12 October 1956, Volume 124, Number 3224 SCIENCE

The Architect Reviews His Files

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We have all had the experience, perhaps when lying in bed at night, of trying to reconstruct a train of thought from its conclusion back to its source. This process is similar to what passes through the mind of an architect as he looks over the files on a completed building. In doing so he relives the chain of experiences that resulted in the finished product, with all its hopes and fears, its pleasures and discouragements, its successes and failures.

On examining our files, I find that the first conferences on the new building for the American Association for the Advancement of Science took place in 1945 at the Smithsonian Institution with F. R. Moulton, then administrative secretary. The Association was about to move to new temporary quarters but was planning some day to build a permanent home of its own.

Some time later we developed preliminary drawings for a building on the new site. These show a tall, windowless building to be artificially lighted, heated, and cooled.

A few years afterward, while Howard A. Meyerhoff was administrative secretary, we developed a new scheme for the proposed headquarters building. It was now to have large window areas, but the daylight was to be controlled so as to avoid glare in the offices. On how this was to be accomplished we were not clear at the time.

Another scheme for this building was prepared still later by another group of architects. But this could not be built because the District of Columbia Board of Zoning Adjustment did not give permission for the erection of the proposed building.

In 1954 we were called in by Dael Wolfle, the new administrative secretary, to prepare a new set of plans which would, if possible, meet the requirements of the Board of Zoning Adjustment. The problem was to erect the headquarters building on the site owned by the Association in an area where commercial office buildings were prohibited; no easy assignment!

Outside Movable Sunshades

The previous problem of daylight control also remained to be solved. By this time we had discovered that vertical louvers, or movable sunshades, made of aluminum had been used successfully in the Far West to control the daylight in buildings, and we decided to look into these as a possibility.

These sunshades are set vertically in rows outside the windows in order to shade them during the day in such a way as to reduce the glare inside the building. They turn during the day by means of an electric motor controlled by an electric clock mechanism and take certain predetermined positions at definite times, depending on the hour of the day and the time of year.

On the east side of the building the sunshades are closed, or partly closed, early in the morning and open gradually during the morning. Their starting position depends on the time of year. On the west side of the building the operation in the afternoon is exactly the reverse of this. The sunshades on the south side of the building operate entirely differently, because the sun covers a wide angle during the day. For this reason the sunshades are open in the early morning and close gradually until noon. At this time they rotate quickly through an angle of 180 degrees and open gradually in the opposite direction in the afternoon. The starting positions and speeds of operation for this installation were determined by A. Olgyay and V. Olgyay of Princeton University.

In addition to controlling the admission of sunlight, the shades also reduce the heat absorption through the windows by keeping the glass shaded throughout the day. This brings about economies in the operation of the air-conditioning system. It also means that the capacity and, therefore, the initial cost of the air-conditioning equipment can be considerably reduced.

The sunshades do away with the need for blinds or curtains. They provide a certain amount of privacy during the day and can be closed completely at night, if so desired. In addition to these practical advantages, the shades give a decidedly novel appearance to the building on which they are used.

Before making a decision on the use of the sunshades, our engineers made calculations of their effectiveness as compared with venetian blinds. We were also interested to see what further economies might result from the use of double glazing or of heat-resisting glass in the windows. The results of these calculations indicated that the most advantageous combination would be the sunshades used in conjunction with the double glazing at the windows. This took into account both the first cost and the operation of the air-conditioning system (see Table 1). It was therefore decided to use the sunshades on all but the north side of the building, where there would be no direct sunlight. They were omitted from the first floor because it was felt that they might be too easily damaged so near the ground. A band of small clerestory windows was used at this level in order to insure privacy for those working there.

We also considered one other feature in order to reduce heat loss. This was the substitution of white gravel, instead of the usual wearing surface of black gravel, on the roof.

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A view of the south (Massachusetts Avenue) and west (Scott Circle) sides of the new AAAS headquarters building. [Photo by Davis Studio, Washington, D.C.]

Table 1. Comparative costs of heating and air-conditioning.

Item	Plan A ¼-in. plate glass		Plan B Double glazing		Plan C ¼-in. Solex	
	With venetian blinds	With outside louvers	With venetian blinds	With outside louvers	With venetian blinds	With outside louvers
Installation cost						
Refrigeration equipment	$ 61,000	$30,500	$ 53,900	$ 30,800	$53,900	$ 38,500
Boilers	10,000	10,000	9,900	9,900	10,000	10,000
Radiation	12,500	12,500	10,200	10,200	12,500	12,500
Glass	12,000	12,000	32,000	32,000	16,000	16,000
Louvers		25,000		25,000		25,000
Venetian blinds	5,000		5,000		5,000	
Total installed cost	$100,500	$98,000	$111,000	$107,900	$97,400	$102,000
Annual maintenance cost						
Fuel (gas)	2,940	2,940	2,360	2,360	2,940	2,940
Maintenance (filters, servicing, electric power, etc.)	1,540	975	1,360	785	1,360	975
Total operating cost	$ 4,480	$ 3,915	$ 3,720	$ 3,145	$ 4,300	$ 3,915
Depreciation (10 yr)	10,050	9,800	11,100	10,790	9,740	10,200
Operating costs per year	4,480	3,915	3,720	3,145	4,300	3,915
Total annual cost	$ 14,530	$13,715	$ 14,820	$ 13,935	$14,040	$ 14,115

Internal Design

Having reached these conclusions, it was now possible to begin the design of the proposed building. The site is centrally located in a highly desirable neighborhood. The task was to design a building that would meet the needs and desires of the Association and would also be acceptable to the Board of Zoning Adjustment, in addition to satisfying the architects' own artistic conscience. This meant a building large enough to house the activities of the Association for the foreseeable future and, at the same time, not so large as to fall into the category of a commercial office building. It also required a dignified appearance worthy of the organization that it was to house.

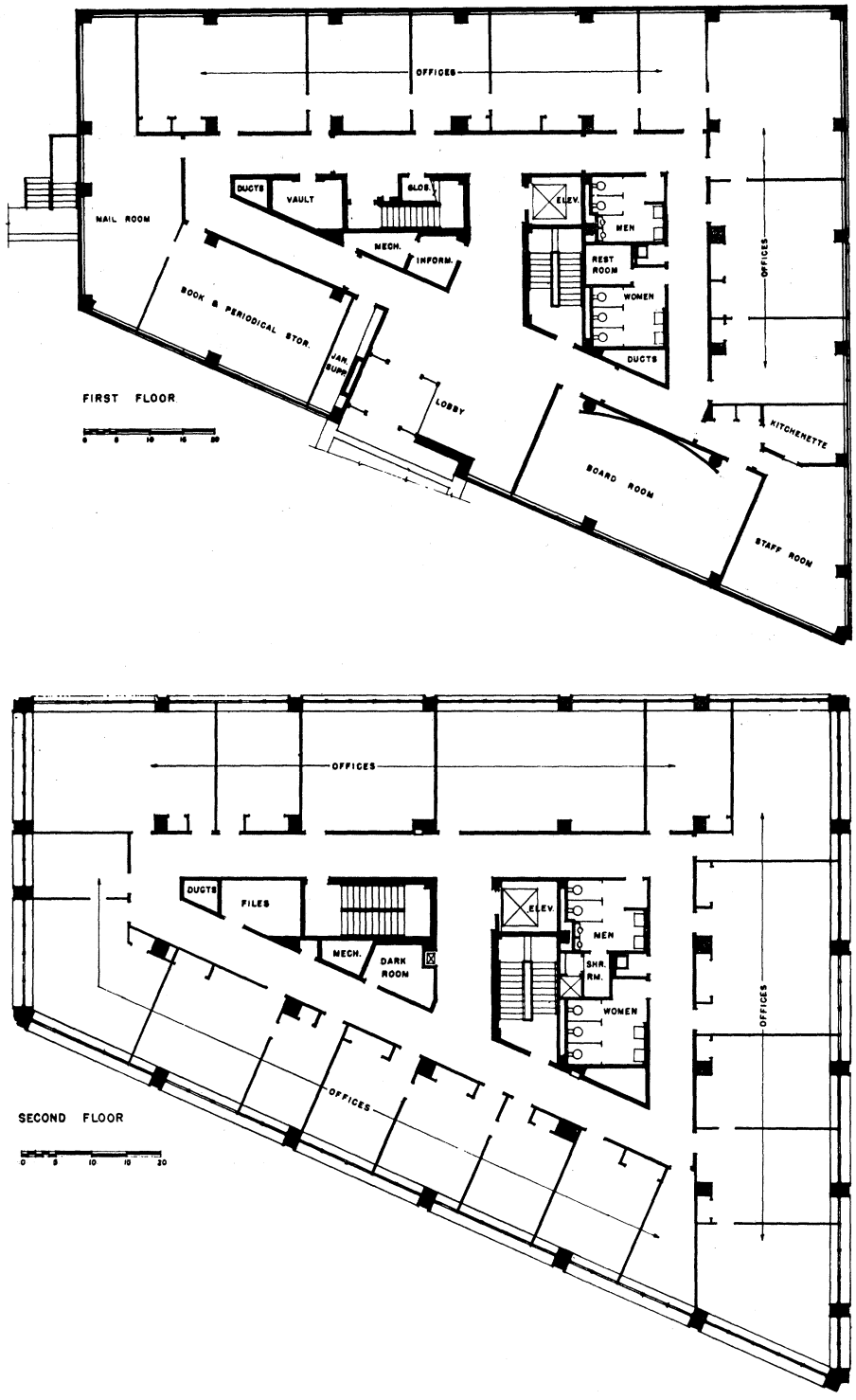
The site on Massachusetts Avenue, Northwest, is bounded by four city streets and forms a trapezoid. It was somewhat restricted in area and was at the time occupied by old buildings, one of which served as the temporary headquarters for the Association. In order to provide the necessary floor area, all the old buildings had to be razed and as much of the site had to be used as the law would allow. This included most of the area between the building restriction lines, and this dictated both the shape and the size of the floor plan. The existing buildings stood on a low plateau about 6 feet above the sidewalk level. It was decided to maintain this grade, thus making it possible to house a parking garage in the basement without having to ramp down as far below the street as would otherwise be necessary. This controlled the level of the first floor of the proposed building. At the same time it gave an economical solution to the parking problem and produced a monumental base for the building. The heating plant and air-conditioning equipment were located in the penthouse on the roof in order to provide more parking space in the basement.

The program indicated that the immediate requirements for office space for the Association could be contained on two floors. In order to meet the requirements of the Board of Zoning Adjustment, it was decided to limit the area for future expansion to one additional floor. At the same time it was also thought wise to design the structural frame of the building so that two more floors could be added later, provided that permission for this could be obtained at some future date.

The next step consisted of planning a building around the specific requirements of the owner. If we were to include daylight control, we also had to be sure to arrange for sufficient daylight where needed. The window areas had to be large and were designed in continuous bands so as to insure flexibility of interior arrangement.

One of the requirements was to make possible the removal of interior partitions in the event that offices had to be moved or enlarged. This led to making the windows about 4 feet wide with mullions between, to which partitions could be attached where desired.

It was agreed that the windows should not be generally operable because the entire building, except the garage, was



The business offices of the Association occupy the east and north sides of the first floor of the new building. The administrative offices and the editorial offices are housed on the second floor. The third floor, on which the arrangement of rooms is similar to that on the second floor, has been rented to several other scientific organizations: American Society of Photogrammetry, American Chemical Society for some of its offices, and the National Academy of Sciences on behalf of the American Geophysical Union and the American Geological Institute.

Some views of the new AAAS building: (top left) one of the editorial offices on the east side of the building; (top right) the board of directors' room; (center left) a corner of the library; (center right) one of the administrative offices on the north side of the building; (bottom left) the staff room; (bottom right) one of the new pieces of equipment in the business office for keeping membership records. [Photos by Hilary Deason, Washington, D.C.]

to be air-conditioned. However, some means had to be found to wash the windows when necessary. This could not be done from the outside, if sunshades were to be used. This meant that the windows had to be hinged to open in and locked so that they could not be opened except for washing.

So as not to interfere with the in-opening windows the partitions at the mullions had to be kept thin. It was therefore decided to use solid plaster nonbearing partitions, 2 inches thick, for this purpose. These could be easily taken down and rebuilt if they had to be moved in the future.

In order to balance the loss of heat in winter from the large glass areas, small radiators were provided at the window sill in each bay. The air-conditioning system was also designed so that the registers would not have to be moved, if partitions should be relocated.

Another feature that makes for internal flexibility is the underfloor electric duct system. These ducts carry electric and telephone wiring under the floors of the offices in two continuous bands around the building. At short intervals along these ducts, both electric and telephone outlets can be installed at any time. If an office is to be moved or if equipment is to be rearranged, new connections can be made where desired.

The same principle was carried out in regard to the electric-lighting system. This also consists of two continuous troughs of fluorescent lights recessed in the ceilings of the offices. These allow for intervals where the partitions intersect the light troughs. However, if the partitions are moved, the lights can be relocated in the continuous trough with a minimum of difficulty.

Another feature makes flexibility of arrangement possible. The interior finishes of all the offices are similar so that if they should be rearranged in the future, no general redecoration would be necessary.

One more problem arose which had a bearing on the question of internal flexibility. This had to do with the structural frame—whether it should be of steel or reinforced concrete. In Washington reinforced concrete is usually less expensive than structural steel.

In a building where the utmost flexibility is desired, a cellular steel floor allows this in the arrangement of telephone and electric circuits. This type of floor requires a steel structural frame, which would also give more headroom for running duct work. However, comparative estimates indicated that the concrete frame would be much more economical (see Table 2), and the steel frame and floor were therefore discarded in favor of concrete.

Table 2. Cost data analysis.

Name of building: American Association for the Advancement of Science
Location: 1515 Massachusetts Ave., NW, Washington, D.C.
Type: Headquarters building
Date building was started: July 1955
Date building was completed: June 1956
Total volume: 407,000 ft^3
Floor area: 34,600 ft^2
Ceiling heights: Garage 8 ft 7 in.; 1st floor 11 ft 2 in.; 2nd and 3rd floors, 8 ft 8 in.
Specifications:
Reinforced concrete structure
Limestone facing on upper stories
Granite facing at first floor
Aluminum sash, surrounds, and vertical weather controls
Concrete block partitions, except 2-in. plaster partitions between offices
Rubber tile floor and base
Mineral acoustic hung ceilings
Architect: Faulkner, Kingsbury & Stenhouse
Engineer: James M. Gongwer (structural)
Voss Engineering & Construction, Inc. (mechanical)
General contractor: Wm. P. Lipscomb Company, Inc.

Item	Cost	Percentage of total cost	Cost/ft^2	Cost/ft^3
Structure	$543,800	77.6	$15.71	$1.34
Plumbing	20,000	2.9	0.59	0.05
Heating, ventilating, air-conditioning	78,000	11.1	2.25	0.19
Electrical	59,000	8.4	1.70	0.14
Total cost of building	$700,800	100	$20.25	$1.72

Final Arrangements

The next step was to clothe this skeleton with an appropriate skin; to give it a dignified architectural expression. The chief esthetic problem was in the use of the sunshades. Although they tended to give the exterior of the building an unusual character, they also precluded any kind of traditional architectural treatment. Although we liked the first studies of the elevations showing the sunshades, we did not know how the Association would react to so radical a departure from accepted precedent. Nor did we know how it would pass muster with the official bodies who would have to approve of the scheme.

In order to satisfy ourselves before showing the drawings to others, we decided to develop a series of elevations, starting with the first scheme and arranging them in graduated steps to a more traditional and less exciting treatment. To our great delight, when this series was shown to the Association, the first sketches were accepted without modification, and the Commission of Fine Arts passed this scheme as it stood.

We were now ready to submit this material to the Board of Zoning Adjustment. We were hopeful that the size and form of the proposed building would meet with their approval. But we were again somewhat fearful of how they might feel about the appearance of the proposed building.

In advance of the public hearing before the Board of Zoning Adjustment, we prepared a scale model showing how the building would look, both with and without the sunshades. We appeared at the hearing under the able guidance of the Association's attorney, Arthur Hanson. The board considered the various problems involved and approved the plans unanimously.

The building was completed in May 1956 and has been in use for several months. It is still too soon to determine whether all the assumptions made in connection with the design of the building or of the equipment are valid. Before long it is planned to run tests on the sunshades to see how closely the theory on which they were built will coincide with actual results on the site. This will bring us to the end of our files on the new building, but the period now past is but a prolog to a new era for the Association.