ARCHITECTURAL ECONOMICS

DESIGN

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WRITING by request and without recompense—writing for my friends, that is to say—under a prescribed title "Architectural Economics" with the sub-heading "Design," I may be permitted to say exactly what I like as to what I think. To begin with I do not know what is expected of me. Design is a much bigger thing than architecture, and design is from its very nature wrapped up in economic considerations from start to finish. I must first deal with the word "Architectural" in the title.

Architecture as an art is usually dependent on design. Design is the raw material of architecture in such cases; but what is called monumental architecture has but a flimsy relation to design. It is primarily concerned with impressions or moods—its spiritual content may have little or nothing to do with the solution of the problem—with discovery of form in terms of practical purpose material and technique. In monumental architecture the purpose is no longer practical, but in ordinary architecture it is the solution in terms of practical purpose, material and technique that matters most; that is the design, the discovered form, is the subject of the artistic commentary in architectural treatment.

As the greater cannot be contained in the less, the word "Architectural" in the title must be interpreted as meaning "having to do with what architects, as professional men, concern themselves with" or in shorter form "having to do with buildings." After all only some architects are artists and even they spend most of their time on matters that have nothing to do with architecture as art and a great deal to do with design—the discovery of form. In this activity they row in the same galley with the engineers and contrivers of things. Only occasionally do they serve in the ranks of the artists marching with the poets and musicians and painters.

So when an architect sets to work in 99.9 cases out of a hundred, he has a problem to solve. He begins by solving it in terms of use. He determines the sizes of rooms. This involves economics right away. For even if the accommodation is to be on a generous scale—perhaps a lavish scale—there is such a thing as waste space. As he proceeds to the arrangement of his rooms and the study of their connections the economics of time and human energy crop up. A long corridor may be a waste of space and a waste of materials. It may also be a waste of time, of leg work and of shoe leather. Pity the poor hospital nurse, who may have to make fifty journeys a day to the ward linen store, if that store is thirty feet farther from the ward door than necessary. Pity the workman's wife, mother of a family, if she cannot juggle pots between sink, stove and cooking table with a half turn and a step with one foot.

Thus in the arrangement of rooms over and above their disposition for prospect and aspect and apart from the absorption of cubic contents in their connections, there is this matter of efficiency engineering as to the movements of their inhabitants.

The eighteenth century French architects produced some quite marvellously graceful and convenient planning without any passages or corridors at all. That was called suite planning, one room opening off another. But the passage space was there—through the rooms—and the rooms needed twice as many doors with the lost effective floor space of their swings, as did the rooms in the English planning of the nineteenth century with its emphasis on privacy and its lavish use of passages. It is by a compromise between these two systems that the modern house planner achieves efficiency. Much depends on the degree to which a passageway through a room, or in a corridor, is going to be used. Light traffic may well be through a room. Heavy traffic—i.e., frequent use—demands a corridor, and privacy demands the corridor too.

In the very close planning demanded in housing operations the designer cannot give too much consideration to these matters. An extraordinarily compact plan may be highly inefficient for the reason that it may not provide enough effective floor space for its area and cubic contents. The dimensions of rooms, apart from floor area and cubic contents, have an important bearing on the economics of their use. There is traffic within the room as well as to the room. Careful furniture layout is the best check to employ here. Six inches more length involving four inches less breadth or vice versa, may make all the difference.

Then there are the economics of the envelope to consider. The envelope of a building is a combination of walls and roof; the envelope of a boat is a combination of deck and body. A rambling plan can never have an economic envelope. The envelope has its own practical purposes and its own material and technical considerations to determine its form. It is not just so much material disposed to

contain the accommodation. What is so obvious in the case of a boat, is not less true, because less obvious, in the case of a house. A roof, especially in a climate such as ours, cannot be just any shape at all; any more than the immersed part of a ship can be any shape at all. Both have form to be discovered by the designer by a synthetic process of analysis and combination—what it has to do, what it is made of and how it is made.

A plan having been laid out and its elements having been brought within a possible envelope, the next question is the points of support. If there is to be economy in construction, these points of support will form a systematic pattern; not necessarily a symmetrical pattern. One begins by seeking a structural bay or cell that will correspond to the use elements. Repetition is the soul of structural economy, and the repetitions the structure imposes are usually the basis of the rhythm of the composition. Obviously all problems cannot be solved in terms of so many equal bays; but there are very few problems of building, parts of which do not easily fall into a series of bays. This structural analysis is aimed at the discovery of a constant building unit, if any exists, which will correspond with the variable use units. If the smaller (not the smallest) use units and structural units correspond so much the better. Large use units may then be manoeuvred into two, three or any number of structural units.

The advent of steel construction has given a greater economic motive to the devices of "unit planning," but from the earliest times the principle has been acted on. It is thus that long ranges of repeating forms have come to be such important elements in architectural composition. Unit planning has a further economic advantage. If a building is likely to be enlarged, the structure can be continued and displaced elements of use can readily find new structural units of the old sizes to contain them—a matter on which the late Frank Darling used to lay great stress when acting with me as an assessor of competitions.

The use of other than rectangular forms is a matter that has economic aspects. The superb plans of Boffrand in the time of Louis XV were economically adroit. His circles, ellipses and pentagons were not decided on for their own sweet sakes. Try and replan one of his Paris hotels without recourse to these forms and you will see. These forms of room, courtyard or staircase came to him out of the problem. Nothing was sacrificed for them. They were simply the forms that did the trick.

Then again there is the marvellous breadth and simplicity of McKim's planning that looks so easy. The discovery of America looked easy after Columbus had made it—as easy as making an egg to stand on its end. But these easy and obvious looking solutions, full of simplifications that are in effect economics, can only be arrived at after the most patient and energetic analysis of the problem. McKim sometimes planned for effect, it is true, but even then he got more effect for less space than any of his contemporaries in America could begin to achieve.

If my friend Noulan Cauchon has his way the question of hexagonal planning is likely to be interjected into all our lives. That the hexagon is a better basis for street planning than the square (checkerboard) or the parallelogram (gridiron) within a city or an urban district I readily admit. It saves road, it saves time. And that a hexagonal envelope for a structure involves less material and less heat loss than a square or parellelogram I also admit. But, in determining form, method of construction is one of the three elements, and except for poured concrete "fair work and square work" is cheapest. As to hexagonal rooms I am all for them if like Boffrand's ellipses they do the trick, which can only be now and then. So long as all beds and most tables remain rectangular, as I venture to hope they will, there must always be much lost space by planning small rooms on an hexagonal basis. In such applications the hexagon does not give full value for cubic contents provided and dollars spent. As housing is likely to be about the only thing to claim our attention or engage our aspirations for some time to come, there is another matter in that connection to be dealt with.

One very eminent English architect with a genius for quarrelling with his fellow English architects appears to advocate the study of mid-European housing. The English scale of accommodation is far more moderate than most of the European. The Germans have recently modified their standards. This is something the English authorities know more about than anyone else. They have been doing assisted housing for fifty years past.

Another very eminent English architect, with a happy experience in monumental jobs, has vociferated "balconies for babies" by which he means long, continuous, stripe balconies on the outside of housing blocks. I am all for balconies for the babies, if the balconies like the babies are short—I am all for little balconies overshadowing non-habitable rooms—but long ones; no—not in this climate at least.

There may be gross economy in putting a passage outside a block of flats instead of in it. If so that passage, from stairhead to outer doors, kills privacy in the rooms facing on it and can be so used for the babies. Also it means double doors for the dwellings. Also, if built with a brick parapet, in the mid-European manner, that parapet will be on the street in a year or two.

The continuous balcony over-shading windows reduces the solid angle of sky seen from the room

to about nothing at all. Compensate for this by giving the room a glass side and then double the glass and treble the heating. Is that an economy?

Everyone knows that sunshine in a workroom is an unmitigated nuisance, but most of us still believe that a sun swept room, even sun swept through common glass that does not let the ultra violet rays through, makes for health and happiness. A geranium knows that and so does a cat with kittens, and so does any person of common sense, to judge by the superior rental value of a "sunny flat."

Town planners and housing experts all over the world spread the gospel of the east and west exposure of windows to get sunshine into rooms for part of the day. Then came some mid-European architects, suffering hysteria in the form of an originality complex. Theirs was the kind of originality that would have created man to walk on his hands with prehensile feet waving over his head. They take an aversion to vertical lines. They get hold of some housing jobs to play stripes with. Then the sheep—always more numerous than the shepherds—say: "Hip hurrah! how original! Let's be original too; come jump the fence; balconies for babies, Ra! Ra! Ra!

I implore my readers to consider what a beam of sunshine entering a workman's flat at 10.00 a.m. or 3.00 p.m. on a midwinter's day means to a woman and small children at home there. I believe it improves their health. Anyhow it adds to their happiness; and that has economic value. But a couple of hours of midwinter sunshine on the glass of a window will raise the temperature of the room 4°. Now you have something to figure with in real dollars and cents, for the price of coal is known. Quite an economy this!

Economic analysis of, let us say, rival solutions of an architectural problem, or of two different ways of doing the darned thing when we are in doubt, should be resorted to more often than it is. Mere comparison of cubic contents means very little. But if we divide our total cubic contents into percentages of (a) effective contents, (b) passages and stairs, (c) heating plant, and (d) walls, floors and ducts, we get useful facts. A school building is very efficient if such an analysis gives us (a) 48.5%, (b) 14.2%, (c) 5%, and (d) 32.3%.

Then again by resort to a cost analysis one might ascertain that the same school cost 17.8 cents a cube foot to build; $6,700 per class room provided; and $157 per child, and incidentally how many cube feet of building each child acquired therein.

And lastly there is the cost and revenue set up, so important when dealing with housing problems. Here the cost set up must cover (a) land, (b) construction, (c) gardens and lawns, (d) design and superintendence, (e) interest during construction—(d) and (e) are usually forgotten. The rent set up must cover two groups of cold, hard facts—(a) capital charges, and (b) carrying charges, or in less technical language, cost of loans and running expenses.

Under (a) we have (a) Interest and Sinking Fund on First Mortgage, (b) the Same Sad Facts as to Second Mortgage, all of which are so important that I have given them capital letters. Under (b) we get (a) insurance, (b) management, (c) maintenance, (d) vacancies, (e) grounds, (f) heating (if any), and (g) taxation.

Well, suppose the whole thing comes too high, what will you do? Reduce the cubage? Perhaps you can, but beware! There are a lot of things in a small dwelling that can't be made any smaller—stairs, beds, sinks, doorways. The things that won't squeeze usually determine one or both the overall dimensions. Well you squeeze the floors and the first thing you know you have lost bed space, or the elasticity that would enable three small beds to go into the same room as two big ones. That means you have reduced rent but also reduced population. Well you squeeze and you squeeze your plan, disregarding the fact that it now gives less for the money, and let us suppose you get 6% out of the cube which is just what you want. Don't flatter yourself. When it comes to squeezing a small plan, 6% out of the cube will rarely be 3% out of the cost.

A good point to bear in mind is this; and is the concentrated experience of England and America. If a four-bedroom house costs 22.5 cents a cube foot, a three-bedroom house will cost 25 cents and a two-bedroom house 28 cents a cube foot. This is partly accounted for by the fact that the kitchen and bathroom equipment will be about the same in every case and partly by the fact that the smaller the house the greater will be the proportion of solids entering into the composition.