CONSTRUCTION AND MANAGEMENT

John Ihlder, Presiding

LAND SUBDIVISION FROM THE POINT OF VIEW OF A DEVELOPMENT COMPANY

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There seems to be a thorough agreement among those interested in housing and in city planning that deep and narrow lots tend to the development of bad housing conditions, whether in the form of deep houses with dark interior rooms or in the form of rear dwellings or both. I am personally an advocate of shallower lots for inexpensive housing than are customary in most American cities. But in the discussion at Detroit I took issue with a more enthusiastic advocate of wider lots, who seemed not to appreciate the relatively high economic cost of extra width in a lot as compared with mere depth.

Of course we all know that one of the important elements of cost represented in the market price of a lot is the cost of improving the street upon which it abuts, and it is obvious that this unavoidable element of cost is substantially proportionate to the frontage or width of the lot and is wholly unaffected by its depth. A lot fifty feet wide is chargeable with just twice as large a share in the cost of constructing the street on which it abuts as a lot twenty-five feet wide. And it is impossible to dodge this increase by any reduction in the depth of the lot, for it does not cost one cent less to build the street in front of a lot fifty feet deep than in front of one two hundred feet deep.

On the other hand the land occupied by a lot, and by the portion of the street which gives access to it, cost a definite amount per square foot before the development took place, and you can double the width of the lot without increasing this element of cost provided you halve the depth, as measured from the middle of the street. Certain other elements of cost beside that of the raw land are also chargeable against a lot approximately in proportion to its area as thus measured.

It will readily be seen that where the elements of cost which depend solely upon the frontage are relatively high, any increase in width of lot must involve a serious sacrifice of depth in order to get a lot of the same cost; whereas in those cases where the frontage costs are low as compared with the square foot costs, the desirable extra width can be secured at a smaller sacrifice. One of the important points, therefore, in determining what shape of lot will give the greatest value for a given expenditure, is the relation between the front-foot costs and the square-foot costs. As a convenient index for expressing this relation in figures I have adopted the following arbitrary convention, viz.: the cost per front foot in dollars divided by the cost per square foot in cents. Thus a development in which the lots had cost 5 cents a square foot plus $5 a front foot would have an index figure of 1.0. The same index figure would apply to a development in which the lots had cost 10 cents a square foot plus

$10 a front foot; while a development in which the cost had been 5 cents a square foot plus $10 a front foot would have an index figure of 2.0, and one in which the cost had been 10 cents a square foot plus $5 a front foot would have 0.5 for an index figure.

If time permits I will attempt to analyze these two groups of costs in dollars and cents, for typical cases, but first I will ask you to take certain index figures for granted and see to what conclusions they lead. I believe that the index figures of tolerably well-conducted and normal land developments on the outskirts of American cities tend to hover in the vicinity of 1.0 or somewhat above it. This tendency to uniformity of index figure is because land so situated as to command a high price is generally developed in a more thorough and costly manner than cheap land. Where land is very cheap or where the community demands an exceptionally costly development, the index figure may run up to 2.0 or 3.0 or even higher. Where the undeveloped land is held at a very high price, or where an exceptionally cheap improvement is enough to sell the lots, the index figure may fall to 0.5 or even 0.25; and of course, in the exceptional case of a piece of land which has lain undeveloped while a large city has grown up about it, the index figure may be almost indefinitely reduced.

I have prepared a chart which takes as a starting point a lot of minimum depth, fifty feet deep, on a forty-foot local street. The width of this shallow lot is taken as a standard of measurement and is called 100 per cent. Its width in feet may be anything you choose to assume without affecting the use of the chart. Starting from the rear corner of this lot are curves which show, for various index figures, by what per-
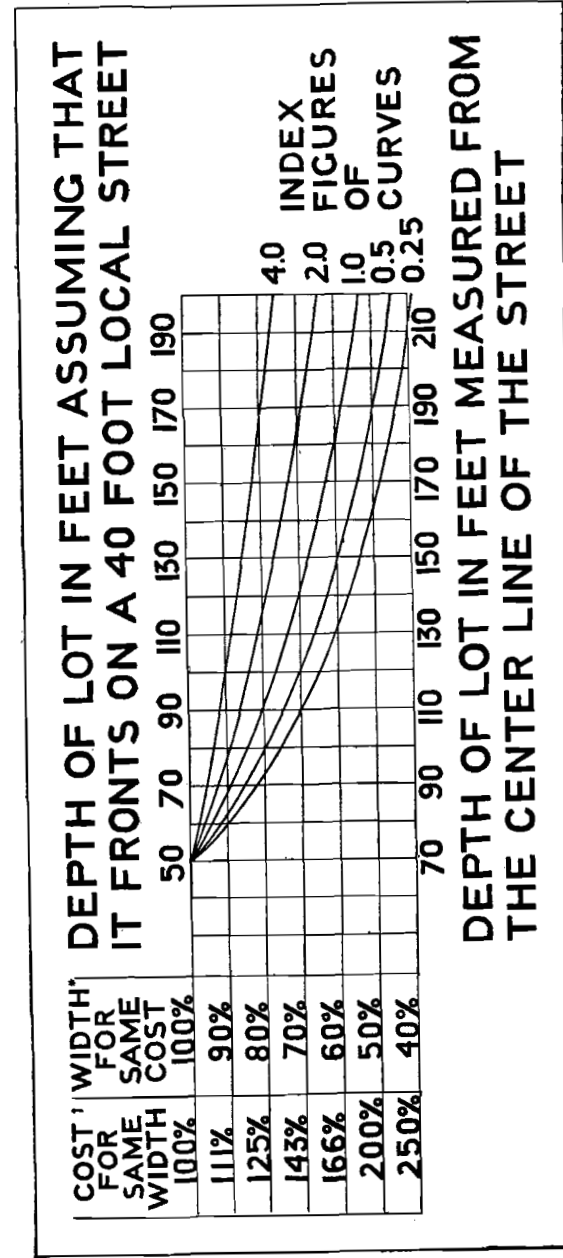
† Increase of cost of lot (in percentages of the cost of a lot 50 feet deep on a 40 foot street) which will result from increasing the depth to various amounts while keeping the width unchanged.

* Width of lot (in percentages of width assumed for a lot 50 feet deep on a 40 foot street) which will make the total cost the same for various depths.

centage the width of the lot must be reduced as its depth is increased in order to keep its total cost the same, and the percentage by which the cost will be increased if the width remains the same. Thus, for the normal index curve of 1.0, if the fifty-foot depth is increased to seventy-five feet, the lot width must be decreased to 87 per cent of the original unit, or the cost increased 15 per cent; if the depth is increased to a hundred feet, the width must be reduced to 77 per cent, or the cost increased 30 per cent; and so on.

Let us read the chart another way, still using the index curve, 1.0. It shows that you can take your choice, for the same money, between a 50-foot square lot, or one 45 feet wide and 69 feet deep, or one 40 feet wide and 92 feet deep, or one 35 feet wide and 123 feet deep, or one 30 feet wide and 164 feet deep. Now I think most of us would agree that if our pocketbooks permitted us precisely this series of lots from which to choose a place of residence, we should *not* choose the square lot 50 feet wide. Much as I loathe the tiresome familiar rows of detached houses squeezed on to 30-foot and 40-foot lots, I should not hesitate a moment to give up the difference between 50 feet and 40 feet of width for the sake of the extra 42 feet of depth. If I were very strongly set on raising my own vegetables or flowers or on having a safe enclosed yard for my children to play in, I should be strongly inclined to a 30-foot lot 164 feet deep, and in that case I should be tempted to build my house the full width of the lot with blank party walls on the sides and to advise my neighbors to do the same.

But wherever in the scale any one's personal preference would land him, I think these figures go to show that there is more of sound economics and good sense

behind the customary deep proportioning of lots and less of stupid and arbitrary fashion than some of us reformers are apt to assume.

But suppose the conditions of the development and of our pocketbooks confine us to a lot of half these sizes, still using the index curve 1.0. We should then have to choose out of a series like this: a lot 25 feet wide and 50 feet deep, which is possible but cramped for a semi-detached house; or a lot 20 feet wide by 92 feet deep, which is adapted for a comfortable house in a row; or one 15 feet wide by 164 feet deep, which means a distinctly poorer house in a row with a larger back yard but of a worse shape; or a half-interest in a 40 by 92-foot lot, which means a two-family house with small grounds.

If we are squeezed down by financial considerations to a series on the index curve of 1.0 starting with a lot 15 feet wide by 50 feet deep, which is near the Philadelphia standard for small row-houses, we stop very nearly where we begin, as far as concerns single-family houses, although it is debatable whether some people wouldn't prefer a $12\frac{1}{2}$ foot lot 84 feet deep. The next alternative in this series is plainly a multi-family house.

I think it is obvious that on the assumption of this fairly normal index figure of 1.0 there is a decided advantage in lot depths upwards of 90 feet, except where there is a determination to provide single-family houses at a low price in a locality where land and development costs are both high. For that case the Philadelphia type of lots, both shallow and narrow, seems to be the only solution.

A glance at the chart is enough to show that for any index figure upwards of 1.0 there is a still heavier penalty for width of lot. With an index figure of 4.0 a

lot 45 feet wide by 102 feet deep, or one 40 feet wide by 167 feet deep, would cost no more than one 50 feet square. It must be remembered, however, that such high index figures seldom occur except where land is relatively very cheap. In such cases the development cost is apt to be so adjusted to the pocketbooks of the purchasers that they can afford to get the width they need and incidentally they are given about all the depth they seem to want.

When we come to consider lots where the index is considerably below 1.0 the case is different, but not as much different as we might expect. Taking the index curve of 0.25 on the diagram, which represents, you will remember, the cases where there is 25 cents of cost chargeable against each front foot for every cent chargeable against each square foot, we find that what we save by reducing the width 10 per cent (instead of enabling us to increase the depth from 50 feet to 102 feet as with an index of 4.0) enables us to increase it only to 60 feet, and a reduction of 20 per cent in width would compensate for increasing the depth only to 74 feet. For a detached house I would rather have a lot 40 feet wide by 74 feet deep than one 100 feet deep and 33 feet wide (another alternative in the same series), but there are many who would not agree with me.

At the Detroit Conference Mr. Bartholomew urged the great desirability of lots $33\frac{1}{3}$ feet wide instead of the 25 by 100-foot lots customary in Newark. Let us see just what this increase would involve. Assuming a 40-foot local street, as I have done throughout, and using the index curve 1.0, this would mean decreasing the depth of the lots to a little less than 50 feet, or, if the depth were to remain 100 feet, it would mean

increasing their cost one third. If the index number were 0.25, however, as it might possibly be in parts of Newark, with very sketchy street construction and high land prices, the increase of cost by adding to the width could be offset by decreasing the depth to 64 feet. A lot $33\frac{1}{3}$ feet by 64 feet might be worth considering as an alternative to one 25 feet by 100 feet at the same price; although it is very likely that the index would presently be raised by improving the original cheap street, in which case the additional front foot cost would have to be met either by assessment on the abutters or by the city at large. In the long run *somebody* has to pay for tolerably good streets and sewers, not to mention all the other service mains, which cost just so much a mile to lay and renew.

This seems an appropriate place at which to say a few words about speculative profits. To one who has acted as a professional adviser in many land development operations, some of them highly lucrative and some the reverse, it is apparent that housing reformers often labor under a serious misapprehension as to the size of the average margin between the cost and the price of lots; the margin which is supposed to include an excessive and illegitimate speculative profit for somebody.

Let me begin my analysis of normal costs by quoting a rough-and-ready estimate which sums up the experience of one of the largest and most successful commercial developers of suburban real estate for people of small or moderate means. He says that under ordinary conditions, unless you can see your way to selling the lots which you can form out of a given tract of land for about three times what the raw land will cost you, or better, its development is hardly likely

to be a profitable venture. Roughly he figures that of the total selling price of all the lots in a development about one third is absorbed by the first cost of the raw land at acreage rates; another third by the cost of development, mainly street construction; nearly a sixth by selling costs, such as advertising, commissions, and all the devices which he has found it profitable to employ because they enable him to sell quickly and thus save more than their cost by keeping down the carrying charges on the investment. This leaves about one sixth, or say between 15 and 20 per cent of the assumed selling price to cover carrying charges (that is to say, taxes and interest, on the invested capital during the entire operation), and also the possibility of profit enough to justify the developer in risking his time and effort and money against the chance that his judgment may be wrong and the venture turn out to be a losing one.

While there are wide variations from the above, I think it is fair to say that, in the process of converting open fields into available building lots, the necessary and legitimate charges, where the process is conducted in the most efficient and rapid manner and the transaction is practically closed up within (say) three or four years, are apt to approximate one third for the raw material of suitably situated land, one third manufacturing costs, and one third merchandising costs and other overhead expenses.

It is very seldom, however, that all the lots are actually built upon so rapidly, and it must be borne in mind that, whether vacant lots are held by the original developer or by a middleman or by the ultimate occupant, they must be charged with interest and taxes without any offset until they are put to use. With

taxes at 1 per cent and interest at 6, the usual mortgage rate, the investment in a vacant lot will double in about ten years. Under ordinarily favorable conditions and with an active and liberally financed campaign on the part of the land company to hasten the erection of houses as well as the sales of land, it seems to be inevitable, taking account of all the lots in a subdivision, that several years should elapse on the average between the date when the lots are ready to build on and the date when they *are* built on and in use.

I think it is fair to say, therefore, that the inevitable costs involved in the process of acquiring acreage land, subdividing and developing it, and selling the lots, together with carrying the vacant lots until they can be built upon, are seldom much less than three times the cost of the raw land and frequently four or five times or even more, the financial success of the developer turning largely upon his ability to turn the goods over quickly and to make the purchasers carry the burden caused by their own delay in putting the land to its full use.

Whether the total costs up to the time of building on a lot are three times the original cost of the raw land, or five times, or what not, there may be added at the time of sale either a speculative profit or a speculative loss, large or small according to the current market price. That price is partly controlled in the long run by the cost of producing competitive lots, but is mainly determined by a prevailing speculative hope of an indefinitely increased demand in the future. How this speculative element tends to increase the actual burden of cost I will try to suggest later; but it is my impression that the prices at which lots are sold for the immediate erection of buildings do not *on the*

average cover more than a very minor fraction of net speculative profit. Usually some one or more of the series of previous buyers and sellers has made a substantial speculative profit and the rest have stood speculative losses.

The same experienced operator whom I have already quoted has told me that he has learned to adhere absolutely to the principle of never buying any vacant land until he is ready to proceed immediately with its development and sale. He has no moral scruples whatever against making money by speculating in such land. But he has found that on the average there is no money in it; that it is cheaper to let somebody else carry the vacant land until he finds the time ripe for working it up into lots and selling them. His opinion is corroborated by that of other experienced operators in real estate. It amounts to this: that on the average and in the long run more money is lost than is made by speculative holding of vacant land; that the element of accrued speculative profit represented in the price of vacant land bought at a fair market value is on the average a negative quantity.

The contrary opinion so widely held, the opinion that there is generally present in city and suburban land values a huge percentage of accrued speculative profit, which, if deducted, would radically change the conditions of the housing problem, appears to be due in part to the incurable optimism of mankind, to the inborn gambling spirit that goes with the desire to get something for nothing; and in part to the incessant systematic and heavily financed campaign for influencing public opinion which is conducted by all the agencies concerned with the business of selling land. Almost the entire force of the real estate business of

the whole country, so far as it comes in contact with the general public, is working all the time, with a vast and costly machinery of publicity, upon the bull side of the market.

If it is true, as we have been told, that advertising has made us into a nation of breakfast-food eaters, it is equally true that advertising and the efforts of professional boomers have made us unduly credulous of the profits normally obtainable from the purchase and holding of city and suburban land. The large speculative profits which are frequently realized on land are like the grand prizes in a lottery. Without them the business would not go on. But the grand prizes in a lottery do not alter the fact that the average cost of the tickets is more than the average return to the ticketholders in the way of prize money.

I do not mean for a moment to deny that land speculation is in many cases responsible for increased cost or diminished quality of housing. Every form of gambling, with its diversion of human energies from useful work, involves a waste for which the community must inexorably pay the price. The loss to the rest of the community is not to be measured by the (supposed) profits of the land speculators and much less is it recoverable out of those supposed profits, as reformers so often assume, misled by the same rosy optimism as the gamblers themselves. The losses to the community as a whole grow mainly out of the fact that the dazzling possibility of a large speculative profit often leads the owner of land to neglect the humdrum business of getting such little use out of it from year to year as it is capable of rendering, and diverts his energy into the more exciting occupation of throwing good money after bad by making "improvements" for which there is no economic justification, or

by going in for other costly attempts to force the market.

There is an enormous economic loss to the American people from this speculative subdivision and development of land far in advance of the needs of each community. But there is no compensating profit on the part of the investors in premature development projects. If compensation is to be found at all, it must be sought in the mere pleasure derived from gambling in lots.

Let us now consider the basic costs which determine the various index figures previously discussed and which, with the addition of a varying percentage of overhead charges, determine the total cost of any given lot.

The front-foot costs do not consist merely of half the cost per lineal foot of the street on which a lot abuts. There are street intersections to be paid for somehow, and the extra value of corner lots is not great enough to cover the cost of laying out and constructing both of the streets on which they abut. Without going into the rather tedious calculations upon which my conclusion is based, I will state my conclusion that the normal cost for street construction per front foot of ordinary interior lots on local streets is equal to not far from three quarters of the cost per lineal foot of the streets.

"Street construction" may, and sometimes does, consist of plowing up the roadway, running a road scraper over it a few times, and putting up the street signs. Sometimes it is even limited to the signs alone. But here, as elsewhere in housing problems, we must fix an irreducible minimum somewhat above the lowest commercial practice. I think Mr. Veiller would include a sewer connected with a proper sewerage system in his

irreducible minimum. If so, I would, under certain circumstances, disagree with him. Upon a suitable, well-drained, sandy subsoil, a fairly open suburban development, provided with a water supply from a safe source (local surface wells being absolutely barred), can get along perfectly well for years with small septic tanks or leaching cesspools on the several lots.

But I hasten to add that the favorable conditions which justify such a development are the exception rather than the rule, and that in the majority of places a housing development cannot be regarded as satisfactory until the streets are sewered. A water main is essential, and either gas or electricity or both are nearly so, but the installations for all such services except the sewers are ordinarily paid for out of annual service charges and are not usually reckoned in figuring the cost of development. From the larger point of view of the city planner, it is clear that any arrangement of lots and streets which increases the length of such mains per capita creates an expense which must be paid for somehow; and they ought logically to be included in estimating the relative cost of different types of layout for housing a given population. But for the present, like the average real estate developer, I will leave these complex problems to the public utility corporations to work out as best they can on whatever street plan they happen to get.

The other chief elements of local street construction are the grading, the sidewalks, the road construction, the curbs, if any, the gutters and storm drains, if any, the parkings and tree planting, if any, and the street lights, if any. I will assume as the irreducible minimum under the most favorable conditions a street costing about $1.33 a running foot to construct. On a flat gravelly sand-plain like those of Long Island such streets are built, including two cement sidewalks and

a passable roadway shaped up out of the material found on the spot. The street would have no sewer, no street lights, no curbs, and no paving. This street construction would be chargeable against the lots at the rate of $1 per front foot. For $5 a front foot, which is equivalent under our assumptions to $6.66 per lineal foot of street, one could add a sewer, a narrow macadam pavement, curbs and street trees; or cut out some of these and include other features; all on the assumption of favorable conditions and a somewhat parsimonious style of work.

For $10 a front foot, equivalent to $13.33 per lineal foot of street, one can build a high-class and thoroughly improved suburban local street under ordinary conditions.

There are certain other elements of cost which are chargeable substantially in proportion to the area of the lots, as measured from the center of the local street to the back of the lot. Of course the chief of these is the cost of land. Next in importance is a share in the cost of the main streets or thoroughfares. In so far as the thoroughfares have to be wider and better paved and their trunk sewers larger in order to do the business arising from the population living on the local streets, a share in the cost of their development must be charged against the lots of the latter. Again, without going into the calculations, I will state my opinion that this portion of the construction costs is likely, in normal cases, to run somewhere in the neighborhood of one cent per square foot, falling in some cases as low as half a cent or less and perhaps rising as high as two or even three cents.

In first-class developments conducted by land companies, or in the ultimate development of an urban area by municipal authorities, there are many other elements of improvement cost, such as parks and play-

grounds, not to mention schools and other public buildings and their grounds, but none of these is fairly chargeable either per square foot of lot or per front foot, and perhaps the fairest practicable method of taking cognizance of them is to apportion their cost in proportion to the value of the lots, as is done in general taxation. For purposes of reckoning total cost these elements may therefore be merged with the other general overhead charges.

To sum up, we have the charges for local street construction running at rates mostly from $5 to $10 a front foot, but in extreme cases down to $1 or above $10. We have the charges for thoroughfare construction varying both sides of one cent a square foot. Finally, we have the cost of the raw and undeveloped land ranging from say one cent a square foot ($435 an acre) up to ten cents a square foot ($4350 an acre), or near a great city up to considerably higher figures. Thus for a lot 50 feet wide and 125 feet deep on a 50-foot street the costs might figure up thus:

Frontage costs, 50 feet at $6.00	$300.00
Square foot costs, 7500 feet	
(a) construction at 1c	75.00
(b) land at $2000 an acre = 4.6 c. per square foot (index figure 1.07)	345.00
Total basic cost	$720.00
Overhead expense up to date of constructing building, including loss of interest and taxes say 100 per cent	720.00
Total cost (irrespective of any speculative profit other than may have been included in the cost of the raw land at $2000 per acre)	$1440.00

I do not flatter myself that the figures I have presented solve any housing problems; but I hope they may be useful in helping us to apply our efforts in directions which are likely to be fruitful and in avoiding the pursuit of aims that are too directly opposed to mathematical and economic law.

TABLE OF CONSTRUCTION COSTS OF AN ACTUAL FIRST
CLASS SUBURBAN LAND DEVELOPMENT

	Portion of Total Cost Chargeable per Square Foot*	Portion of Total Cost Chargeable per Front Foot*	Amount Chargeable per Front Foot*	Amount Chargeable per Square Foot*
A. MATERIAL AND LABOR				
1. Grading of Streets ...	....	$42,185.81	$1.1601(c)	.....
2. Grading of Lots	$27,740.74	....	.....	$.00463—
3. Sanitary Sewers	10,526.00	38,428.64	1.0568+	.00175+
4. Storm Water Sewers.	32,754.16	....	.....	.00546+
5. Curbs...............	11,116.00	24,484.00	.6733+	.00185+
6. Sidewalks..........	8,309.19	26,312.41	.7236+	.00138+
7. Street Paving (a)	21,304.84	68,335.16	1.8729+	.00355+
8. Street Planting (b)...	7,968.54	38,255.20	1.0520+	.00133+
9. Ornamental Lamp Posts.............	....	8,475.00	.2330+	.....
10. Electric Conduits....	....	9,869.01	.2714+	.....
11. General Improvement and Sundry Decorative Features......	24,934.38	....	.....	.00438+
B. SUPERINTENDENCE (d)	11,067.85	20,118.00	.5532+	.00184+
C. DESIGN AND ENGINEERING...............	26,892.69	48,883.05	1.2772+	.00448+
	$182,614.39	$325,346.28	$8.8735+	$.03065+
TOTAL CONSTRUCTION COST	$507,960.67			

The above costs include no contractors profit, no portion of the general overhead expenses of the development company and no allowance for taxes or interest.

Land cost, .14076 per square foot. (e)

Construction cost, .03065 per square foot.

The cost per front foot in dollars divided by the cost per square foot in cents, that is $8.8735÷17.141¢ = .5+ Index Figure.

* The division of items between these columns is not made on the books of the company, but according to the judgment of the author. The square foot area of lots measured from the center of the street.

(a) Excluding certain alleys built to provide access to certain row buildings and charged as part of individual lot development.

(b) Including soil preparation, establishment of turf, trees, shrubs, etc.

(c) Per front foot of saleable lots, exclusive of side frontage

Park frontage	3,032 lin. ft.	
Saleable lot frontage	36,363 " "	=68.2% of total frontage.
Side frontage of lots	12,605 " "	
Railroad frontage	1,330 " "	
Total frontage	53,330 " "	

(d) Superintendence including foremen and other incidental expenses of construction gang.

(e) Square foot cost of land is determined by dividing total land cost by the saleable lot area.

THE PLANNING OF THE LOW-COST HOUSE

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IN approaching the topic of the design of the low-cost house I would like to explain that when I say "low-cost house" I really mean a low cost one, or what is the same thing, a substantial house, not of wood, which can be offered for a rental of fifteen dollars per month or less in a populous city and free from corporation paternalism. Wooden cottages can be, and are, built in small towns for lower rentals, but the real problem is not the habitation for the teacher, clerk or social worker, but for the horny-fisted son of toil, unionized or not, who faces the financial problem of bringing up a large family of children on an income represented by twelve or fifteen dollars per week when times are good and a large-sized minus sign when the work goes slack. This portion of the population needs clean, well-lighted houses, in healthful surroundings and can and will get along without trimmings if the rental can be brought within their needs, provided the neighborhood is large enough to bring a good many families into the same social plane.

Generally the designer of low-cost habitations finds himself in a dilemma between the ever-increasing demand of the laborer's family for conveniences and comforts and the contemporaneously increasing cost of building construction. No matter how much the cost of building goes up the demand of the tenant for larger rooms, more plumbing and other equipment