Summary

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Otto Senn, Basle

Church construction: Ideological and design aspects

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Any analysis of the development of church architecture is to some extent an analysis of contemporary architecture in general, and here we can detect two opposed trends, either total submission of architecture to function or a quest for aesthetic abstraction.
As applied to church buildings, this means that the community, intent on realizing itself, deprives the church of its initial purpose, which is to be a place of worship, in order to subordinate it essentially to community programmes (auditorium, etc.). Moreover, the church, considered as a work of art, would become a pretext for a purely architectural debate, where the notion of the sacred would be equivalent to artistic perfection.
Nevertheless, it must be asked, what is the mission, the essential raison d'être of the church.
This critical attitude ought not to be confused with a purely rational denudation which would compensate for an arbitrary emotional world; it is simply intended to create an awareness of the relationship that exists between our actions and religions life, for absolute formal principles, stemming from the autonomy of the technological domain or the aesthetic realm, deprive our undertakings both of meaning and of human dignity. Paul Klee said of the artist: "he is interested essentially in form; that is what one struggles for; it constitutes an integral part of the artist's craft. But it would be wrong to deduce that the meanings embodied in a work of art are secondary". Martin Buber said of objectivity in art: "form is the achievement of relationship between man and things". Sobriety ought not to be confused with renunciation of imagination, but ought to be understood as the demoniac peril which in its technological or pseudo-aesthetic form is stalking our lives.
However, does not the church, above all, have glad tidings to convey, as set forth in the Bible?
Since design belongs by essence to the church, the given architectural features are, by structural analogy, components of the liturgical order during a divine service.

The following conclusions emerge:

1. The design in its structure and in its essence is a bearer of symbolic values. Its determination in accordance with external criteria is no longer possible at the present time (J. P. Sartre). The symbol signifies here the union between essence and appearance.

2. To aim at the "sacred" per se is to be ignorant of the essential nature of the church, that is, to provide a place where all pray to and thank the Lord in common. Church architecture ought to get detached from the idea of the other world, of ideological condemnation of modern man by the architect.
"We must overcome thinking lodged in two chambers, with religion in one and the rest of reality in the other" (G. Ebeling).

3. The order of a community whose action is integrated determines the structure of a given space, and not external considerations or purely formal ideas. The church is a place of divine worship and it is from this point of view and with the aid of the resources of our age that we can undertake the architectural creation of space.

Church construction:
What will the next stage be?

The problem of church construction does not reside in modern technology nor in new materials nor in the modern architectural idiom, but in the mission of the church itself, if it can be defined by means of psychological, sociological or artistic factors. Instead of lodging objections at the level of a certain atmosphere entailing all sorts of associations of ideas, instead of initiating purely philosophical or aesthetic discussions, would it not be better to base oneself on the message of the church, translated in terms of a given divine service?
The internal objective points of departure would then be expressed by the structural correspondence between the expression of a volume and the ordering of the religious message.
What is to be understood by the order of the church?
– Every word of God is a profane word (G. Eberling).
– The structure of the word of God is analogous to ours (= analogy of relations) (H. Gollwitzer, K. Barth).
– There are human relations, conceptual structures analogous to the Christian word of God.
– Thus the analogy of the relations between God and men is expressed in the existence of the self confronted by the other (H. Gollwitzer, K. Barth).
– The relation between God and man of which the Christian Gospel speaks is the relation of the self and the other (M. Buber, H. Gollwitzer).
– The Christian Gospel, word of God, is the thing in and for itself, stripped of all mythological symbolism (H. Gollwitzer).
Builders are told that the key element in a church is the wall, bearer of Christian symbols (altar, choir, baptismal fonts), conveying the message to the congregation seated opposite.
Thus the modern church is a sort of framework, a setting, a spatial volume directed toward the ideal other realm, contrary to the medieval church, in which the space was subdivided into the choir (clergy) and the nave (congregation) or to the Protestant church before the 19th century, which grouped all functions together in one and the same space.
To illustrate these two types of space, a comparison can be made of a cinema (Neuhausen, Max Bill) and a meeting hall (Zurich, town hall).
What are the structural elements of a cinema? The spectators' gaze is directed towards an ideal distance, a screen which projects the action. The separation of the auditorium into an orchestra and a gallery is not important. The spectator, detached from the action, plunged in darkness, no longer is aware of being in a group: it is the ideal situation of isolation and anonymity. The public is a passive recipient.
In contrast, the structure of a hall of assembly is oriented toward the centre. The assembly made up of active participants engaged in a debate with one another remains a collectivity, with common interests. The attitude of men of action is distinguished from that of consumers.

Otto Senn, Basle

Church of the Bethesda hospital in Basle

Plan: 1955

Construction: 1964/66

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The church is part of a general extension plan for the hospital. It is located with the other community facilities between the old part and the new hospital. It was given an award in 1954, and the first stage (nurses' training school and physiotherapy division) is currently in the construction phase. The church, an integral part of the community facilities, is attached to the dining room. Extension possibilities are assured by various subsidiary areas.

Protestant church in Hamburg

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This church project is a constituent part of a parish centre. It being borne in mind that the number of visitors varies, the volume is subdivisible: nave–134 seats, gallery–180 seats, annex–96 seats. The foyer is designed to serve the special needs of the Diaspora parish.
The two accesses emphasize the homogeneity of the volume, which remains the place of divine service, prayer, etc., where the parish meets with its pastor.
The square plan of the church is based on four points. Lighting is effected through a skylight located above the gallery the corners of which are elevated. To prevent glare, the natural glass is held in position by concrete slats. Visual and acoustic requirements have determined the siting of the chancel and the altar as well as the shape of the ceiling and the serrated lateral walls.
Construction:
Roof structure articulated into eight panels, with central symmetry, of thin concrete shells, taken up by 4 supports situated in the middle of the four equal sides. The horizontal and vertical loads are transmitted to the ground by oblique columns. The equilibrium of stresses is assured by the gallery which exerts a buttressing effect.

Church of the Ecumenical Council of Churches in Geneva

Plan : 1958

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This church plan is part of the complex of the ecumenical centre in Geneva; it constitutes its centre of gravity.
The plan reflects the basis of the ecumenical idea, that is to say, the organization of the primitive church. The architectural conception symbolizes the parish united as a congregation in divine service, in which all those present, both laymen and clergy, are jointly responsible for the service.

Kaija and Heikki Sirén, Architects, Helsinki

Church in Orivesi

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As the Orivesi church, which was 180 years old, had burned down except for its clock tower; reconstruction was pushed forward and that on the basis of the competition of 1960/61.
The plan is that of a central church, where the altar constitutes the optical focus, as in the old church. The distance between all the seats and the pulpit is but slight. The parish hall adjoins the church, being separated only by sliding partitions. The altar is lighted from two sides by high windows, and an illumination strip on an upper level with blinds caps the high walls.
The construction is made up of five walls 5.80 meters high, concave, consisting of a double row of bricks laid up with wide joints and whitewashed. Between the projecting springers which rest on these walls there is an ample intake of light which lends an appropriate atmosphere to the interior. The rear wall and the railing of the gallery are of vertical wood panels.
The particular effect of this church is obtained by the contrast among the materials: floor of black slate, walls of whitewashed brick and the rare liturgical appointments: the pulpit, the altar with its relief and the fonts.
Heating:
Total volume:
Hot air supplemented by radiators.
8,000 cubic meters; 800 seats.
The wood relief above the altar is the work of the sculptor Kain Tapper and was selected for the Finnish section of the Biennale of Venice.

P. Zanstra, Amsterdam

The "Ark", Protestant church and community centre in Amsterdam-Sloter-vaart, Holland

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The complex is on a square plan, with the steel clock tower forming the entrance to the interior courtyard. The church, open all week, and the chapel, designed in this style for the first time for the Dutch Protestant Church constitute solid volumetric accents in the midst of the residential district surrounding them. This church, understood as a kind of parish home, is composed of the "lounge" with a small library, of the parish hall which can be connected to the church by means of a folding wall, of the church and of the chapel. The hyperbolic paraboloid roof has its highest point above the altar. The floor of washed concrete slabs runs through the entire complex at the same level.

G. Schlegel, R. Kargel, Darmstadt

Paul-Gerhardt Church in Mannheim

Competition: 1957
Construction begun: 1959
Completed: 1961

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Site
Northern suburb. Surroundings: five-storey apartment blocks generally flat-roofed and from 50 to 100 meters long, built around 1925; factories to south-east.
On the site there is also a parish hall from the Twenties, a parking area and on the north a former parking area for trucks now converted into a children's playground.
Programme
Church accomodating 500, new parish hall, kindergarten (not yet executed), conversion of the former parish hall into a parsonage and youth centre.
Planning
Two essential points:
1) How to provide a counter-weight to the massive buildings in the neighbourhood with a relatively modest volume designed for five-hundred persons?
2) How to seal out the noise from the streets?
No attempt was made to rival the height of the neighbouring buildings, for placing the church and the parish hall above each other would have given too constricted a volume. What was hit upon was a low closed-in structure. This effect was obtained by connecting the church and the parish hall by two concrete walls 10 meters high, which form an interior courtyard. The church has on the side facing this severe courtyard a large stained-glass window, the court being a spatial extension of the church building itself. The sole ornamentation of the complex is provided by the cross of silver on the altar dating from the time of Paul Gerhardt and the mosaic on the west wall of the courtyard. On the short sides of the courtyard the concrete walls are so constructed that at eye level it is impossible to look through them. Above, however, the wall has a port, facing of linen.
Seats of black steel and Brazil pine. Since there is no central aisle, the long rows are articulated by means of hymnbook racks.
Choir-organ beside the altar (only for accompaniment). Main organ on a canopy structure opposite the main entrance.
In the courtyard: Fountain of the Holy Trinity: granite shell, triangular bronze overflow.

Hans Borgström, Bengt Lindroos, near Stockholm

Church centre at Farsta near Stockholm

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Among the satellite towns resulting from the financial and town-planning policy of the city of Stockholm, situated along the urban railway line, is Farsta.
Its religious centre, on a plan stemming from a competition, comprises a church seating 500, community rooms, premises for instruction and communion, administrative offices (vital statistics in the hands of the church) grouped around an interior courtyard. This complex is situated on a hill, with spiral roadway approach, and is a low-silhouette mass of concentrated buildings resembling a stronghold, in sharp contrast to the high-rise buildings all around.
The subdued illumination of the church is effected by a skylight above the altar, by two interior courtyards and by the rose-window. The materials employed present an effect of great unity: walls and floors of untreated red brick, skeleton of raw reinforced concrete, church floor of granit. The materials utilized recall the Town Hall of Stockholm and old Swedish churches.

Aesthetic integration:
A rather strange sculpture in wood (Mary, Joseph, the Child and the Three Kings in peasant garb) by Ivar Lindecrantz, Göterborg; rose-window and lateral windows by Uno Lindberg, Eskilstuna; cross by Per Olov Ultwedt.

Viljo Revell, Architect, Helsinki

Mortuary chapel of the cemetery of Vatiala

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It was erected by the Lutheran parish of Tampere. The complex is made up of two chapels accommodating 150 and 50 persons respectively, which are connected by a public hall with a waiting-room, the entrance for family members and the sacristies. If large numbers of people are present, they are received near the entrance; the service entrance is located on the opposite side and leads to the cold rooms and the morgues on the basement level.
The principal construction material is concrete; this is to stress the ascetic character of a building of this nature.
The roof is a pre-stressed concrete shell insulated on the inside, which is supported by two pre-stressed concrete frames for the small chapel. The walls are of pre-stressed concrete slabs with light brick insulation. The floors are composed of pre-fabricated concrete flagging resting on a bed of gravel.
The horizontal ceilings are faced with treated pine. The window frames as well as the other metal elements are of treated bronze, and the jambless doors are affixed directly to the concrete.
The radiant heat is furnished by sunken elements concealed in the ceilings or placed underneath the benches.

Günter Behnisch, Stuttgart

Prefabrication in concrete and steel, experiences in school construction

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Examples:

Schools entirely prefabricated by the L. Rostan enterprise, Friedrichshafen

Net cost of construction
about DM 120.– to 135.– DM/m³.

Duration of execution:
3 months (types 9 and C), 5 months (types B and D).

Assignment:
Construction of solid school buildings, entirely prefabricated, offered by the concern at fixed prices, with definite time limits. Two classrooms sizes, result being that 4 basic types (A. B, C, D) can be juxtaposed and varied.

Construction:
Decks:
Decks with longitudinal span, supported on templates or transverse supporting walls.

Load transmission:
Transverse and longitudinal walls, supports.

Reinforcement:
Transverse and longitudinal walls.

Faces:
Solid parapets and walls: prefab concrete elements, integrated insulation. Windows of wood placed externally against the support covered with asbestos-cement panels.
Assembly: horizontal, after assembly of the supporting structure.

Installations:
In horizontal:
partly visible, partly set in raw concrete; heating: one-duct system (rectangular section) of the Rud. Meyer house.

In vertical:
Installations elements in U of concrete placed in the corridor partition panels, closed on corridor side.

Criticism:
The construction corresponds to the terms of the programme. These schools can erected and assembled in little time.
The lack of a horizontal installations zone complicates the execution of buildings on several levels. For the same interior height of floors, there would have been required longer face panels, which, transported vertically, would not have passed under some bridges.

National Engineering College at Ulm, study hall

Builder:
State of Baden-Württemberg, Ministry of Finances, represented by the construction office, finance department, in Stuttgart, national construction service, at Ulm.

Architects:
G. Behnisch, W. Büxel, E. Tränker, E. Becker, Stuttgart.

Static calculations:
P. Herrmann, Stuttgart.
Prefab concrete elements:

Site:
The school, situated on the Galsenberg hill north of Ulm within an old fortification, is surrounded by trees to the east and enjoys a view over the city and the Danube.

Construction volume:
Total: 113,500 m³.
Study halls: about 37,000 m³.

Net cost of construction:
about DM 120/m³.

Duration of execution:
Total: 18 months.
Study halls: 10 months.
Assembly of prefab elements: 4 months.

Year of construction:
1961/62

Construction:
Decks:
Decks spanned longitudinally, entirely prefab, made up of girders and fill elements, resting on sleeper beams or transverse supporting walls.

Load transmission:
Transverse walls and supports.

Reinforcement:
Transverse and longitudinal walls.

Faces:
Prefab reinforced concrete elements, comprising steel windows and constant ventilation; the insulation is added at the time of assembly.
Assembly: horizontal, after assembly of the supporting structure.

Installations:
In horizontal:
in suspended ceilings.

In vertical:
visible on the concrete in corridors.

Criticism:
The study halls were assembled in little time.
The many various jobs on the site were not always well integrated with the assembly work. The prefab elements of fine finish were fouled by the concrete poured in site.

Public School at Geislingen, Balingen district

Construction of pavilions:
Builder:
Municipality of Geislingen.

Architects:
G. Behnisch, H. Bidlingmaier, M. Sabatke, H.-J. Wessel, Stuttgart.

Static calculations:
P. Herrmann, Stuttgart.

Site:
The school is situated in an orchard on the outskirts of the town. The road runs along the old castle.

Construction volume:
Total: about 19,000 m³.
Pavilions: 3×1900 m³ = 5700 m³.

Net cost of construction:
about DM 135.–/m³.

Duration of execution:
Total around 18 months.
Assembly of prefab elements of the three pavilions: 2 months.

Year of execution:
1963/64

Construction:
Decks:
Decks spanned longitudinally, resting on sleeper beams or transverse walls.

Load transmission:
Transverse walls and supports.

Reinforcement:
Longitudinal and transverse walls.

Faces:
Parapets and solid walls: prefab concrete elements, insulation laid on at the time of assembly.
Wooden windows placed afterwards against the supports, covered with asbestos-cement panels.
Assembly: horizontal, after assembly of supporting structure.

Installations:
In horizontal:
embedded in the concrete of the floors and ceilings.

In vertical:
in the apertures or embedded in the concrete of the panels.

Criticism:
The handling of independent volumes not closely integrated is more difficult than that of concentrated masses. (traditional construction methods and prefabrication).
The fact of but little pouring on the site permitted the installation of a central cement-mixer. Nevertheless, there was frequent shifting of the crane.
A more clear-cut horizontal arrangement of the installations would have facilitated the project (cf. 3.1), for the elements set in the concrete allowed for less flexibility.
However, the project shows that even an individual and dispersed solution can be prefabricated rationally and economically.

Junior High School at Furtwangen in the Black Forest

Builder:
Municipality of Furtwangen.

Architects:
G. Behnisch, L. Seidel, P. Schirm, K. Weber, Stuttgart-Radolfzell.

Static calculations:
W. Gumpert, Freiburg.

Site:
The school is situated on a slope of a narrow lateral valley, near a forest, at 900 meters above sea-level.

Construction volume:
about 16,000 m³.

Net cost of construction:
DM 130.–/m³.

Duration of execution:
Total: 11 months.

Year of execution:
1963/64

Construction:
Decks:
Decks spanned longitudinally resting on transverse sleeper beams.

Load transmission:
From floor to floor via supports.

Reinforcement:
Longitudinal non-supporting walls, central corridor frames.

Faces:
Prefab reinforced concrete elements comprising steel windows, constant ventilation and insulation. The entire face is situated in front of the supporting structure. Assembly: horizontal, after assembly of the supporting structure.

Installations:
In horizontal:
in suspended ceiling, apertures in transverse sleeper beams.

In vertical:
Installation elements situated between the lockers.

Criticism:
This compact project clearly revealed the advantages of a consistent prefab execution.
Despite the severe winter climate of Furtwangen, the building took only 11 months.
Advantages: dry assembly (flooring on insulating slabs), little paint.
A suspended ceiling beneath the transverse sleepers would have facilitated the handling of the installations.
The height of the concrete elements in the corridor, transported vertically, was determined by the bridge clearances on the railway used for transport.
To obtain the interior heights required, the suspended ceiling had to be suspended between the sleepers.
Employing the same building procedure, the architects G. Behnisch, L. Seidel, E. Tränker, K. H. Weber are now building the high school at Schwenningen/Neckar (about 42,000 m³.).

Junior High School and Public School at Haigerloch, district of Hechingen

Builder:
Municipality of Haigerloch.

Architects:
G. Behnisch, H. Bidlingsmaier, M. Sabatke, H.-J. Wessel, Stuttgart.

Site:
On the outskirts of the town above a closed-in valley.

Construction volume:
Public school? about 8,200 m³.
Junior High School: about 13,300 m³.

Net cost of construction:
Public school: DM 135.–/m³.
Junior High School: DM 130.–/m³.

Duration of execution:
Probably 12 months.

Year of execution:
1964/65

Construction:
Decks:
Decks spanned longitudinally resting on transverse sleeper beams.

Load transmission:
From floor to floor via supports.

Reinforcement:
Longitudinal non-supporting walls and corridor frames.

Faces:
Parapets and prefab concrete panels, insulation comprised. Wooden windows set in position from the outside against the supports; supports covered with asbestos-cement. The entire face is placed in front of the supporting structure.
Assembly: horizontal, after the supporting structure.

Installations:
In horizontal:
between the deck and the suspended ceiling and beneath the last deck.

In vertical:
in the concrete U installation elements, situated in the partition panels of the corridors, closed in on conclusion of assembly from corridor side.
This school is under construction. Employing the same procedure, the architects G. Behnisch, W. Büxel, E. Tränker will erect the public schools of Dettingen, Alfdorf and Neckarweihingen.

Girls' High School in Freiburg im Breisgau

Builder:
City of Freiburg.

Architects:
G. Behnisch, F. Auer, E. Tränkler, Stuttgart.

Static calculations:
P. Herrmann, Stuttgart.

Site:
The relatively small site is located in a residential district on two levels built during the 30s. To obtain sufficiently large green areas, the buildings are grouped around interior courtyards.

Construction volume:
about 40,000 m³.

Net cost of construction:
about DM 150.–/m³.
Duration of execution: (envisaged)
Total: 18 months.
Assembly of concrete elements:
4 months.

Year of execution:
1965/66

Construction:
Decks:
Decks spanned transversely on supports.

Load transmission:
From floor to floor via supports.

Reinforcement:
Transverse non-supporting walls.

Faces:
Parapets and prefab reinforced concrete panels, insulation and constant ventilation comprised. The face is located in front of the supporting structure.
Assembly fly floors, faces after skeleton.

Installations:
In horizontal:
between decks and suspended ceilings.

In vertical:
Installation elements located between the lockers.
The construction of examples 3.21 to 3.24 did not represent the most economical solution for this programme. The distance between supports is narrow, and the corridor canopy means broad decks with peripheral sleepers, supporting in transverse direction placed directly on the supports. The solid compact volume calls for a precise assembly programme. The great weight of the decks complicates the work.