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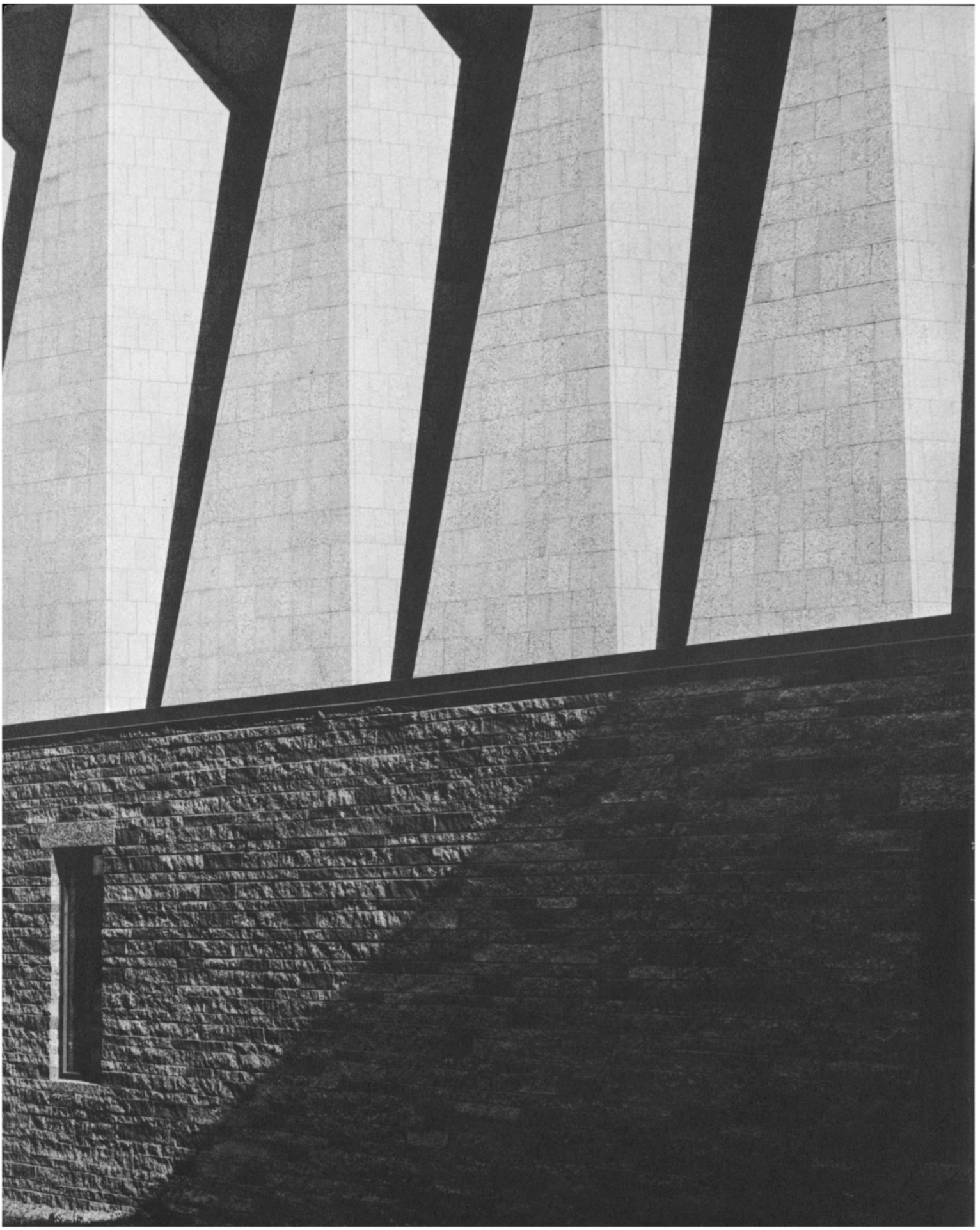
MARCEL BREUER

The Buildings at St. John's Abbey

Collegeville, Minnesota



On the occasion of the opening of the exhibition "St. John's Abbey", the Walker Art Center presents this issue of DESIGN QUARTERLY, devoted to the recently completed and projected works designed by Marcel Breuer for St. John's Abbey, Collegeville, Minnesota. This great building project represents an extraordinarily enlightened and historic cooperative effort involving the Benedictine community of St. John's Abbey who worked closely and imaginatively with Marcel Breuer and Associates.

We are grateful to Mr. Breuer and his staff for designing the exhibition and for their invaluable assistance in preparing this publication. Hamilton Smith, one of Mr. Breuer's closest associates and a senior architect on the project, has had an important part in developing the master plan of the church complex and in the design of the various buildings. It is particularly appropriate that the descriptive article in this issue should be his.

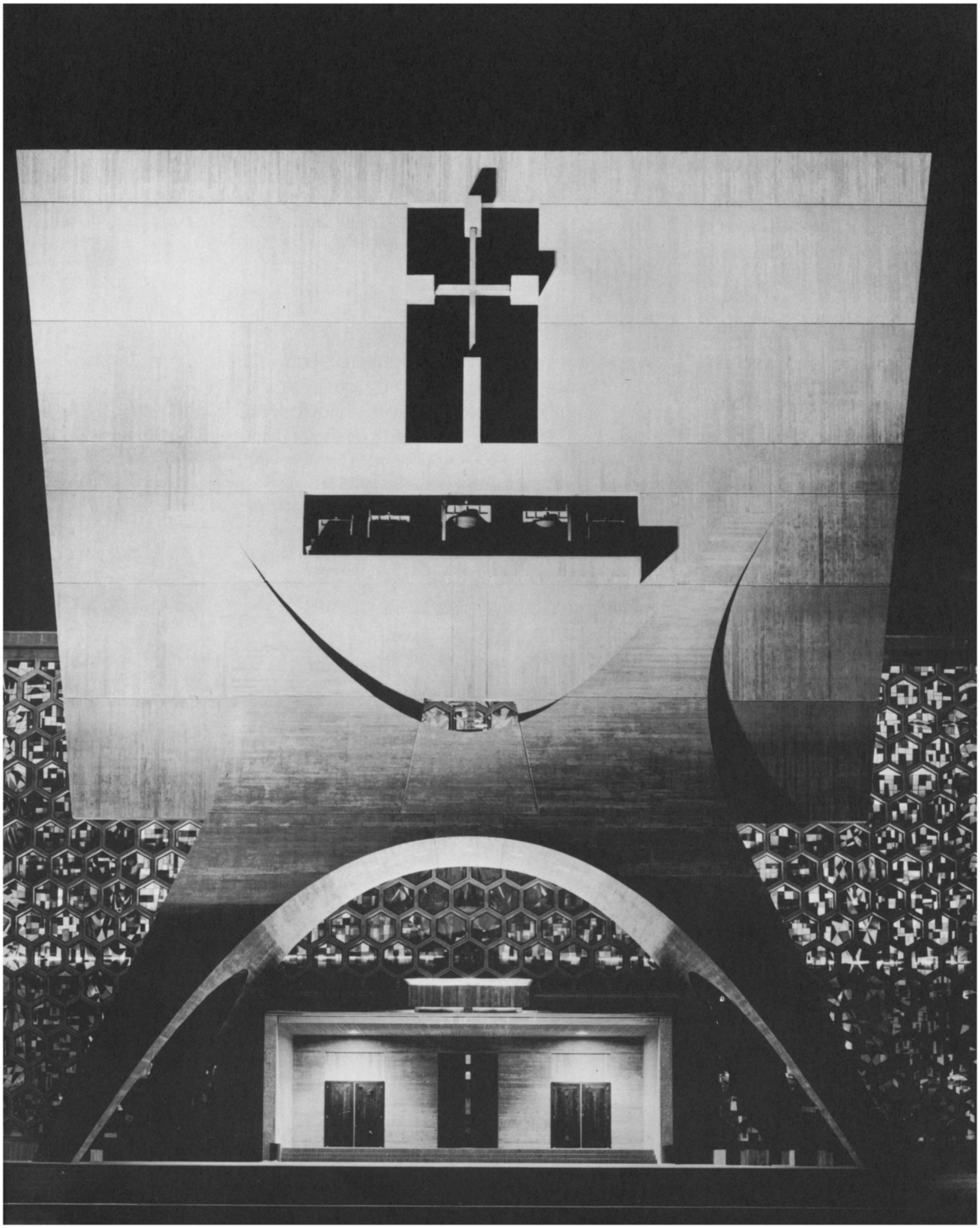
We are grateful to Abbot Baldwin, the monks, and the brothers of the community who were responsible for fabricating the colored glass for the mock-up hexagonal window in the exhibition and who gave support and encouragement to the entire project.

Important thanks are due Charles P. McGough for his efforts in coordinating the contributions of his own firm with those of the sub-contractors listed on page 32 of this issue. All have given generously of materials, services, and funds.

Thanks are also due the photographers. Photographs on pages 1, 2, 4, 10, 12, 14, 16, 18, and 20 are by Eric Sutherland, Walker Art Center photographer. The photo on page 8 is by Lee Hanley. The remainder are by Shin Koyama.

Martin L. Friedman
Director, Walker Art Center

Exterior sidewalls of church are concrete folds with granite sheathing.



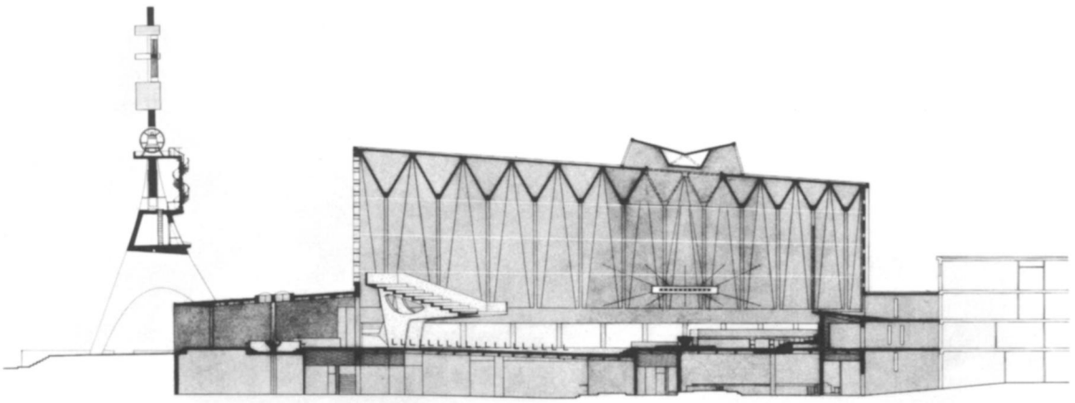
Plans and details of the St. John's Abbey Church were based upon a meticulously re-examined liturgical tradition. To crystallize this tradition was a vital contribution of the devoted monastic community to the building.

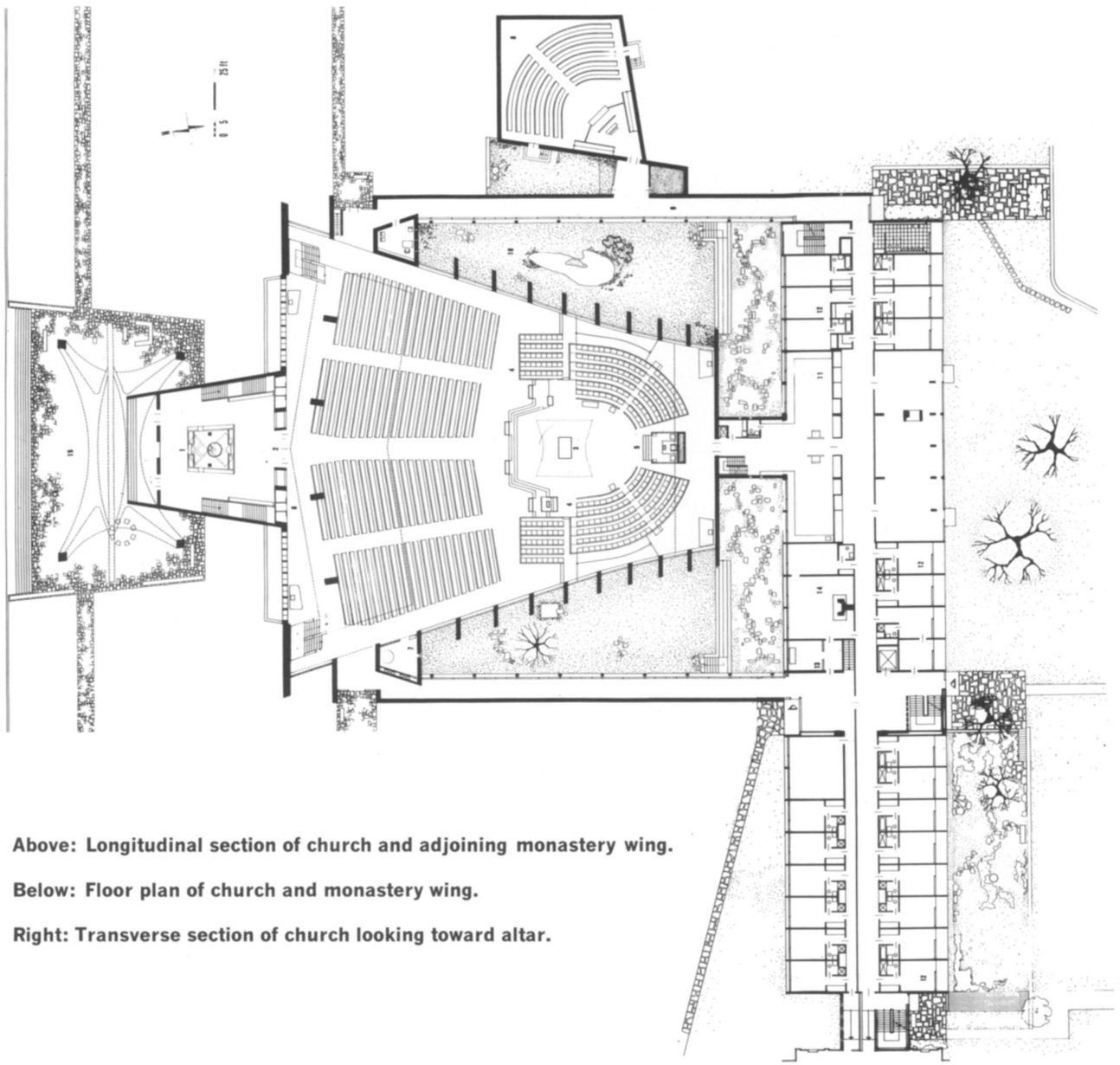
Although the church may be a new sensation to the eye, its architectural concepts resemble in some ways those of religious buildings in the Middle Ages and the Classic period. Whether stone lintels on stone columns, whether Roman or Gothic arches, whether dome, barrel vault, or folded plates of concrete are employed, church architecture at its best is always identical with the structural logic of the enclosure. This identity is basic, dominating, and it is visually so obvious that it almost appears simple though including infinite subtleties. The rhythm of space is that of its structure despite important differences of technology and form: in the old days, stone on stone held in place by the weight of the parts; now, one flowing line of concrete held in place by the continuity of integral steel bars.

How much we will be affected by the building, how much it will signify its reverent purpose will depend on the courage it manifests in facing the ancient task: to defeat gravity and to lift the material to great heights over great spans; to render the enclosed space a part of infinite space. There the structure stands, its story told by the eternal laws of geometry, gravity, space. This is also true for its bell banner— a slender cantilevered slab on parabolic supports. This form, or symbol, is made possible by our technology, by new building methods, new materials, and modern engineering. Still, it is ruled by the same eternal laws of geometry, gravity, space.

Marcel Breuer

Left: Church bell banner, a thin slab of concrete 112 feet high, is seen against the north facade, a hexagonal window-wall 165 feet wide.





Above: Longitudinal section of church and adjoining monastery wing.

Below: Floor plan of church and monastery wing.

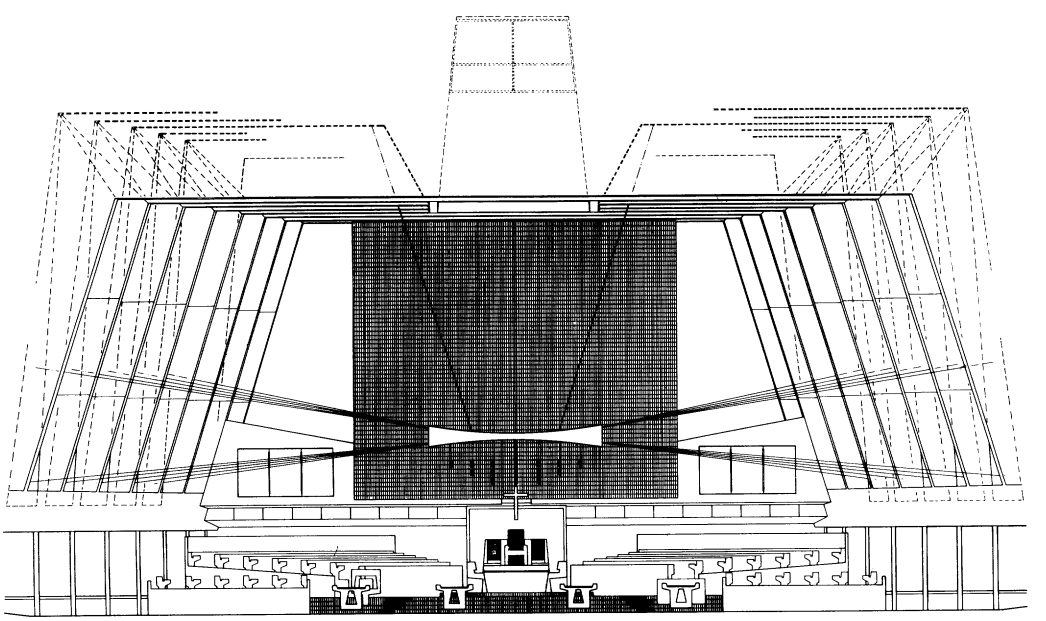
Right: Transverse section of church looking toward altar.

In 1953 Marcel Breuer was commissioned to prepare a master plan for a building program at St. John's Abbey, Collegeville, Minnesota.

To carry out this planning project, an intensive program of fact-finding, analysis, and evaluation was inaugurated in collaboration with the monks of this religious community. Out of this study evolved a forecast of immediate and long-range building needs, spanning a period of 100 years.

Replacement of old buildings past usefulness would be accomplished gently through a system of "shadow-building" devised by Breuer. This process is analagous to changing the bed of a river: a new water course is created parallel to the old, the stream is diverted to the new bed, and only then is the original course altered. Existing and essential communications are, therefore, never interrupted.

Three buildings—the monastery, the student dormitory and the church—have been completed. These along with the projected library are discussed in this article.



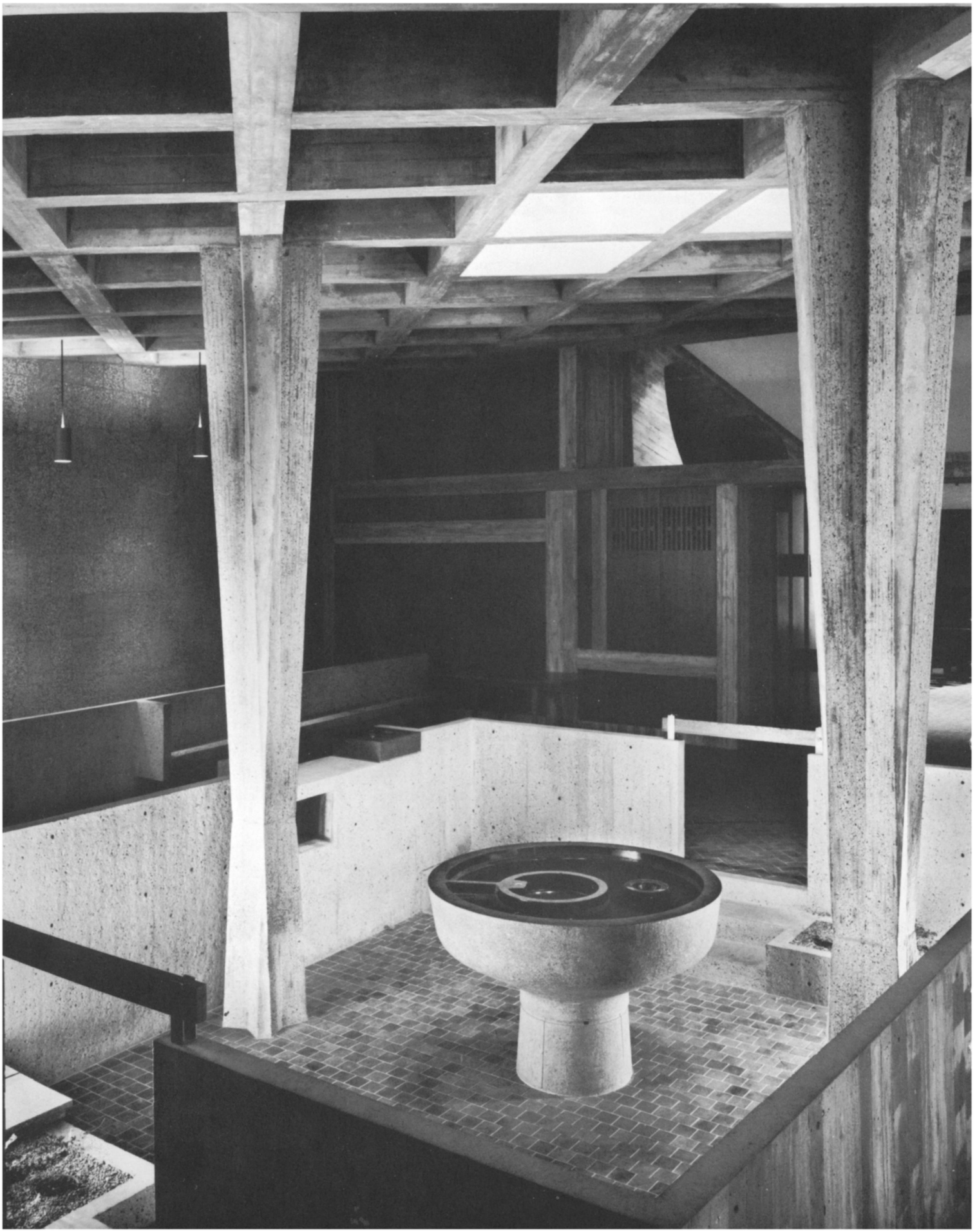
Abbey and University Church of St. John the Baptist

The church at St. John's was designed and built for a community of Benedictine priests, clerics, and brothers, for students enrolled in their university and preparatory school, and also for parishioners living on neighboring farms. Each of these three groups had special requirements to be met in planning.

The program for the monastic church called for: a large choir for almost two hundred priests, augmented on occasion by the brothers' choir of eighty; thirty-four small chapels to be used for private devotions required of each priest daily; an unusually spacious sanctuary for ceremonies of investiture; a separate chapel for the brothers who chant their services in English (the monks adhere to Latin); and a chapter house seating 150 where the monks meet in congress to decide secular matters. The university's program need was seating capacity in the main church for 1,600 college students. The preparatory school program called for a separate chapel seating about four hundred to be used by students and also by parishioners. In addition, the parish required a pastor's office and a baptistry.

The following is a description in simple terms of how some of these program requirements were incorporated into the final plan and how these space-needs, together with certain important ideas, contributed to the building's shape and form. To illustrate this complex process, three liturgical, three architectural, and three philosophical viewpoints were selected for discussion. Obviously these nine viewpoints were qualified and modified by many other similar considerations.

Left: Bell banner with its parabolic supports forms entrance to church baptistry.



Three significant liturgical ideas proposed by the monks as fundamentally affecting their use of the new church are reflected in its plan-shape. They requested the following:

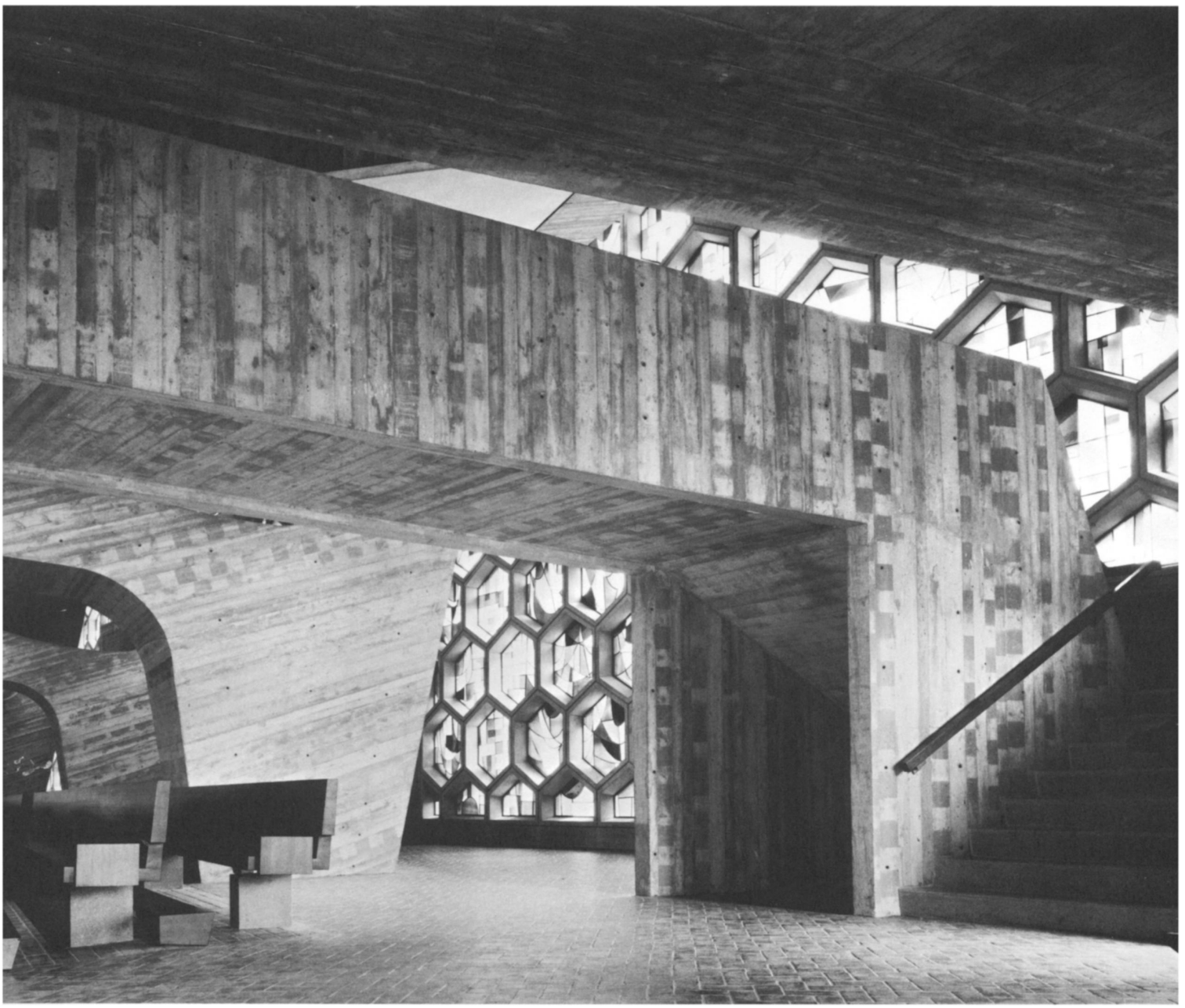
1. The high altar should be separated from the reredos and ciborium and relocated as a central free-standing element so as not to seem remote to either the congregation or the monastic choir.

2. The monastic choir should be visible to the congregation, should not be concealed in traditional transepts or behind screened enclosures, and should be separated into equal halves as required for the musical dialogue of the Benedictine plain song in which daily offices are chanted.

3. The significant liturgical elements—baptismal font, church doorway, confessionals, communion tables, altar, and throne—should be ordered for symbolic and visual reasons in a sequence along the central axis of the building. Thus, one should enter the church through the baptistry and immediately find the confessionals. Proceeding down the central aisle, one should find the altar, balanced by communion tables. Beyond these should be the symmetrical halves of the choir and, at the termination of the axis, the Abbot's throne.

The first two ideas led to the bell-shaped plan. The large sanctuary, surrounding the altar, and the two halves of the choir fill the throat of the bell. The nave occupies the mouth of the bell and is, therefore, broad rather than deep. In order to realize as fully as possible the aim of having the entire congregation close to the sanctuary, a free-standing balcony, cantilevered from only four legs, was designed over the nave in preference to the usual lengthening of the body of the church. The bell-shaped plan, in turn, fostered an interesting and useful spatial phenomenon. From the viewpoint of the monastic choir, the length of the nave seems foreshortened. The converging effect of perspective is counteracted by the diverging sides of the building. The result makes the whole interior visually approachable to the choir even during pre-dawn services when the church is otherwise empty.

Left: Baptistry, with font under glazed skylights, leads to main entrance of church.



The third idea led to the design of a low entrance structure in front of the main mass of the church, reminiscent of the ancient atrium. In recognition of Minnesota climate, glazed skylights in the center of the roof replace the open court. Directly beneath this natural light source on the central axis is the baptismal font surrounded by low parapet walls. In a liturgical sense, the symbolic doorway to the church proper is not the outside opening in the atrium but is the entry following the baptistry. Thus, entrance to the church is gained via the font-area and, in the case of a newly-baptized child, directly through it. The entrance doors swing between wide granite jambs in a wall which contains the confessionals within its thickness.

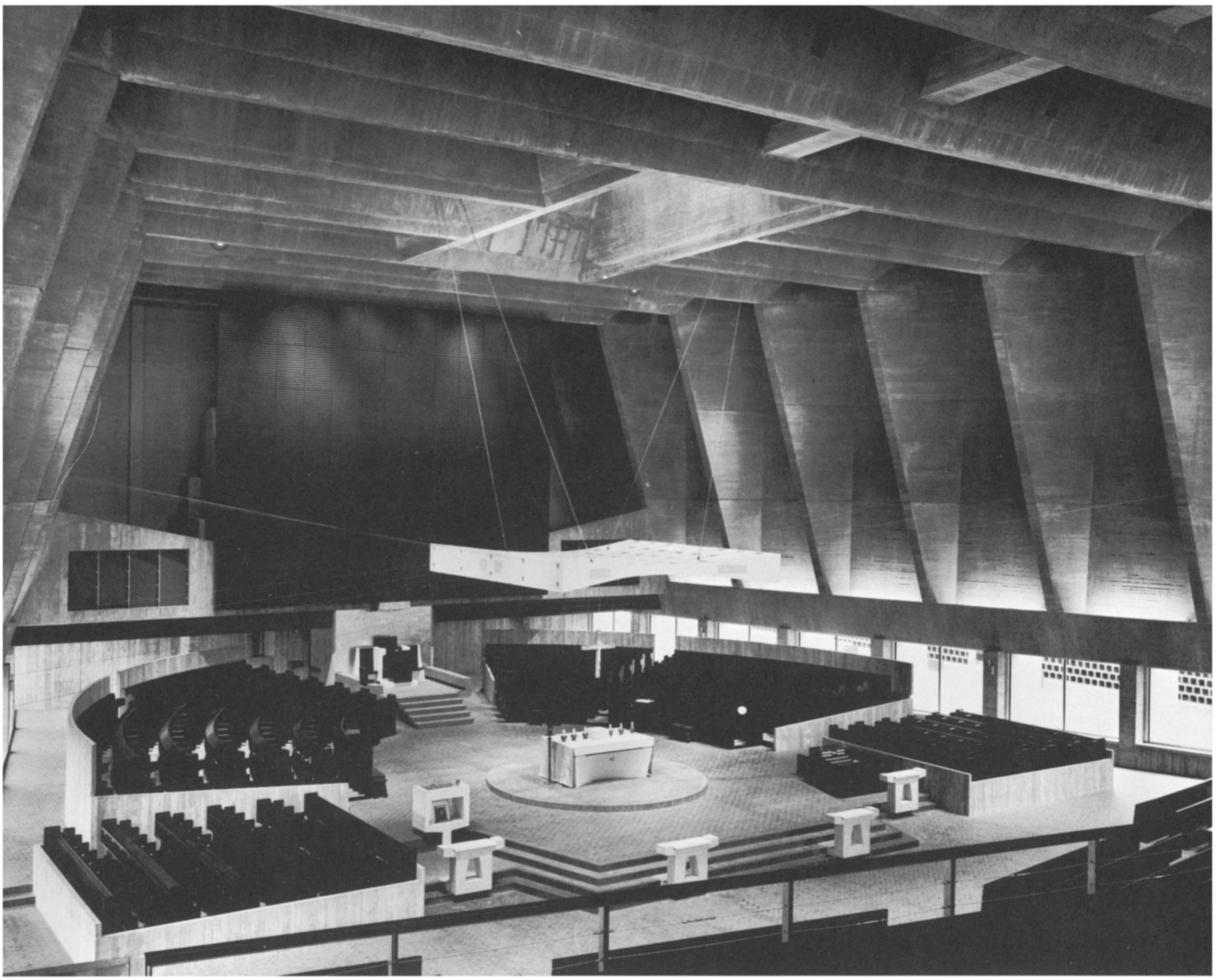
Paralleling in importance the three liturgical ideas which gave rise to the building plan-shape were the following three architectural convictions developed by Marcel Breuer. These gave the building its basic form.

1. The means of construction by which the large space is framed and roofed-over must be clearly shown as the dominant visual fact of both the interior and exterior and must grow out of contemporary building technology.

2. The interior space of the church should not be limited to that area covered by the roof but should extend to adjacent outdoor spaces, confined and controlled by architectural order.

3. The traditional bell tower could be resurrected in new forms to fulfill contemporary needs. It could serve as an immense reflector of the southern sky, enlivening the otherwise shadowless northern entrance exposure and at the same time directing natural light deep into the interior of the church. It could form a monumental gateway to the church, sheltering an assembly-terrace before the doors. The free-standing concrete slab, cantilevered upward from its foundations, could become a form symbolic of our time.

Left: Stairway to balcony, cantilevered from four pillars, shows untreated architectural concrete surfaces.



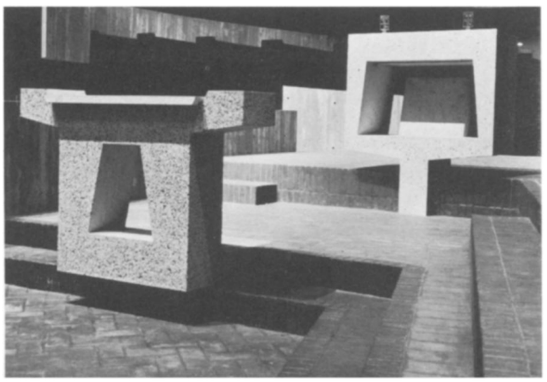
Above: Sidewalls and roof are a series of reinforced concrete folds, untreated and unadorned. Sanctuary is enclosed by choir stalls for monks, priests, and clerics.

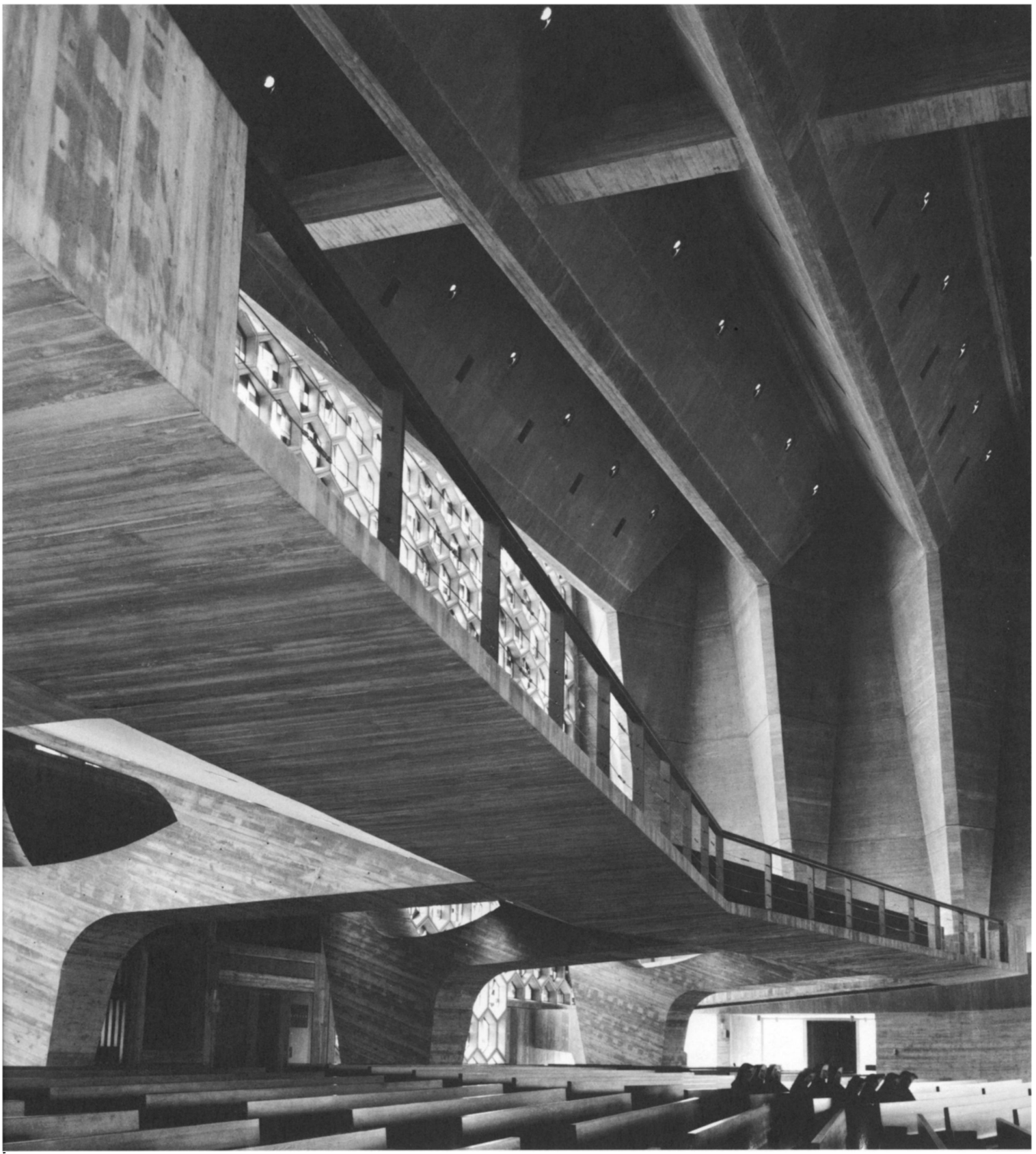
Upper right: Crucifix for the main altar is suspended from baldaquin. Rising above the roof level, the lantern lets in light and gives prominence to the altar from the outside.

Lower right: Communion tables and pulpit are of bush-hammered concrete.

The first architectural conviction led to the use of a concrete folded plate construction on side walls and roof. Folded plate describes a system of building in which structural stiffness and the capacity to span long distances is derived from a repetitive pleating or corrugating of the concrete surfaces.

At St. John's the length of the church is divided into twelve pleated folds which increase in all dimensions—width, depth, and wall-thickness—as they cross successively broader segments of the bell-shaped plan. The longest fold accomplishes a clear span over 135 feet, measures almost 15 feet top to bottom, and has walls which vary between 6 and 8 inches in thickness. The twelve folds are made up of both wall and roof members in a structurally continuous and visually related system. They are essential to the building—as structure, as enclosure, as interior finish.
Also, these folds create an architecturally dominant and expressive form.



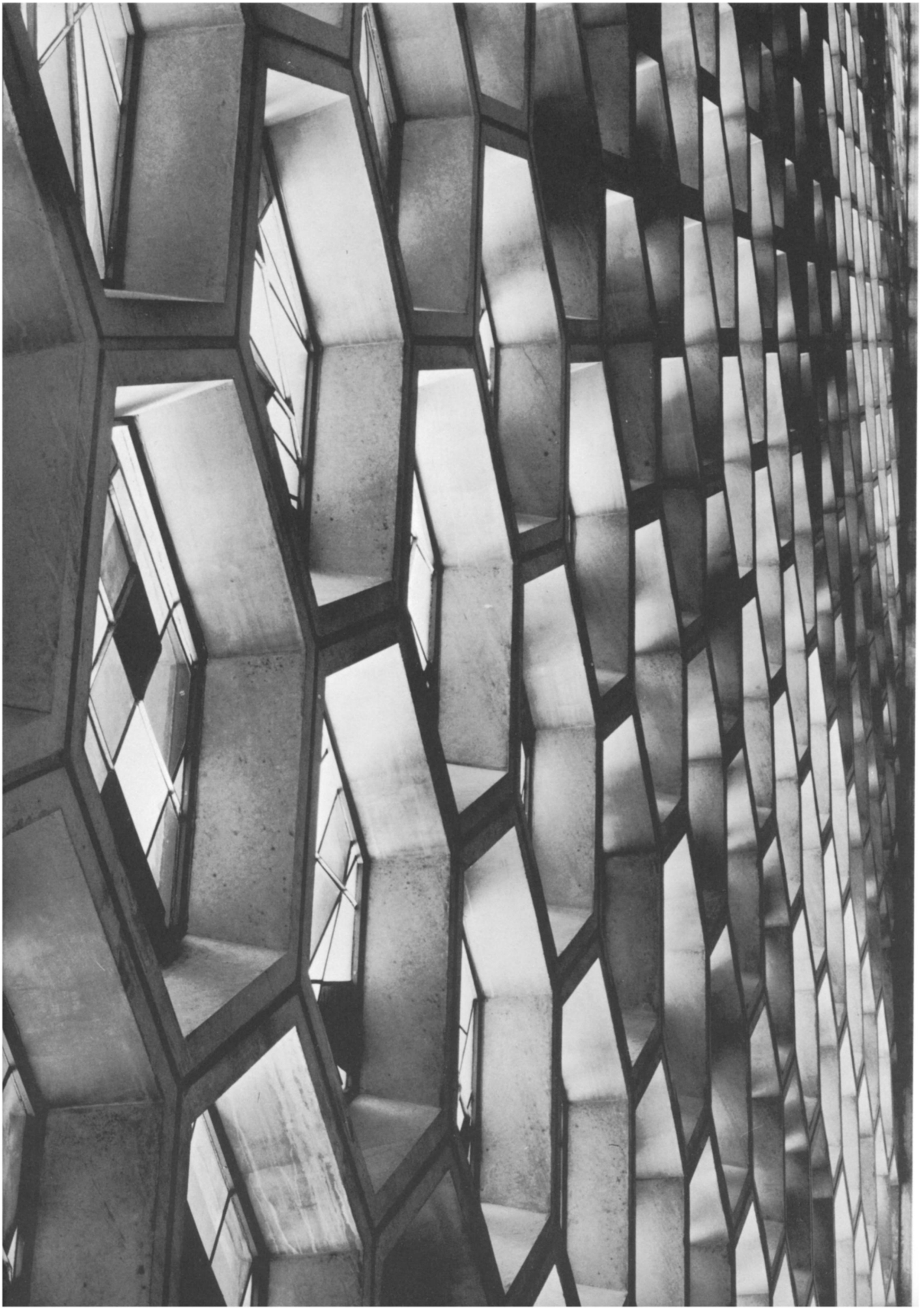


The folds have less visible uses as well. In the roof construction a concrete deck has been laid across the ridges of the folded members making each pleat a closed pipe, triangular in cross section. These pipes contain much of the equipment needed to illuminate and ventilate the church. For ease in servicing this equipment, the pipes are connected to one another by a narrow central footbridge. Finally, the deep projection of the folds with their many-angled surfaces into the interior space contributes acoustically by promoting a general diffusion of reflected sound instead of permitting uneven, echo-producing concentrations.

The second architectural conviction caused the folded plate construction to be raised clear of the ground and supported on concrete buttress-piers. The interior space extends freely between and beyond these piers and includes the enclosed cloister gardens. The transfer of loads from the superstructure to the piers is accomplished through an edge beam. This beam is hollow to contain concealed up-lights which illuminate interior walls and roof.

From the third architectural conviction developed the form of the bell banner and the correlated north wall of the church proper. St. John's reinforced concrete banner is a huge plane, only 2½ feet thick at its base, that cantilevers upward 112 feet from supporting parabolic cross vaults. The plane is pierced with two large windows, the upper one framing a laminated wood cross 27 feet high, the lower one housing the five bronze bells originally in the old church at St. John's. This pierced, thin cantilever, a landmark identifying St. John's, could have been built only with tools of modern technology. The north facade of the church is a wall of glass, a self-supporting geometric tracery consisting of 500 separately glazed concrete hexagons. It admits light reflected from the banner and serves as the background against which the banner is seen.

Left: Cantilevered balcony, with four concrete supports, is free-standing.

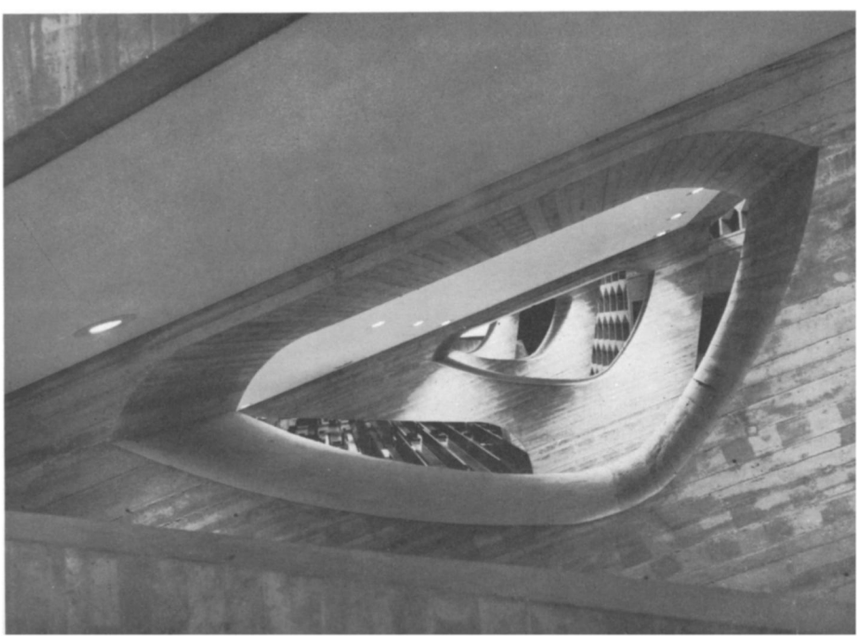


Three philosophical viewpoints, despite their intangibility, also had considerable impact on the church design. First was a basic optimism, characteristic of Benedictine monks. This positive attitude was evident from the beginning in Abbot Baldwin's introductory letter which stated the monks willingness to participate in the search for a contemporary form for the church: "The Benedictine tradition at its best challenges us to think boldly and to cast our ideals in forms which will be valid for centuries to come, shaping them with all the genius of present-day materials and techniques. We feel that the modern architect with his orientation toward functionalism and honest use of materials is uniquely qualified to produce a Catholic work . . . ." Specifically, this attitude is reflected in the monks' desire for a church building which would be serene, open of countenance, and generally well-illuminated rather than filled with sombre recesses.

The second viewpoint—a belief in the virtue of simplicity—was derived from monastic ideals and coincided with Breuer's convictions. It resulted in the use of basic, enduring, and non-pretentious materials in construction. The structure is built almost wholly of reinforced architectural concrete which is allowed to remain entirely untreated and unadorned as the interior finish.

Left: Hexagonal window from the interior.

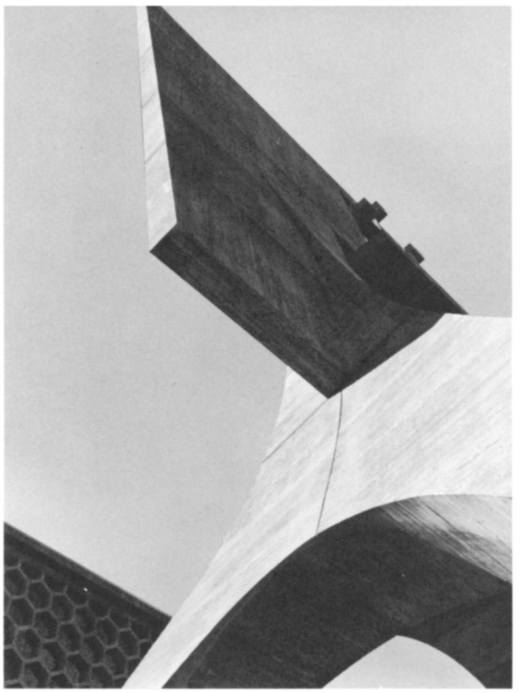
Below: Openings in the four cantilevers which support the balcony.



Most exterior wall surfaces are sheathed with granite. Floors are of brick, and partition walls around the separate areas on the crypt level are of concrete block. Wood seating and cabinet work are of oak, stained very dark brown—nearly black. This insistence on the simple strong statement led to the discreet use of religious artifacts which when over-used tend to obscure the significance of major sacramental elements.

The third viewpoint is Breuer's attitude toward space. He believes that the special quality of a devotional space depends to a considerable extent on spatial amplitude, and that architectural dignity and solemnity are enhanced by generous height and breadth. These qualities, of course, cannot be reduced simply to a matter of dimension. However, it is interesting to note that the concrete shell of St. John's church encloses a volume of more than a million cubic feet, the maximum interior clear height under the lantern in the roof is over 65 feet, and the overall width of the building on the entrance side is 165 feet—a dimension somewhat greater than the west facade of Notre Dame in Paris.

Left: Rear of balcony, from below, shows its relationship to the window-wall.

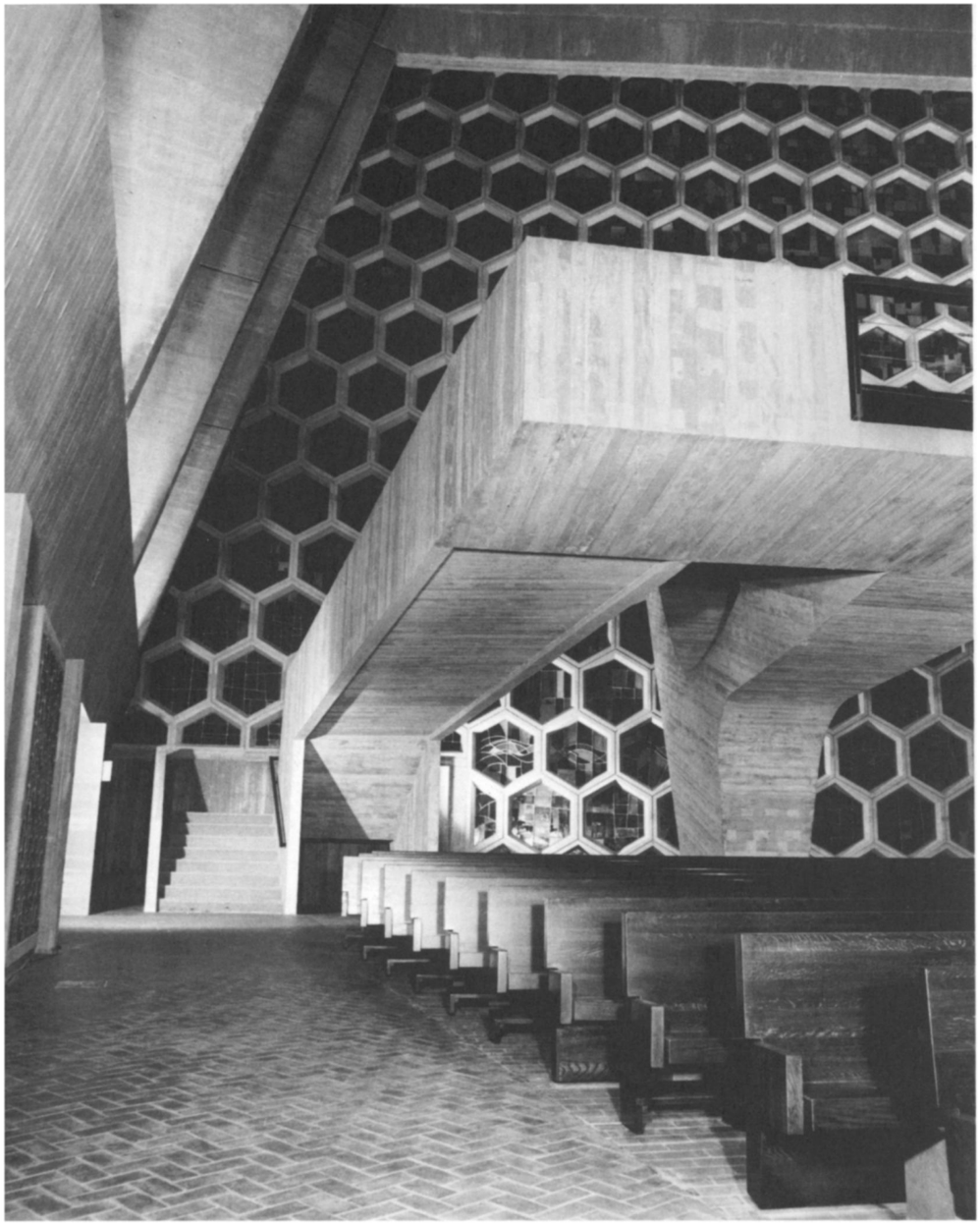


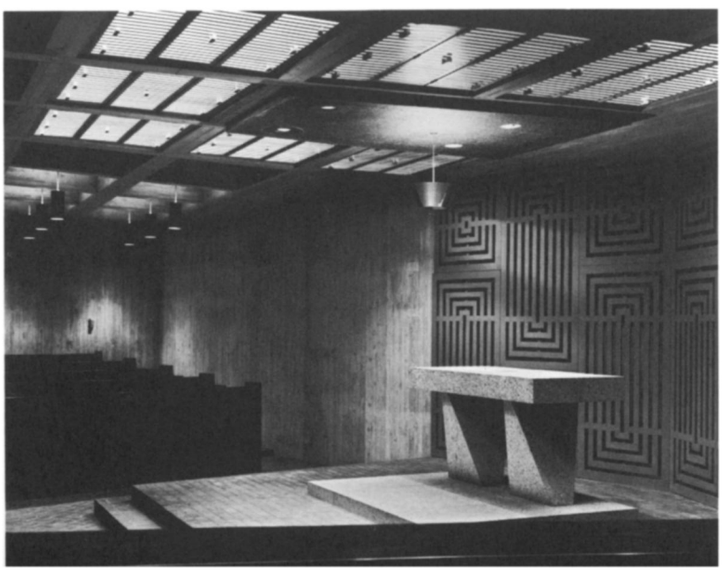
In the preceding discussion of how certain ideas affected the design process, the term "architectural concrete" has frequently appeared. Architectural concrete differs from other concrete not so much in its mixture as in the care which is exercised in its design, forming, and placement. As one of the materials composing the building's finished surfaces, it receives in the drafting room the same attention to profiling and detail which is given to stone or wood. At St. John's, the surface texture of the hardened concrete comes from the imprint of the form boards into which the wet mix is poured. This means architectural drawings must indicate size and direction of the boards used in the formwork. In addition, the drawings must locate recessed joints to be cast into the final product. Their purpose is to transform into a conscious modulation of the surface, the texture, color, and planar differences which occur between successive pouring operations or at expansion joints. These measures reflect an acceptance of the inherent nature of concrete which is poured on the job site where factory-type control of temperature, humidity, and other factors is impossible. Thus, the unpolished overall texture of the form boards assimilates the unavoidable irregularities and imperfections in concrete work and provides a complexion which weathers gracefully like that of native stone.

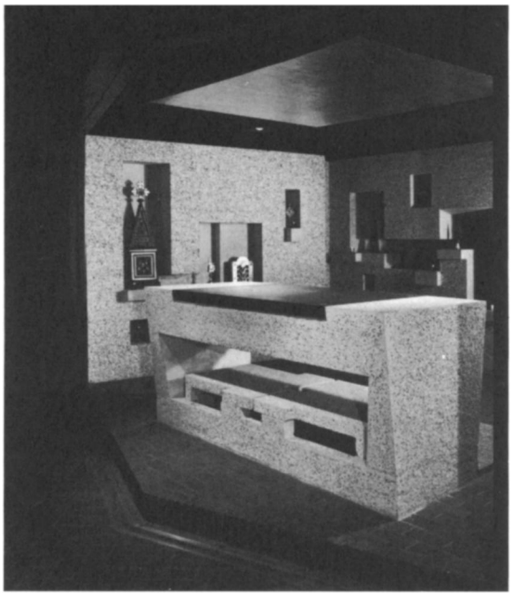
Architectural concrete demands attention beyond that given in the drafting room. Specifications are more rigorous to prevent leakage or bowing of form boards under pressures created by the liquid pours. They require a stiff mixture containing a minimum of water for increased strength and resistance to weathering even at the cost of additional effort in placement. They call for the addition of certain chemicals which increase plasticity and placability of the wet mixture without dilution. Specifications are also more demanding about temperature and humidity conditions during the curing of the concrete after the pour and during the first twenty-eight days. Reinforcing steel beyond that required for structural capacity alone is added to resist stresses caused by temperature change.

Upper left: Bell banner from below.

Lower left: East wall of church and chapter house, in foreground, with its projecting lanterns.







Finally, architectural concrete demands a high degree of cooperation, collaboration, interest, and experience on the part of the builder. St. John's was fortunate in finding a contractor so well-qualified.

While requirements for producing excellent concrete work are many, rewards seem even greater. The material gives the architect almost the same design freedom possessed by the sculptor and combines this quality with structural strength and durability.

Monastery Wing

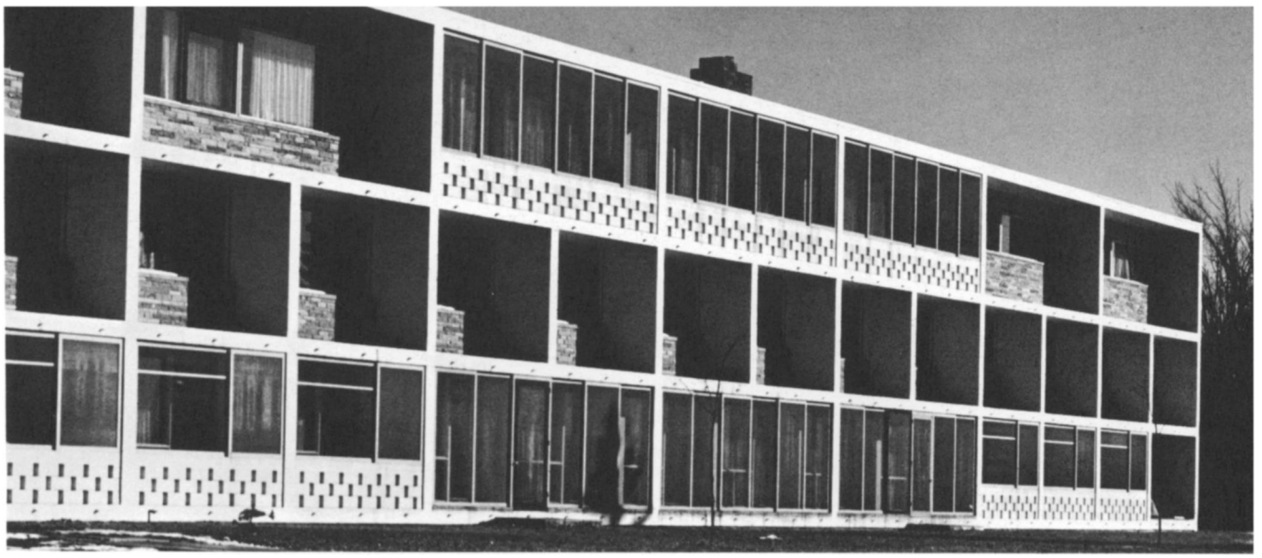
The new monastery wing reveals on its two long facades the organization of interior space. Essentially the building is devoted to private cells for fifty-six priests, with dormitory, study, and recreation rooms on the third floor for sixty clerics and novices. This internal use of space is revealed on the exterior by the shape and spacing of the concrete structural members designed to project beyond the enclosure to form sunshades over the windows.

Concrete was chosen for several reasons. Its plasticity lends itself to expressive use. Its weight and inertia make for a quiet building, resistant to the transmission of footfalls and other sounds. Then too, its unpolished qualities of face and surface, previously described, reflect monastic ideals. Other building materials were selected for natural color and texture: granite block in a random mixture of grays for exterior panels beneath the windows; waxed red paving brick for floors in public spaces; oak flooring in private rooms; concrete block, painted white, for partitions throughout. The woodwork and doors are also of oak and, like the floors, are stained to a black-brown color.

Upper left: Seats are of oak, stained a dark brown; flooring is of brick, terra cotta color.

Upper right: Walls of relic shrine in the crypt are of bush-hammered concrete.

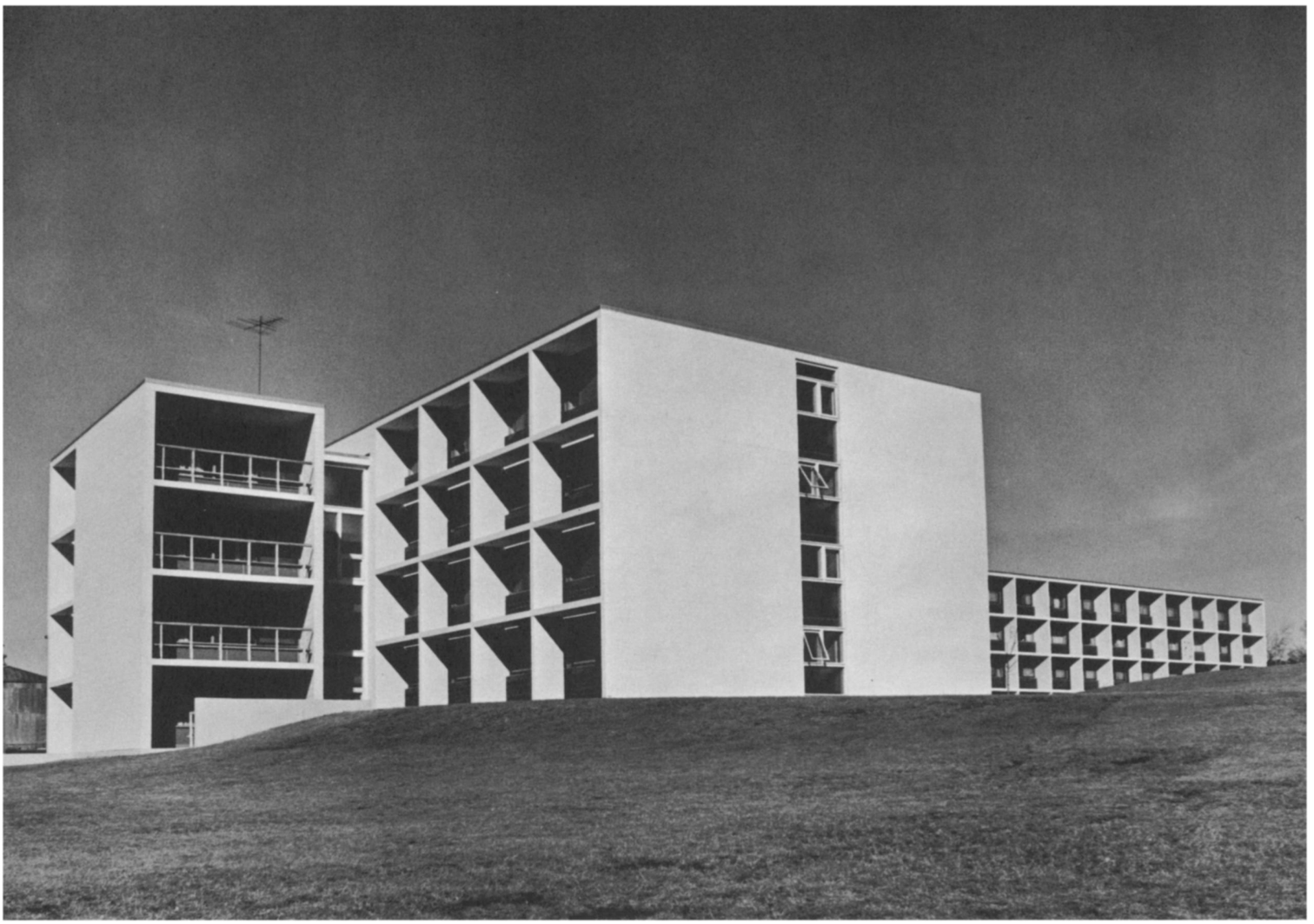
Lower left: Wooden grills over concealed fixtures throw warm light on altar in St. Benedict's chapel in the crypt.



Left: Cloister walk connects monastery wing with rear of church.

Above: South wall of monastery wing has balconies, serving as sun shades which block summer sun, admit winter sun.

Below: Detail of main stairway in monastery wing.



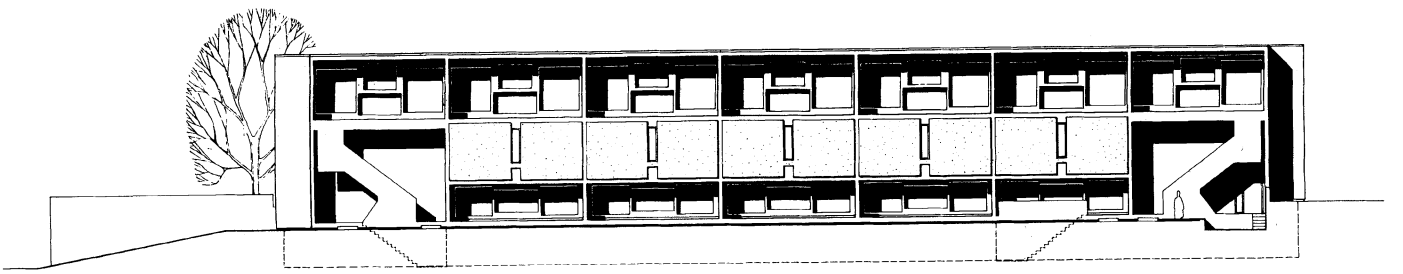
Student Dormitory

The monastery wing was the first building completed in terms of the master plan and was occupied in the fall of 1956. Design began on a new student dormitory the following spring, and actual building began a year later. Economy was a key factor in design and planning. Like the monastery wing, all floor and roof slabs are of concrete flat-slab construction. However, unlike the earlier building, these slabs are carried not on columns but on bearing walls of concrete block. The completely consistent division of space into semi-private rooms on all floors made this simple, direct, and economical system possible. These block bearing walls project, as do their column counterparts in the monastery, beyond the enclosure walls and create the strong and unifying visual discipline of the exterior. Again, they function as horizontal sunshading and as lateral protection to window areas they frame.

Upper left: Student residence hall from the southwest.

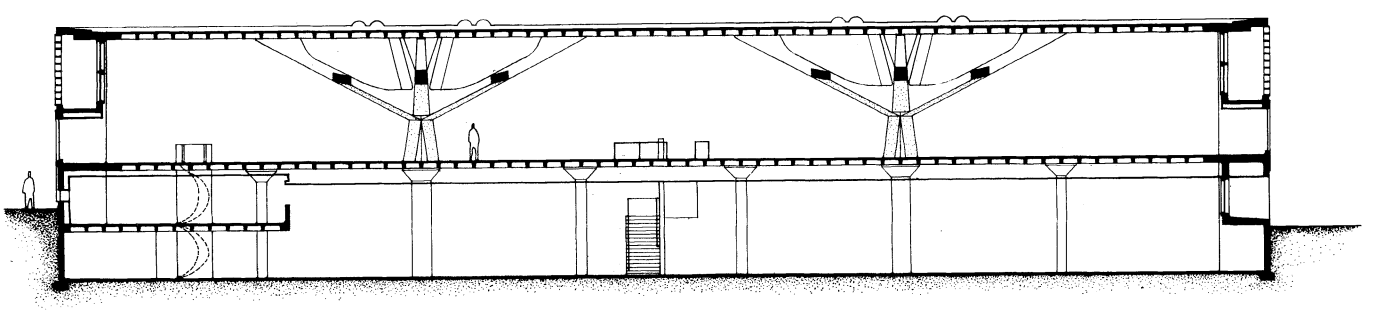
Lower left: East entrance of residence hall.

Below: Study-lounge balcony of residence hall.



North elevation of the projected library.

Longitudinal section of the library showing tree-like interior supports.



Library

The university library is completely designed. Working drawings and specifications have been prepared, and the project is ready for construction whenever the Abbey decides to proceed. The proposed building is to accommodate 600 library patrons and provide space for 300,000 volumes. It will have audio-visual and seminar rooms seating an additional 300 persons. Potential expansion within the projected envelope could allow the book collection to extend to well over 400,000 volumes.

The faculty of St. John's University asked for an open-stack library inviting easy and natural contact with as many books as possible. The librarian also requested a degree of flexibility in layout which would permit groupings of both book stacks and reading tables by subject classification.

The building design developed by Marcel Breuer in response to these program requirements is distinguished by almost complete freedom from columns on the main floor. The concrete waffle-grid roof slab, 204 feet long and 124 feet wide, is carried on only two interior supports. Each support is a concrete tree having branches which spread symmetrically to brace eight points on the roof.

The perimeter structure consists of a single file of widely spaced piers with their long dimension perpendicular to the exterior wall so as to give lateral stiffness to the entire roof system. At the third point of their height above the floor, the piers are bridged by an intermediate slab. The alcoves thus created below provide for special functions such as carrels, stairs, and typing niches, thus further freeing the primary floor area for readers and books. Clerestory windows fill the space above the intermediate slab. These are drawn in over the alcoves to gain protection of the roof which projects outward the full depth of the piers.
Further sun shielding is achieved through the use of a screen wall composed of rectangular clay tile units.

In this building, as in the church and monastery wing, a system of structure in architectural concrete has been consciously sought and developed which could serve in a variety of ways. Not the least of these purposes in the library is the visual one. Here the structural trees modulate the large spatial volumes of the open reading room and, in combination with the deeply modelled ceiling construction, provide its dominant architectural character.

Hamilton Smith