Stuttgart and Zurich, 1963, Krämer, Girsberger.

Here is the basic concept that the architects realize in this project: The progress made in technology (industry and transport) is leading to large-scale production and to ever increasing leisure. This development makes possible individual production on a smaller scale in the shape of active participation by the home owner in the elaboration of his house.

This project the nought to be considered in relation to a given social and economic situation, for it seeks to translate these facts into an architectural application: it effects a synthesis between the principles of mass production and the overriding needs of the individual.

For a workers' housing scheme, at Eindhoven, the architects also proposed "growing houses". The sketch shows a number of row-houses representing a further development of the Wulfen sketches: the rectangular plan has evolved into an L-core, where the east or west living-rooms advance towards the north or the south. The total complex of spaces becomes highly differentiated. The living and bedroom tracts are separated on different levels; nevertheless, the small Eindhoven type provides for a bedroom on the ground floor and the living-room is rather small. The extension of this type, however, makes possible a spacious living-room whose shape lends itself to many different kinds of furnishings, and the livable surface will be 100 sq. meters, which is most generous; thus the initial idea of creating a restricted core for a young couple which can be extended subsequently loses much of its original validity for this type, for all of a sudden it contains four bedrooms, thus six beds; it corresponds then to a family with from two to four children. But the planned extension possibilities distinguish this type of dwelling from traditional designs.

From the point of view of the sketch, the arrangement of the houses in an L, in an interlocked pattern, involves an east orientation for half the apartments, which is a disadvantage.

The small type faces west (Wulfen). When the two houses are built, it will be interesting to ascertain the social relationships among the residents, when and how the extensions are made and how the financing and the pre-fabrication of these houses will be handled.

Thus the idea of Martin Wagner (1932), interior decorator, will be put into practice 30 years later, for he, even at that early date, suggested that houses and living areas be made subject to the principle of growth, both as applied to disposition and to utilization.

What is a "growing house"? This question contains not merely a spatial concept but also a concept of value and of means. The growing house will be the house of the future. This house in stages will take on not only spatial extensions but also its technical equipment will be expanded in parallel and will develop from an initial simplicity in the direction of the perfection desired.

Thus we hope to introduce more dynamism into our new types of houses which will be more easily transformable and adaptable to the needs of the given moment. We wish to liberate new housing schemes from the rigidity and the limitations of buildings in old districts and to enable them to grow with the times.

Van den Broek and Bakema

### Workers' Housing Scheme

at Eindhoven

(pages 154-157)

This plan sums up to some extent the town-planning activities of the last ten years of these two architects. Even in their first plan, since realized (Klein Driene at Hengelo, 1949), we encounter the housing scheme as an entity with a clearly visual unity. The town-planning projects of the following years represent a further development of this idea of "visual entity" (Bakema) culminating in the concept of a repeatable urban unit (prolongation of the Nordkennerland region, B+W, No. 9, 1961). These principles are applied directly to the Eindhoven project: clear spatial differentiation, separation of motor traffic from pedestrian paths, chances for isolating private spheres in each apartment, open spaces serving community purposes, density and type of apartment in conformity with sociological statistics, size of district within the individual resident's grasp, definition and accentuation by a high-rise tower, good ground utilization despite community areas.

Distribution of apartments:

Tower	72 apartments = 19%
Flats and maisonnettes	142 apartments = 38%
Single-family houses	161 apartments = 43%
	375 apartments = 100%
Garages and parking sites	Capacity 223

Density:

Gross area (surface)	10 hectares
Gross density per apartm.	37.5 apt./ha.
Gross density per resident	165 res./ha.

The apartments are in general well orientated: all the single-family houses, detached or adjoining, face south or west and the living-room opens directly outdoors or on to a private area (interior courtyard). Nevertheless, the large number of rooms facing east in the high-rise tower is open to criticism, and the same applies to the same orientation in the case of half of the "growing houses" in rows. The blocked flats and the maisonnettes face south and open on to the site.

The rows of houses form three public squares. The parking sites are aligned along the access route.

Sketch of conception submitted for the competition for the new town of Wulfen, 1961. The diagrams show the different stages of the extension.

Initial distance between the boundaries of the site: 27 meters; initial length of the constructed building (min.): 10 meters, width about 8 meters.

Right, in plan, a residential unit, at the west end of which are three rows of "growing" row-houses. The unit comprises 650 apartments. It represents a "visual entity" (cf. the Eindhoven plans).

Jürgen Joedicke

### Tensile Constructions

Applications for high buildings

(pages 158-159)

Whatever the type of a new structural system, the architect is interested in it only in respect of its possibilities of application in a formal conception, the latter often becoming an end in itself to the neglect of structural considerations.

It seems to us all the more important to define the relationships between architecture and construction, which ought to be merely a means for the architect and not an end in itself.

Tensile construction in Europe is not at all recent, steel tensile structures being first attempted in the 18th century.

Before the completion of the first arched bridge (Coalbrook, 1779), the English had erected a suspension bridge for pedestrians, with a span of 20 meters (between the counties of York and Durham, 1741).

The suspension bridge by James Finley across Bay (between Uniontown and Greenburgh, Pennsylvania, 1796) had a span of 21 meters. After obtaining a patent on this type of construction, Finley built 40 similar bridges up to 1808, and since that time this type of construction has been employed everywhere.

Old examples:

J. Templeman: bridge on the Merrimac, Massachusetts, 1809, span 62 meters. Th. Telford: bridge across the Menia Strait, 1819-26, span 175 meters.

For bridges the advantages of tensile construction are evident, for the arches or the templates are adapted only for a certain span, beyond which only the suspension or prestressed bridge remains feasible.

It is our own age that has offered possibilities of new types of application for tensile constructions, such as large halls and high buildings; and this kind of building presents a direct interest for the architect. In these new projects, the criterion of economy remains valid for tensile constructions, which, moreover, are capable of spanning great distances without supports and give rise to fewer difficulties in execution than do thin shells.

In this connection, it should be noted that every method of construction is possible only for work on a given scale which cannot be greatly surpassed even when the weight is increased to make possible longer spans, because the extra load due to supplementary reinforcements soon cancels out the value of the stress resistance.

Bernard Lafaille was one of the first to employ tensile systems, and that was for the construction of halls (French Pavillon, Zagreb, 1935).

René Sarger developed such systems in various projects.

In Germany Otto Frei in particular devotes himself to these problems (cf. the criticism of his work "Tensile Constructions").

The height capable of being reached by traditional skeleton structures is entirely adequate for present-day requirements.

Up to the present time the question of the advantages of tensile construction as compared to traditional skeleton structures has not been satisfactorily answered.

It was the Rasch brothers who first suggested the new possibilities open for other structural methods.

By concentrating loads on a core of reduced dimensions and by the suspension of decks, the encumbering of the site by such high-rise buildings has been greatly cut down. In this way such a conception offers new utilization possibilities and satisfies the continual demand on the part of modern architects that the site at grade level be kept free.

The economic advantages of tensile constructions also clearly emerge when we have buildings of low silhouette at the foot of high-rise buildings, whose compact supports do not interfere with the independent low structures.

Thus for a complex of involved volumes, tensile construction renders possible kinds of structural articulation that existed only theoretically heretofore or that were difficult to execute in practice.

Van den Broek and Bakema

### Auditorium Centre, Institute of Technology in Delft

(pages 160-162)

Execution: 1961

This centre comprises a large auditorium for 1500 persons, two auditoriums for 350 and two halls for 250 as well as a senate hall, plus the subsidiary premises (cloakrooms and WC for students and general public, utility rooms, supplementary installations of the senate hall with cloakrooms, WC and "vestment chamber" along with some board rooms; the plan is completed by the technical installations on basement level and under the roof). The original idea of accommodating part of the administration and the central library in this program was dropped.

Van den Broek sited the complex on the highest point of the university grounds and put it on piling to allow for free movement on the site. Only the entrance lobby remains on grade level.

The three sides that seal off the square imposed a maximum length of 60 meters for the building, which in turn determined the development of the other dimensions. The plan allowed for sufficient parking space and a bridge connecting the auditoriums and the physics building.

The furnishings are designed according to a longitudinal axial symmetry.

The stairs, lifts, halls and galleries are accessible from both sides. The hall is located between the two covered open-air spaces beneath the large auditorium and the other auditoriums; the cloakrooms are on the side of the main hall, the WCs on basement level.

Two symmetrical stairways go up from the entrance lobby and on the first floor lead into a hall which also serves as a canteen. This level accommodates the lower parts of the four auditoriums with the preparation rooms and, between them, the access to the bridge crossing over to the physics building; corridors with steps taking up the difference in levels run along the auditoriums.

A half-level higher is the lower part of the large auditorium, and on the second level there is the senate hall and the upper parts of the four auditoriums. On the inside of the building there is a hall lighted from overhead where all the corridors converge, some of them widened, which surround all the rooms.

Still another half-level higher the stairways terminate in a gallery opening on to the upper part of the large auditorium and on to an open-air passageway surrounding it. The solid separating barriers between the auditoriums and the main hall are constituted by a vertical core comprising the technical installations, the lifts, etc. Two open-air stairways connect the passageways around the large auditorium with the entrance level and tie in on each level with the intermediate halls.

The building has a mixed supporting structure. The auditoriums are carried by pillars, floats and frame elements at intervals of up to 15 meters and by decks, T-beams or coffered ceilings (beneath the auditoriums). The "saucer" base of the large auditorium, trapezoidal in shape, supported by four elements (two solid cores on the interior of the building and two pillars on the outside), projects along the entire length of the building; it rests on two cores, and a row of freely disposed pillars supports it in the rear. The stairways, the senate room and the interior auditoriums are covered by a reticulated construction which is lower resting on the same pillars carrying the lower floors. This construction is staggered upwards above the outer auditoriums and rests on supporting walls the interval of which corresponds to that of the pillars.

Above the large auditorium this construction ends horizontally, whereas in the other auditoriums it folds back to form the rear wall.

The communications surfaces resume the lengthwise articulation of the interior volumes in convincing fashion and develop upwards with a to-and-fro movement. The staggered galleries sited at half-level in relation to one another accentuate still more the contrast between two complexes of interior volumes by opening directly on to the large vacant space in which is sited the main stairway.

The communications surfaces diminish upwards, and the corridors running along the sides of the auditoriums are kept narrow to accentuate still more the importance of the central hall. - "Function of the design" (van den Broek and Bakema), "semantic information" (Bense).

Whereas the central communications arteries, the corridors, the stairways and the exterior passageway are directly related to the open-air spaces and whereas this spatial penetration becomes even more concrete owing to the plastically conceived faces and the connection with the large auditorium, the interior spaces grouped around a closed in hall are totally self-enclosed.

Thus the threefold spatial succession is distinct and clearly defined.

Nevertheless, the symmetry (especially in the central hall) gives rise to equivocal situations, for the even balanced movements from each side lead to confusion. This problem comes up in all symmetrical constructions, where each architectural element is simply doubled, which way of proceeding remains dubious both from the aesthetic point of view and from the functional standpoint.

As for the design of the roof structures, it should be pointed out that the reticulated and sharply projecting construction of the large auditorium

seems to be rather arbitrary in its formal continuation into the other parts of the building; above all, when it is considered that the same spans (e.g., central tract) are bridged by simple decks or ribbed decks on the lower levels. Now then, the junctions between the roof structure of the large auditorium and that of the rest of the building are statically unclear and plastically disproportioned, when it is borne in mind how much formal significance resides in such a construction. However, it is mainly the projecting angles due to the folding back of the reticulated construction of the exterior auditoriums which is open to discussion, for they possess no interior meaning since they are cluttered with technical installations.

At this juncture there can be noted the same principles as obtain in the work of Niemeyer, Breuer and Johnson, who apply these designs without preserving their static functions. Thus it remains difficult to make sense of the resultant idiom.

The development of the communications areas is consistent and clearly defined. As for the plastic masses, their expression is decidedly constructivist (roof structures and underfaces of the halls).

However, the constructive clarity of the interior is practically nil. The supporting system is duplicated by independent elements matching the architectonic expression of each volume.

The formal exterior articulation reveals openwork construction at street level, with constructivist elements on the roof and ceilings of the interior volumes.

The central part housing the communications is sharply articulated with a view to expressing the interior functions.

Powerful contrasts between the open parts and the closed parts and when viewed in relief.

K. Wiekart

### Present-day Architecture in the Netherlands

(pages 163-168)

#### Introduction:

Holland, a flat country, devoid of mountains and valleys, without untamed rivers and impenetrable forests, with its exemplarily articulated Polder structure, cannot even employ for new industries and housing its remaining forests and heaths, which are protected or used as military proving grounds.

Dutch culture is a symbiosis derived from a centuries-old struggle between the Roman Catholic (Latin) civilization and that of Calvinism (Germanic), whose serious stolid character checks any tendency toward dangerous experimentation and bold expressionism. This attitude becomes clear in architecture in the disappearance, and it was rapid, of the Amsterdam School (de Klerk, Kramer, van der May), whose exuberant idiom did not strike a responsive chord in the hearts of the Dutch people, by their very nature sober and steady.

Holland was one of the first countries to introduce the style of Wright into Europe (van Berlage, van 't Hoff, Oud, Rietveld), there are very few buildings that are influenced directly by this American architect.

When it was sought to attribute the first creations of "Stijl" and "Functionalism" to the influence of Mondrian, and Mondrian's work to the presence of the Dutch landscape with its Polders (Giedion), Rietveld raised a lively protest affirming their theoretical convictions which constituted the essential basis of their experiments.

To sum up, it can be concluded that modern Dutch architecture in the pre-war period was the outcome of environmental influence, of a specific cultural pattern and of contact with the outside world, and that actual projects were stimulated and carried forward by a spontaneous idealism.

#### Developments after 1945:

The stoppage in construction in the period 1940-1945 caused by the war did not furnish any real basis for the post-war architect. Since overseas ties were broken and since the only neighbouring influences were those of the Third Reich (anecdotal style of Schmitthenner), many Dutch architects conformed-without, however, being

Nazi sympathizers-to this traditional Germanic historicist style with its false romanticism which Granpré Mollière imposed on the Delft School, he being responsible for the reconstruction of Middelburg and Rehen and some of the first districts of the new Rotterdam.

Therefore-aside from the housing shortage-it is perhaps fortunate that prosperity did not return to Holland until around 1950; because in the meantime the precursors of the Twenties and the post-war avant-garde (Oud, van den Broek, Bakema and the critic Vriend) won out definitively over the Delft School. The consequence is that a survey of contemporary Dutch architecture can concentrate on the last fifteen years.

To give a clear over-all view, we can classify the different buildings in the following categories:

#### 1. Housing

The present situation in the field of housing in Holland is regrettable, for the number of good housing projects (built by Groosman, van den Broek, Bakema, Zanstra, Fledderus, Rietveld, van Tijen, Maaskant and others) that are known abroad is comparatively small. Also, after the worst shortage was overcome, complaints were heard regarding imperfect workmanship, excessive sound conduction, insufficiency of living space, lack of comfort and the monotony of the new urban outskirts and suburbs.

Architects, as well as the public, want to do something about it. There is a tendency in the direction of a "habitat" with a veritable core that can be recognized as such and directly felt.

At this juncture there ought to be cited the studies made by van den Broek and Bakema in association with the CIAM group (plans for Rotterdam-Pendrecht, 1949, Klein-Drienne district, Hengelo, planning of Nordkennererland).

#### Public housing projects.

Despite the restrictions imposed on subsidized buildings, some housing projects have been satisfactory (Rietveld, Bloemsa: apartment house in Amsterdam; Oudejans and Alberts: workers' housing at Edam and Volendam).

Since Holland has a large number of elderly citizens, the problem of homes for the aged is a very pressing one. Attempts are being made to create housing that takes into account their physical handicaps but at the same time keeps them in touch with social life (Tijen, Boom, Posno: A. H. Gerhard Home for the Aged, 1956/59).

Collective housing seeks a compromise between social living and privacy for the individual. Designs are executed that leave open the possibility of isolation for everyone, by disposing apartments in staggered lines connected by corridors forming what amount to interior courtyards (home for nurses, Hilversum hospital by Elshuis; children's home in Amsterdam by Aldo van Eyck).

#### Single-family homes.

There are many good examples in Holland. Mention must be made of the experiments of Rietveld with a cell-unit that can be multiplied, or stacked in an apartment tower (Utrecht, 1960), as well as of the houses of van den Broek and Bakema (house for Dr. Wieringa at Middelharnis, van Buchem house in Rotterdam), of Elling (at Wassenaar, etc.), of Romke de Vries (at Emmen, etc.), of van Leeuwen (in The Hague and at Aerdenhout), of Vlaming and Salm (at Bilthoven, etc.), of Oud (Weissenhof, Stuttgart, 1927; country house near The Hague, 1960).

#### Hospitals.

Recently the comfort offered in sick-rooms has greatly improved and hospitals have the most up-to-date installations. However, the most recent hospital construction does not present any architectural interest except for that of Kloos at Almelo and at Terneuzen. (Dijzig Hospital in Rotterdam, 1961, by Viergever and den Hollander; Red Cross Hospital in The Hague, 1960, by Luthmann.)

#### Social Welfare Building.

Children's rest home by Oud in Arnhem, 1960.

Oud imagined this complex as a village in the forest composed of pavilions, a main building, a sports build-

ing, a heating plant, a chapel and a school (the latter two not yet executed). Each building conserves its identity and the communications among them integrate the whole with the natural surroundings.

Children's home by van Eyck in Amsterdam, 1960.

In the van Eyck complex the children live indoors and outdoors simultaneously, for the numerous interior courtyards separating the different elements open on the landscape, as do the large picture windows and the partitions between the buildings. Communications are effected on the inside via streets with lamps, benches and small squares. The complex is divided into units in accordance with age groups with separate dining-rooms and dormitories. The employment of simple materials further accentuates the spatial wealth of this complex.

#### 2. Places of Work

##### School Construction:

There are many good contemporary examples in Holland, where architects have had the wisdom to break with the tradition of the big rectangular block with its central corridor and classes on both sides. They have opted for more richly articulated plans (van den Broek and Bakema: Montessori high school in Rotterdam; High school in The Hague by Oud).

For primary schools, with a smaller number of pupils, pavilions have been constructed; in this way, each new academic year presents a new atmosphere by the fact that the classrooms are changed, the pupil being given a new focus and a new outlook (van den Broek and Bakema: Brielle; Maaskant: Mappel; van Eyck: Nagele; Groosman: Axel).

Nevertheless, a certain fatigue both in utility building and in housing is becoming apparent, and in the place of the idealism at the outset of the modern period there is becoming noticeable and attitude of disinterest, a kind of disappointment that is leading to a generalized spirit of conformity.

The philosophical and psychological explanation bases itself on the mounting influence of the nihilist thought of the last decade. This outlook grew into an obstacle to any faith in the possible progress of architecture.

This malaise becomes most essentially apparent in office buildings, churches and cultural centres. (Dudok: is no exception save for his port authority building in Amsterdam, 1958/60; Wils [who was in "Stijl"]: Citroen building in Amsterdam, 1961; Bodon: "Eertse Nederlandsche" insurance building in Rotterdam, 1960; Merkelbach: G.A.K. building in Amsterdam, 1960; Abspoel: Shell building in Rotterdam, 1961; numerous buildings by the two Kraayvangers in Rotterdam; all these buildings are honest but mediocre.)

##### Better examples:

Boks: office building for the harbour tug services, Rotterdam; Bakker: Philips-Roxane building in Amsterdam; Brouwer and Deurvorst: Nilmy building, The Hague, 1960; Rietveld: Schrale Concrete building, at Zwolle, 1958; van den Broek and Bakema: broadcasting building at Hilversum, 1961; Oud: Utrecht building in Rotterdam, 1961; Elling: broadcasting studio and secretariat at Hilversum, 1962.

Van den Broek and Bakema separate the recording studios and the offices but simplify internal communications by the disposition of the two blocks in a cross and thus stimulate increased personal contacts as well as integrate the complex with the outdoors. The siting of the studios is therefore not an ad hoc inspiration but derives from their technical function.

##### Factory construction.

Only a few good examples have been built:

Rietveld: "De Ploeg" textile mill at Bergijk, 1961; van Hasselt and de Koning: electric power station at Geertruidenberg, paper factory at Nimwegen; Maaskant: Tomado and Tozindo factories; office building of Tomado SA (which is a problematical visiting card), 1962.

##### Traditional style buildings:

Now then, the over-all idea resulting from these examples would be much too optimistic if we did not take into account the traditional style buildings arising in every Dutch city:

Friedhoff: tax administration building in Amsterdam, some government buildings in The Hague; Berghoef: town hall at Aalsmeer, A.N.W.B. building in The Hague; Berghoef and Vegter: city hall in Amsterdam (plan in moderate conformity to modern architecture externally, not thoroughly conceived). Although the public is unanimously opposed to this proposal, the authorities seem to be ignoring this fact, and there is a danger that this stylistic anomaly will be constructed.

### 3. Recreation and Communication

At this juncture it is necessary to point out another aspect of contemporary architecture (and this does not apply to Holland alone), a consequence, in fact a kind of opposite pole to the fatigue described above: what we mean is this tendency toward originality at all costs.

It often appears that "do it differently" takes priority over "do it better" and becomes an end in itself, which, purely by chance, may entail doing the job better, as if quality need not remain the highest criterion—and not in the sense of "art for art's sake"—but as a response to human requirements.

In this way we have an explanation both for the numerous attempts to be original and for the lack of cogent plans born of an overriding will to form and grounded in a unified personal creative drive, in present-day requirements and in a well understood tradition. For centuries past, in architecture, the choice has always been: "do it better", and "do it differently" remains but an inherent effect.

#### Churches:

Oud said once that "the architect could celebrate its own carnival when he built a church". Almost the same can be said of the construction of theatres, cinemas, convention halls, etc. There is an all but omnipresent confusion, and it is rare to come upon honestly designed churches, such as: van den Broek and Bakema: church in Schiedam and at Nagele; Oudejans and Alberts: Chatolic church at Volendam, 1962.

#### Museums:

Examples of cultural buildings: Rietveld: "Zonnehof" Museum in Amersfoort, 1960 (worthy successor to the "Sonsbeek" Museum near Arnhem, 1954, unfortunately destroyed); it is based on the same principle of harmoniously grouped background walls permitting the exhibited works of art to retain their own autonomous life; the whole complex is surrounded by one single exterior protective wall; Schamhart and Heyligers: extension of the municipal museum, 1962 (conceived according to the same principle).

#### Theatres:

Bijvoet and Holt: theatres at Tilburg and at Nimwegen. (These buildings fully comply with the technical requirements set; the volumes depend on the different interior functions, but the masses of the final complex are not in the last analysis in equilibrium.)

Rijvoet and Peutz: theatre at Heerlen, 1961; (adaptation of a classical design: central tract with auditorium and stage, utility rooms disposed symmetrically around; less imaginative conception but greater clarity).

Bijvoet: plans for the Opera in Amsterdam and for a concert hall in Utrecht; Oud: "large convention hall" in The Hague, work on which will get under way in March 1963.

#### Shopping Centers:

Van den Broek and Bakema and Maaskant have designed a number of "objects for all purposes" which, however, taken as a whole do not present any original solutions;

Bodon: RIA building in Amsterdam, 1961;

Maaskant: lake bridge at Scheveningen, "Euro" tower in Rotterdam.

#### Communications, Post offices, RR stations:

There are some good examples:

Van den Broek and Bakema: post office building; van der Gaast: railway stations in Eindhoven, Schiedam, Venlo, Hardinxveld, Zevenaar.

#### Hotels:

Boks: Britannia Hotel at Vlissingen, 1955/61; Delta Hotel at Vlaardingen, 1955;

Elling: Rijnhotel in Rotterdam, 1959; Bakker: Cocagne Hotel at Eindhoven, 1959; Bakker: Cocagne Hotel at Eindhoven, 1962;

#### Recreation:

De Vlaming and Salm: scout hut in Amsterdam; Schröder: recreation centre in Utrecht; Clim Meyer: hockey club house in Amsterdam.

These three small buildings are singled out merely as examples of very successfully conceived small buildings. We can conclude that Holland prefers to apply itself to small projects where it can exercise its gift for minuscule architectural detailing, for large-scale programs with their impressive monumentality are not in keeping either with the character of the people or the landscape.

Whoever is familiar with the political and cultural history of the Netherlands will be tempted to believe that Dutch architects will succeed in evolving a new form of architecture on the basis of their love for detail, which will circumvent the pervading scepticism and open the way to a new architecture whose importance will be considerable.

#### Werner Kallmorgen

##### Ernst Barlach Museum, Hamburg-Kleinflottbek, Jenisch Park

(pages 169-175)

Execution: 1961/62

"Barlach is not interested in articulated structure, in naked tectonics. All his shapes are clothed, not in the manner customary in the 19th century but like veiled figures fraught with mystery beneath the mantle of their coverings. These creatures wear their garb like a shield, they shiver under it and they seek shelter. They resemble exiles fleeing mankind but at the same time seeking out their brothers" (Werner Hofmann).

Ernst Barlach, born January 2, 1880 at Wedel/Holstein, died October 24, 1938 in Rostock, had a complicated nature for whom work was not a pure joy but rather a severe discipline (Theodor Heuss), and he suffered more than others from the Nazi regime. At the same time he enjoyed the friendship of the patron Hermann F. Reemtsma, who visited the artist for the first time in 1934 and encouraged him by making it possible for him to finish his Frieze of the Listeners, which is one of the finest pieces in the Reemtsma Collection. In 1960 he bequeathed his entire collection, but he did not live to see the completion of the museum of which he had already accepted the plans. Beginning in 1962, the City of Hamburg has had a Barlach Museum housing his sculptures, his graphic works and his dramatic writings (Blaue Boll, Arme Vetter), which are important documents of the German theatre during its golden age of the Twenties.

The monumentality of the statues of Barlach does not reside in their actual size (they are of rather small scale) but in their expression and in their gestures. All the more difficult then is the assignment of the architect to create a setting for these works. Kallmorgen has designed an architectural skin that effaces itself in the presence of the objects exhibited.

The site is the Jenisch Park, with a large public garden, a botanical garden and a patrician house in classical style on the steep bank of the Elbe.

Kallmorgen selected as building site an area with a stand of large oaks close to the great house and the botanical garden. Kallmorgen preserved the basic conception of the Jenisch house, which is a simple cubic volume enlivened by cornices and the portico, and which establishes a rhythmical element in the luxuriant natural setting; he built a simple block articulated on the interior, its whitewash constituting yet another contrast to the natural surroundings of the park. This contrast between the landscape and the architectural mass in taken up again in a different fashion on the interior: the statues of Barlach, replete with movement, with ecstasy, are placed in front of a background which underlines their scale (via col-

our) and their expression, which is plastic, and which renders possible a "dialogue" between the sculptures and the spectator.

As an example Otto Frei cites the Boston Arts Center Theater, a building in the shape of a lens, supported by a steel compression ring.

Although the work as a whole is impressive, the detailing on the exterior walls in particular shows the difficulties encountered in attempting to assimilate architectural designs to this type of construction.

Then the author deals with shapes subject to interior pressure exerted by a fluid. Up to the present time, the container is the best known application of this principle, but research is being focused on new shapes applicable to rigid or flexible dams.

Finally, Otto Frei enumerates the combinations of rods, cables and membranes or those of membranes and arches.

The author is surely right in pointing out that the animal world is the best example of how shapes and functions are brought together in such a way that man will probably never succeed in explaining.

It is on such considerations as these that Otto Frei bases his aesthetics, persisting in contrasting the formal world of natural organisms and that which has issued from the mind of man.

The first part ends with a discussion of "sail-shell" structures (a kind of elastic skin suspended, loaded, frozen, unloaded and finally reversed) and of reinforced pneumatic structures.

These experiments with the aid of models permit the architect to become familiar with this type of construction and with the very difficult field of stress distribution in membranes.

The second part, which ought to be reviewed by a statics specialist, deals with methods of calculating pneumatic constructions.

The third part takes up the question of ground guys in tensile constructions.

The great scope of this work, the profound interest in the subject that is displayed and the authors' thorough knowledge exceed by far the usual limits of works on building and architecture.

This work has value only for someone who takes the pains to go into the subject very thoroughly, and it remains stimulating even in those places that give rise to criticism, for Otto Frei himself wishes the unfinished parts to be more provocative than the sections where the problems are clearly defined.

For all these reasons this is a most rewarding work, a first-rate work.

#### Frei Otto and Rudolf Trostel

##### Tensile Constructions

(page 176)

Ullstein Books, technical section, Frankfurt-Berlin

To illustrate the continuous efforts that Frei Otto is making to give concrete realization to his mathematical ideas, we are citing here his last work entitled "Tensile Constructions", which he brought out in association with the engineer Rudolf Trostel and which lives up to his first work (The Suspended Roof Structure, 1953).

His experiments are among the most interesting in the field of new structural designs applicable to architecture.

The first part deals with pneumatic constructions. Frei Otto's justification of these is debatable, for he claims that his constructions satisfy the modern trend toward "assimilating abstract and mathematical techniques to the organic world".

At this juncture it should be pointed out that natural structures and those created by man belong to existential realms that are different in essence.

Whereas natural organisms, even in their initial states, imply their laws of development, the world created by man consists only of projects that are ceaselessly transformable.

Despite the modern notion of "organic architecture", the works of man will always be distinguished from biological organisms, and the existing corre-

spondences which Prof. Helmckes shows us in his electronic photographs of diatoms remain inexplicable and miraculous. The attempt to achieve organic form starting from fixed shapes is in any case doomed to failure, and the author elaborates his designs on the basis of the laws of statics.

The following chapters comprise the various concrete shapes derived from this theory of tensile constructions.

First of all, as main shape the dome (stressed pneumatically, by cables or by netting).

In this chapter it is particularly interesting to follow the analysis of the laws governing the formation of soap bubbles. The author illustrates his theories by constructed examples. Mention ought to be made of the spherical vault stressed pneumatically with a span of 60 meters planned by Walter W. Bird and by the Schjeldahl Co.

It would be easier, however, to understand the text if it were presented independently of the examples, which can represent only particular applications of general laws. Thus only a careful comparative effort enables one to distinguish the general theoretical principles from those that are applicable only to a special case.

Then Frei Otto speaks about domes capping a square base or a rectangular one, and this he illustrates by means of instructive models. Everyone knows about the cylinders stressed pneumatically in the form of automobile tires. Frei Otto emphasizes the proposals that are valid in the field of building by way of examples of greenhouses, swimming-pool copings and large factory sheds.

In the following chapters an enumeration is made, with diagrammatic drawings, of conic and helicoid shapes.

As for their realization, it depends on the problem of the absolute effective dimensions as well as on the maximum load values.

Being in possession of rather comprehensive knowledge of the laws concerning dimensions, Frei Otto could have defined them in summary fashion for each type of construction. Also the execution of such shapes depends essentially on the materials available which are capable of adaptation. We should have appreciated a comparative list containing, respectively, the loads and the necessary resistances which could likewise have served as a basis for a new series of industrial tests.

As for "cushion" constructions, exhibition pavilions are the largest field of application.

To accentuate the spatial character of the figures and to prevent the formation of silhouettes, the architect selected an identical shade, a dark shade, for both the walls and the floor.

The visitor enters the building through an opening cut out of the solid face and steps into a hall giving access to the reading-room and the library. Some steps separate the hall from Room No. 1, which is elongated and which runs on the right into a board room and, opposite, into Room No. 2. This room, decorated by the Frieze of the Listeners, can be used as a platform for the board room for special functions (cf. "Spatial sequences at an exhibition" and "Spatial sequences during a special event"). The left corridor leads to the statue of Moses in Room No. 3, where there can be seen a bust of Tilla Durieux. Moses is illuminated by a skylight (technique often employed for the exhibition of sculptures). Some steps go from No. 3, which is very narrow, into Room No. 4, very spacious, and still more steps go up to Rooms 5 and 6, two joined cubicles, at whose intersection is the passageway to Room No. 7 and so back to the entrance. It is only at this point that there is again a view toward the outdoors. The rooms are spatially differentiated and subject to varying light effects, which makes possible the optimum sitting of each statue.

It is a simple building containing a succession of richly differentiated volumes, but preserving clearly articulated shapes and proportions; it is a clearly unified entity and deserves mention among the best things that have been created in the last few years in Germany. Jürgen Joedicke