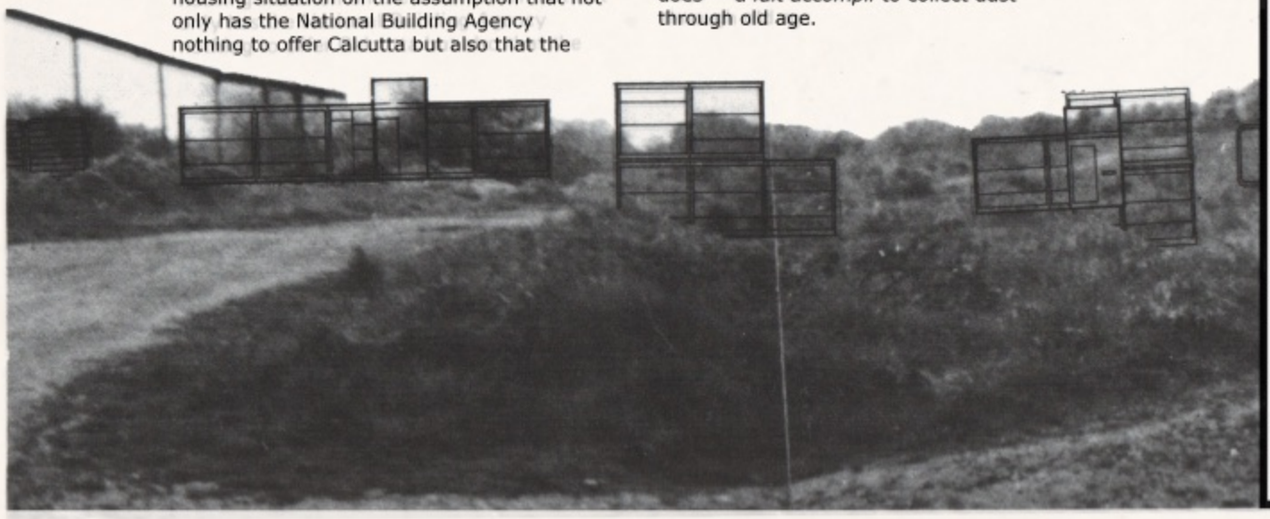
HOUSING

Housing as an element in life patterning must be continually re-examined and re-graded in the scale of humane additives. At present anything more than the concrete drainage tubes lent to the refugees of East Pakistan is considered by private and public 'dispensers' alike as an autonomous and peculiar yet essential ingredient in life styling. It has been allowed to create in Western society a self-perpetuating and exclusively interlocking supply system reinforcing the existing categories with which it is linked.

These include: the structure of investment and expenditure; land use; the structure of manufacture; the delineation by 'dispensers' of performance specifications.

However, there is an obvious shortfall in numerical provision, product choice, user satisfaction and performance. This research and development programme — "Son of Thinkbelt" — takes an Anglicised view at the housing situation on the assumption that not only has the National Building Agency nothing to offer Calcutta but also that the Barriadas would never catch on in Bradford. It is only when housing is seen as malleable yet particular as a chocolate bar will there be valuable international exchange, public and private, of information on desirable attitudes to what could be one of the World's most enjoyable commodities — the house.

This supplement is the first part of a two part summary of this work and as such is the first and last item in the Cedric Price Supplement Series, which covers work "in progress" and as such has to be an incomplete abstract of the total programme which will not be complete until December 1971. Work in progress — with all its wants, sores and dry patches — should be available to a wide disinterested, mean, critical, avaricious audience if only for the benefit of the producer. More hopefully, it should provide fresh malleable information for others rather than present — as a final report does — a *fait accompli* to collect dust through old age.



619

CEDRIC PRICE SUPPLEMENT 4

68+	81	A35	81	18

HOUSING RESEARCH Pt 1

Objectives

Ability to change one's *house* as rapidly as one's social appetites and aspirations.

Ability for Society to include housing amongst its range of variable artifacts — this enables society in general and in particular to equate housing with other aspects of social immediacy hitherto assessed differently from housing – e.g. vehicular traffic. Continuous public sensing is also needed as a design constituent (e.g. Donnison — Micro-politics of Inner City, BAAS 1971).

This comparison can extend to economics thus enabling a re-think of a major element of public and private investment and expenditure. Such a re-think is desirable for many reasons, one of the main ones being the increasing difficulty of poorer authorities to finance housing allied with the near impossibility of a large section of the community to self-purchase.

While subsidising people rather than houses is an attractive idea, it does not alter the major economic aim of this programme which is to reduce the overall cost of housing and thereby its constituent parts.

A new design approach to the relation between land and its use requires a re-think of their existing inter-relationships.

Any physical alteration of such relationship — particularly in "time in use" — requires new investigation of the socio/economic value of each element.

The means of production must affect the total structural system directly since the 'packaged' structure can be looked on as the single building element when located on site or transported.

Thus the rate of change of methods of production and their location will be the

RESEARCH DOCUMENT

96lines 10pt

BAD SCENE

Too solid slums

Sir,—I agree with Franklin Medhurst ("Guardian," April 26) that we should not be committing the nation to building half of its dwellings to standards that will be inadequate in 25 years.

However, I entirely disagree that the solution is to build slightly more expensive houses that "can be expected to remain above minimum acceptable standards for 100 years." Not only would it seem socially unhealthy, if not impossible, to delineate the minimum acceptable standards of domestic life in 100 years' time, but also architecturally it is extremely dangerous to predict in built form human requirements for such a period.

An alternative solution to the very real problem noted by Medhurst is to concentrate on short-life housing, enabling continuous and accurate improvement of conditions within the house, while ensuring the possibility of continuous re-thinking on siting and concentration. The fact that the present building industry and methods of housing finance make such a solution difficult should accelerate the constructive questioning of housing techniques and finance and not instill in architects and administrators the rather reactionary attitudes underlying Mr Medhurst's proposals.

It is extremely sad that so many of our present slums were so substantially built. There is no reason to repeat the mistake.

Cedric Price,
38 Alfred Place,
London, WC 1.

GOOD SCENE

decisive factor in determining the extent of the basic structural unit at any one time.

This work has been concerned with postulating a coarse model of a potential 'housing' service which would help correct the shortfalls and ensure that future appetites and demands, as yet unknown, can be identified and when necessary, satisfied.

To test such a coarse model of service, an equally crude manufactured component in the service has been designed and developed so that proposed service structure and component can be refined and sharpened against each other in a process of constructive abrasion. The stage in this process now reached will allow limited component manufacture for testing in actual use conditions and subsequent feedback in further refinement of the service structure. Such application will be detailed in Part 2 (AD Jan 72).

The effects of a long-life dwelling philosophy and its associated manufacture, land tenure and financing structure can be seen to produce the following undesirable effects:

A decrease in physical and social mobility since the War set against a massive increase in the desire for such mobility.

Use of land for functions that may no longer be sensible due to the relatively high cost of removing or changing the shell and service structure implanted on it.

Use of materials and construction methods which inhibit the individual's ability to manipulate his own internal and external environment as he wishes.

Reliance upon the peak technologies of twenty, thirty or even fifty years ago to supply the performance requirements of the present day.

This interlocking and restrictive system can be broken apart at a key point by changing one of the fundamental rules of the game — the notional life of the building. Such a lever only becomes valuable, however, if the pressure applied to it can produce the following fundamental changes:

Ability for the individual to match desired mobility to performance.

Maximum fit between desired degree of occupancy and performance. This must include both 'over' and 'under' occupation: overall normative criteria in such matters must be replaced by the individual's own

RICHARDSON.

First Home • Second Home • Third Home • Stationary • Relocatable • Stable • Transcient • Leisure Home • Vacation Home • Country Home • Town House • Summer Home • Winter Home • Ranchette • Park Suite • Garden Flat • Family Club • Lodge • Mother-in-law Home • Guest House • Tenant House • Studio • Work Shop • Knock-about • Retreat • Ski House • Hide-away • Pool House • Dog House • Love Nest • Go Go House •

YOU NAME IT • WE HAVE IT

The 40 800ft² administrative offices for Greater Anchorage Area Borough, Alaska, are scheduled for occupation on February 15. They comprise seventy 10 x 60 x 12ft modules manufactured in 30 days by Designed Facilities Corporation and shipped 2 000 miles from Oakland, California, on a 400ft long barge

Richardson Home varieties.

Exploded view of Richardson Home construction.

'Cox, the finest name in trailer homes'

The Essen aluminium Telescope house. Very expensive.

Research of usefulness is often more valuable than answers of great design.

621

96lines 10pt

Standard house plans issued by the Irish government to those interested in building their own home. Standard details, trad layout and simple techniques mean the single plan has country-wide application.

Mobile homes designed and used by the G/LCC's housing department.

criteria. Similarly, enforced and undesired 'over' and 'under' occupation must be wiped out.

Maximum separation between the housing product and the land upon which it alights, enabling rapid response to greater mobility.

Maximum speed of 'on-site' erection and removal of the housing unit to eliminate as far as possible the loss-making effects to the community of fallow ground caused by development. Mediaevil strip cultivation must cease.

Maximum environmental 'plateau' for each dwelling coupled with minimum time lapse before such a plateau can be upgraded by every individual through the selection of a new model.

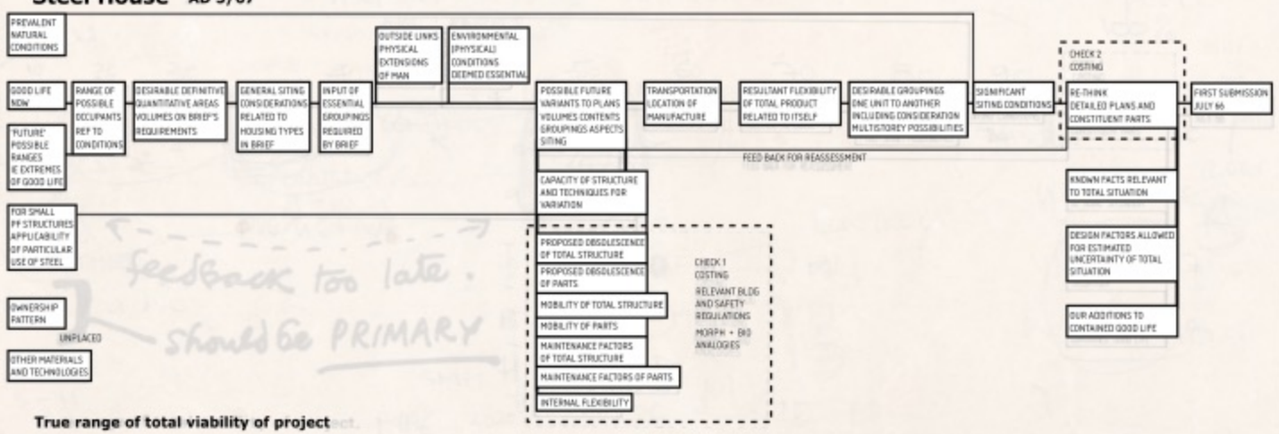
see AD 9/71 p569

If the likely period of occupancy of a dwelling by the same occupier can be forecast, then it is possible to make some estimate of the frequency of major changes in the functions of the dwelling, and to select the materials and equipment of the dwelling in such a way that their life will be expended at times of major functional change or that they can be re-used in a different way or a different dwelling.

A model has been developed which approximates to the pattern of residential mobility existing in the UK at the present time.

EARLIER SCHEMES

Steel House AD 5/67



True range of total viability of project

WORK PROGRAMME 1969

Content
Particular. Materials, Construction, Particularised costings, Finishes — variable/fixed, Services, Maintenance.
Support equipment. Possible activity — individual + group — change of 'family'. Construction/siting — Roads, paths, shelters, stores.
Availability/costing — Grouped services, security, area conditioning.
Servicing/Site Variation — Maintenance plant and equipment.

External effect and recognition
General. Societal, economic, communications — services.
Particular. Physical — on selected sites, services, alteration to existing structure/fabric + activities, regional exploitation.

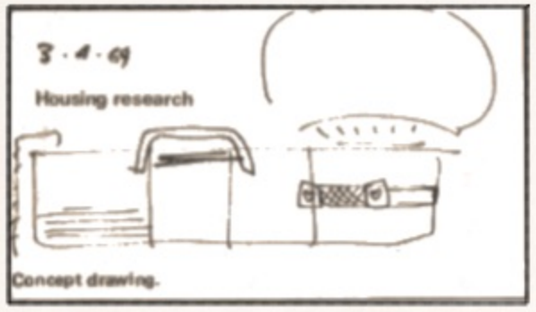
Theory
General. Societal, economic, structural/production, operational/Servicing.
Particular. Housing, houses, support equipment.

Application
General. National/global, immediate/in time scale.
Particular. Selected industry and labour force, actual sites — staging/re-think, costing/Maintenance/life span — alternatives.

Content
(houses)
General. Plan forms — capacity for variation and expansion.
Structures system — present/future (production engineering equation).
Assembly techniques — present/future including removal and/or demolition.
Siting constraints — Servicing including access/egress. Climatic. Contour.

Conclusions
Feasibility/applicability — Social, theoretical/practical, national, regional. Economic re-think, 'Test-bed' potential, Possible futures.

Recommendations
Look around.



Concept drawing.

steel + plastic house Concept for 100 'Complete'

Axonometric.

The kit of parts.

A Main unit types
B Transportation and assembly
C Construction
D Construction and assembly requirements for main units and internal units demanded by extreme conditions of plan variants.

A1
2 identical units: complete 'shell'

A2
2 identical units: 'shell' without floor

A3
2 identical units: 'shell' without ceiling and variable 'roof' unit

A4
'Shell' without floor fits over A1 type unit

A5
'Shell' without floor fits over A2 type unit

A6
Stackable 'shells' without ceilings and variable 'roof' unit

B1
Internal units pre-fixed in factory and transported to site in main unit

B2
Internal units transported separately and site fixed

B3
All units transported in 'stacked' form and site fixed

C1
Ceiling/wall finish applied direct in factory

C2
Floor/wall finish applied direct in factory

C3
Ceiling/wall finish applied on site in wet, or dry panel, form

C4
Floor/wall finish applied on site in wet, or dry panel form

C5
Upstand/downstand joint *external* to units

C6
Upstand/downstand joint *internal* to units

D1
Internal partitions and units within module and not crossing main unit junctions

D2
Internal partitions and units within module but crossing main unit junctions

D3
Internal partitions and units, non-modular and crossing main unit junctions

D4
Internal partitions and units 3-dimensionally modular and capable of positioning anywhere without 'specials' i.e. totally rectilinear

D5
Simple piercing of end face of main unit for 'door' or 'window' condition

D6
'Corner' piercing of main unit

'structural skin' – architecturally tidy – socially limiting

Method of costing housing

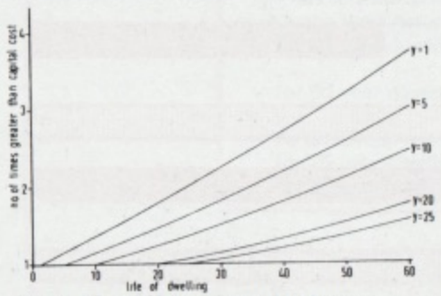
The standard method of costing housing makes use of the annual equivalent cost, usually spread over the estimated life of the house. This annual equivalent cost is affected by the interest rate and by the life of the dwelling. If the interest rate is high, then the annual equivalent cost reduces very little if the life of the building is greater than about 30 years, since a large proportion of the cost is in interest on capital (at 8% over 60 years, 80% of the repayments are interest only, 20% are capital repayments).

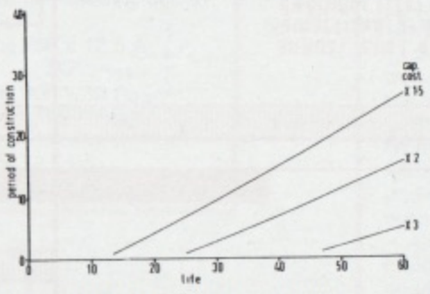
This may be a practical method of costing for most private developers who do in fact borrow money for a specific development to be repaid over a period of time. In the case of local authorities or other organisations who already have a stock of houses which are continually being replaced, and added to, the situation is somewhat different. In this case the initial capital cost of the house seems to be the major factor since theoretically at least, the capital debt is constant.

COSTING

The extent of overprovision of accommodation in housing, that is, the number of spare or unnecessary rooms within households, is much larger than the extent of overcrowding. Over the last half century, households have become smaller and thus houses too big; thus in spite of the increased demand for housing in terms of household units, space overprovision still exists together with overcrowding.

The main reason for this – the reduction in family size – is not likely to continue to the same extent as in the last half century but other factors effecting the size of households such as the earlier formation of separate households by children, earlier marriage, and possibly other factors such as easy divorce will greatly influence the demand for different household sizes.





The important consideration in the planning of housing is to recognise that while population figures can be projected with only very limited accuracy, the prediction of future household size is dependent on such a wide range of unknowns that it is virtually impossible to make any reliable estimate even ten or twenty years ahead. For example, if 10% of persons aged 18 to 23 changed from 2 person households to form single person households, then in the UK 200,000 additional household units would be required; an increase of one year in the average marriage age would add a further 200-300 thousand households to the national demand. Similarly reverse changes would have the opposite effect.

The change in population – or at least the numbers of persons of household forming age – can be estimated reasonably accurately for 15-20 years ahead: after this the estimates become less accurate.

RESEARCH DOCUMENT

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Costing method

Methods of costing housing are generally based on the assumption that the capital cost will be paid for by borrowed money and the cost amortized over a period of time which is generally equal to the expected life of the building. In the case of conventional housing this is usually 60 years. While there may be some argument for costing local authority housing without interest, since if the building programme is large and constant in activity then the capital costs will be very similar each year and so no peaks of capital expenditure will occur. But local authorities invariably have a large capital debt and so the effect of paying capital out of a more or less constant rates income is to increase that debt by an amount equal to the amount of money that would otherwise be borrowed.

Even in the case of owner occupied housing the cost is very much dependent on interest rates whether purchase is made by mortgage or cash, since any cash payment may be considered as a loss of investment income.

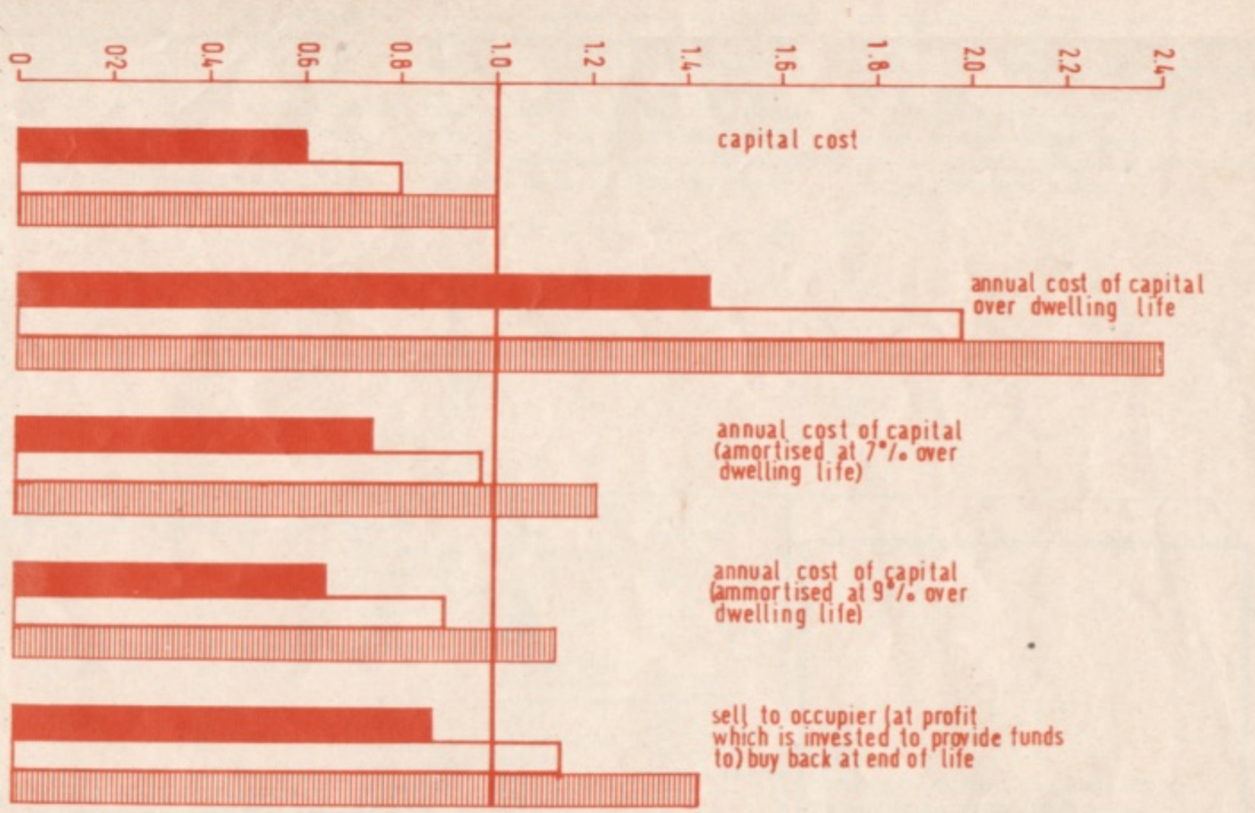
Whether this method of costing is theoretically the most satisfactory or not, it is probably the most realistic in terms of current economic practice, and the most acceptable. Alternative methods of costing are considered in the appendices but the first part of analysis which follows employs in the main this costing principle. The second part of the analysis considers the significance of indirect costs such as those of tying up of land use for a long period.

Inclusions and exclusions

The basic cost study commences with a comparison of simple amortized capital costs of two types of housing: conventional, with an expected life of 60 years and short-life, with an expected life of 25 years. In each case the cost is amortized over the expected life of the building.

There are, however, two other major factors which are considered which have a significant contribution to make to the relative costs of the two types of housing. The first is maintenance costs, which rise steadily as a building gets older, and are therefore higher on average for conventional housing. The second is consideration of the year by year increase in housing stock.

Normal running costs – heating, lighting, etc., have not been included in this part of the study, although reference is made to them in the appendices.



Comparison of costing methods
Comparison of conventional (60 year life) dwellings and 25 year life dwelling by different costing methods
Cost index of conventional dwelling = 1·0

Comment

For approximate comparison multiply all costs by appropriate figure for inflation

Effect of maintenance costs

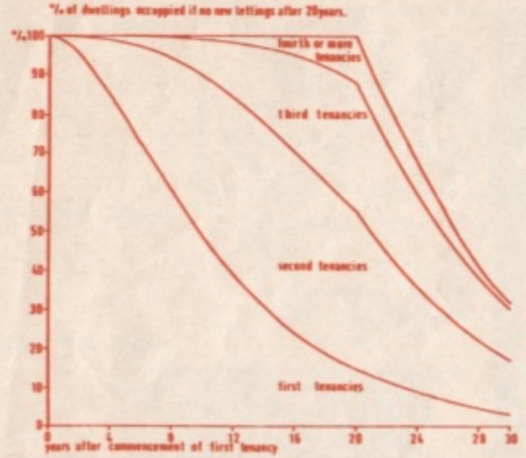
It is assumed that maintenance costs per year are based on the formula

$$\frac{c}{10{,}000}(60 + 1.6y)$$

where y is the age of the house in the year in question and c is the capital cost of the house. Thus the average annual maintenance cost for a 25 year house is £8 per £1000 initial cost and for a 60 year house £11 per £1000 initial cost. These costs are a minimum and both the annual costs and the difference between the two types will normally be higher.

Life years	0	2	4	6	8	10	12
25	48	59	72	86	102	118	136
60	28	40	55	73	92	111	131

Table 2: showing annual costs of loan and maintenance on £1000.



Amortization of capital cost

It has been assumed that annual repayments of capital cost and interest combined will be constant over the repayment period.

The annual cost is thus –

$$A = \frac{CI\,(1 + \frac{I}{100})^n}{100\left[(1 + \frac{I}{100})^n - 1\right]}$$

where C = capital cost
I = % interest rate
and n = repayment period in years

For two dwellings with lives of 25 and 60 years and various rates of interest, the following table shows the annual repayment per £1000 capital cost. As the interest rate rises, the annual repayment becomes less dependent on the period of the loan and at a rate of 10% the 60 year loan is more than 90% of the 25 year loan. In addition the absolute difference in the annual repayments becomes less with rising interest rates (for example it is £20 cheaper per year to have a 60 year loan at 4% but only £10 cheaper at 10%).

Hence, when interest rates are high, the advantages of spreading the capital cost over a longer period of time are almost cancelled out by the interest repayments; when interest rates are low the advantages of a long loan are more marked.

Life years	% interest rate 0	2	4	6	8	10	12
25	40	51	64	78	94	110	128
60	17	29	44	62	81	100	120

Table showing annual repayment on £1000.

Indirect costs
dependent on life of dwelling

1. Future change of land use.

Particularly in the last few decades, largely because of the increase in motor traffic but also because of general changes in social and economic patterns, houses have not survived their expected life. They may be demolished to make way for roads or industry or simply become derelict due to changing demand in a particular area. There is, in the U.K., no overall reduction in demand for housing and so any dwelling which ceases to be used as such must effectively be replaced. If the annual cost of the replacement is assumed to be the same as the replaced dwelling, then for the remainder of the planned life of the first dwelling, two dwellings are being paid for.

It is clear that the probability of a dwelling failing to reach its planned age increases with the life of the dwelling. In the simplest case we can assume a probability of the use of a dwelling being terminated in any year as constant i.e. independent of the age of the dwelling. In fact, it is more likely that the probability increases with age.

Constant probability of use being terminated.

Probability in any year = P

Average cost of dwelling life unused.

for 25 year dwelling: 12.5 A_{25}

for 60 year dwelling: 30 A_{60}

where A_{25} and A_{60} are the annual costs of 25 and 60 year dwellings respectively.

Thus additional cost per dwelling due to use being terminated is:

for 25 year dwelling $25P \times 12.5\,A_{25} = 312P\,A_{25}$

for 60 year dwelling $60P \times 30\,A_{60} = 1800P\,A_{60}$

As an annual sum this becomes:

for 25 year dwelling $12.5\,PA_{25}$

for 60 year dwelling $30\,PA_{60}$

Building costs savings

Because of shorter time on site and the reduced foundations required, the preliminaries and foundation costs for short life losing can be reduced, even though the superstructures may be the same cost.

It is assumed below that the superstructure costs for 60 year and 25 year houses are the same, and the costs shown are for each £1000 of 60 year house building costs.

Preliminaries	114	18
Foundations	79	18
Superstructure	684	684
External Works	123	123
	1000	843

Thus, to provide a short life dwelling whose superstructure (manufacture and erection) is the same cost as the superstructure of a conventional dwelling, the total cost will be only 84.3% of the conventional dwelling.

It is also possible to suggest areas where savings might be made by social services, individuals and others e.g.

National Health Service (reduced rate of illness among occupiers).

Sickness and injury benefit.

Employers (reduces loss of hours due to sickness and injury).

Occupiers (reduced loss of pay: increased time and better conditions for leisure activity: better conditions for study [esp. children] producing better job potential: reduced costs of services).

Local authorities (reduced costs of services).

Greater mobility of residence would be possible with short life housing producing other savings e.g.

Occupier (better job potential and therefore better earning potential reduced wastage of payments for housing due to under-occupation: reduced problems of over-occupation [e.g. health]).

Local authority/Government. (Reduced building demand due to reduction in under-occupation and problems of over-occupation [e.g. health]).

Comment

For approximate comparison multiply all costs by appropriate figure for inflation

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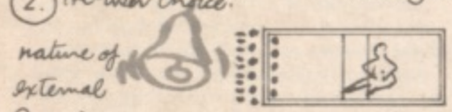
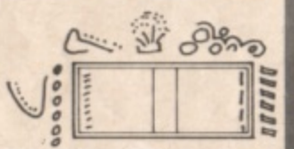
PRINCIPLES

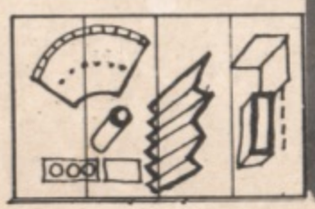
1. House must be compared to other commodities:

2. Pre-user choice:



3. Post 'purchase-ownership' variability





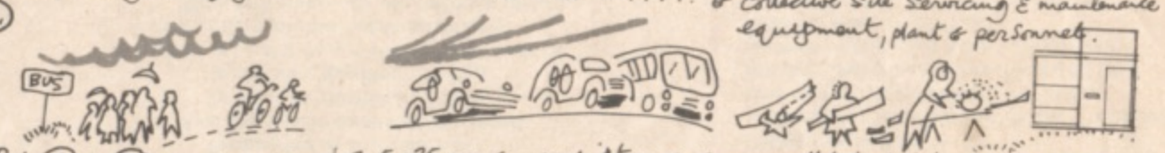
4.

Capacity to vary locale & condition of manufacture & assembly — both in 24 hours & over the years — related to the availability of both materials & labour.

5.

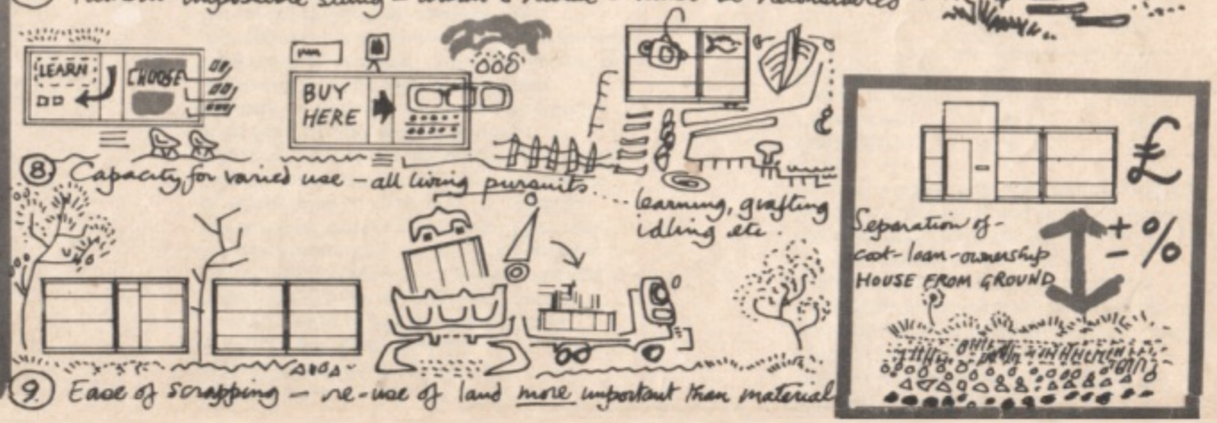
Capacity to vary ... equipment ..... materials ..... & collective site servicing & maintenance equipment, plant & personnel.

6.



Ref (4.) + (5.) — over a period of 5-25 years — realisation of changing attitude to labour — incl. D.I.Y.

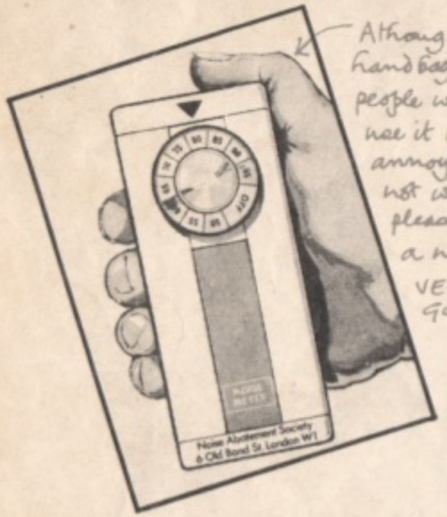
7. Hitherto impossible siting — urban & rural — must be reconsidered



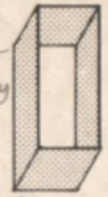
8. Capacity for varied use — all living pursuits

9. Ease of scrapping — re-use of land more important than material

SITE SENSING KITS

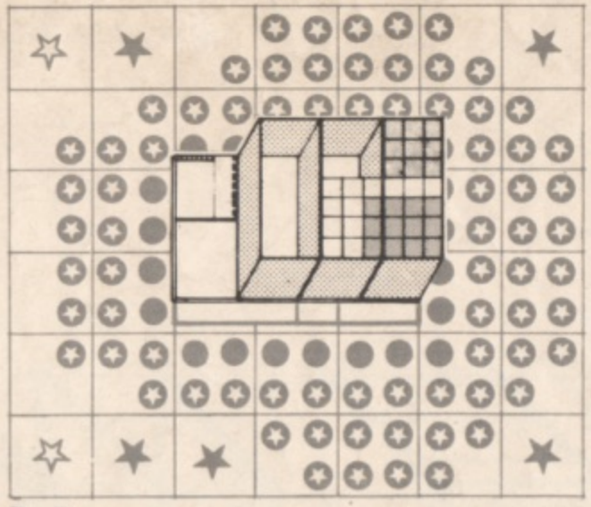


Although handbag size — people will only use it when annoyed — not when pleased by a noise. VERY GOOD.



A

C



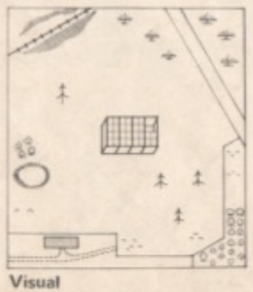
B D

A stranger's car at midnight is a nuisance Your daughter's car is a relief – both the same dbs.

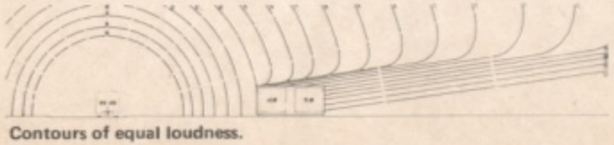
GAMES MUST BE CAPABLE OF BEING PLAYED

D

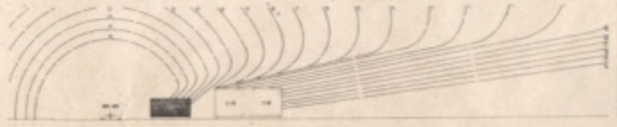
Audio



Visual



Contours of equal loudness.



COMPONENTS

A. RING BOX. Fixed magnetic metal sides 2 no widths 2M and 3M.

B. STANDARD PLANS. Transparent and capable of being attached to bottom of ring box Current Practice acoustic levels assumed levels (dbs) marked on plan. Area uses can be added by prospective occupier.

C. BLOCKS. Transparent perspex 1M x 1M to scale on plan. Colour coded for acoustic levels (as on basic charts) visual quality (translucent, transparent, opaque).

D. CONDITIONING GRID. Transparent and flexible — 2 no. are made available for each plan with CP acoustic standards (1 no open 1 no obstructed). The 'obstructions' can be 'natural' as found or consist of unit stores, shelters etc. as detailed.

PROCEDURE

1. Build up selected house with appropriate number of RING boxes.
2. Fix appropriate plan.
3. Place colour coded blocks as required. Cubes can be used for acoustical and visual sensing.
4. If block pattern matches the current practice pattern then the house box can be placed directly on the transparent conditioning grids available for the appropriate plan. (Acoustic use only).

If cube pattern differs from CP's then special marked CONDITIONING GRID sheets should be prepared by the 'planner' for the use of the possible 'client'.

In both cases the grid will be of the same dimensions.

5. The agreed grid, with or without the house box, is then placed on a possible site and final adjustment made by the prospective user. These adjustments can be based on a private assessment of priorities e.g. costs, access, privacy, view etc.

The conditioning grid being flexible can be laid on a profiled site plan.

Agreed land boundaries access etc. can be marked direct on the GRID and transferred when finished to the general site plan for use of both the 'planner' and the next 'client' (Additive planning!)

6. For visual sensing, the house box can be placed directly on the site determined in 5 without the conditioning grid.

Coloured block — visual type — are then positioned at choice. NOTE, House Plan is attached to bottom of box.

The initial siting of these cubes can be peripheral with internal 'blanks'.

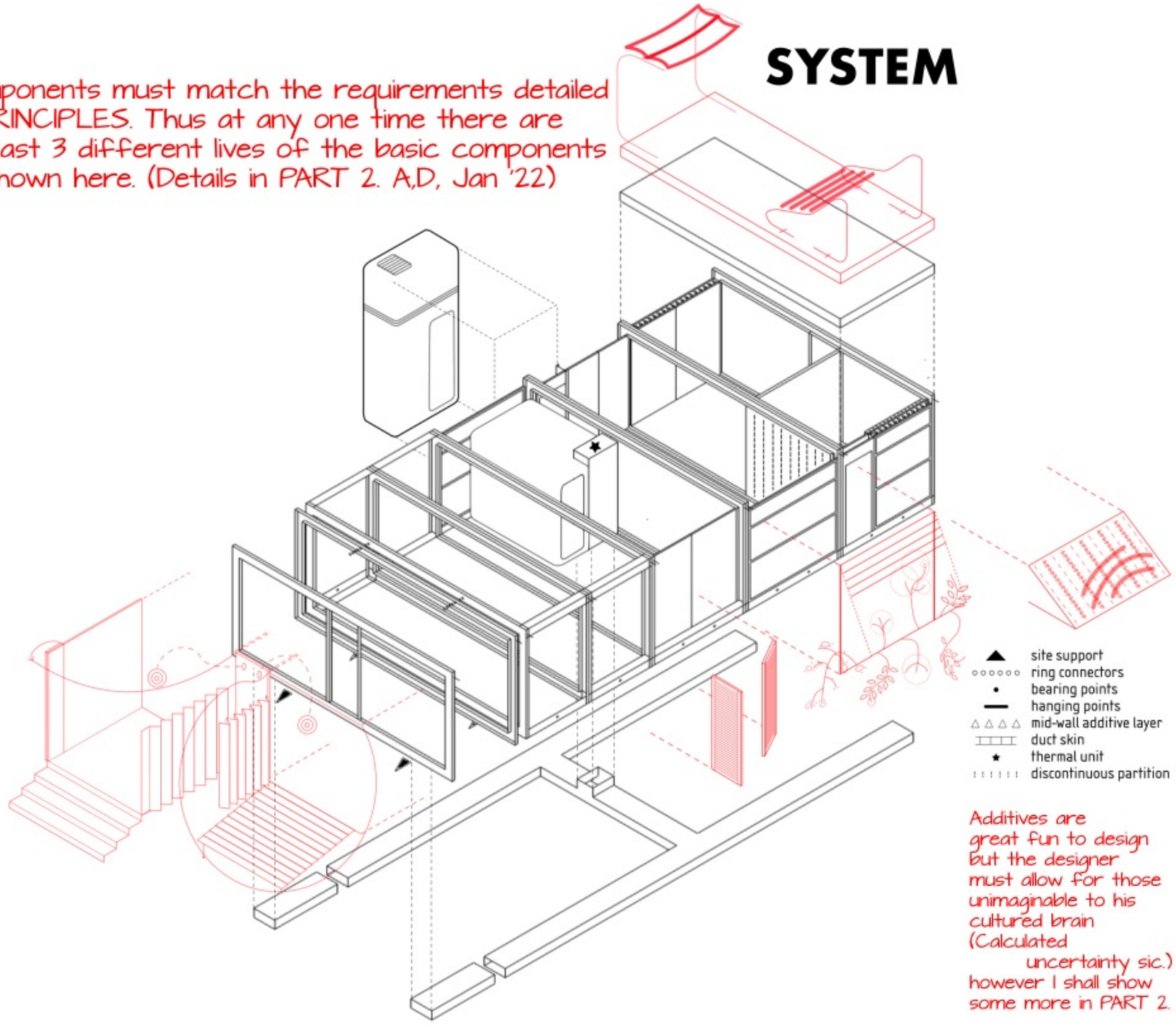
7. A record of this choice should be made possibly by marking the edge of the boxes with appropriate letters. TR transparent TL translucent OP opaque

This visual coding, while enabling a variation in the 'fixed' external skin can also be used later by the occupants with relation to the nature of the internal and intermediate skins.

8. External 'obstructions' should be considered in the visual sensing as in the audio.
9. There is no requirement for thermal sensing since all units are fully air-conditioned with variable area control.

SYSTEM

Components must match the requirements detailed in PRINCIPLES. Thus at any one time there are at least 3 different lives of the basic components as shown here. (Details in PART 2. A,D, Jan '22)



- site support
- ring connectors
- bearing points
- hanging points
- mid-wall additive layer
- duct skin
- thermal unit
- discontinuous partition

Additives are great fun to design but the designer must allow for those unimaginable to his cultured brain (Calculated uncertainty sic.) however I shall show some more in PART 2.

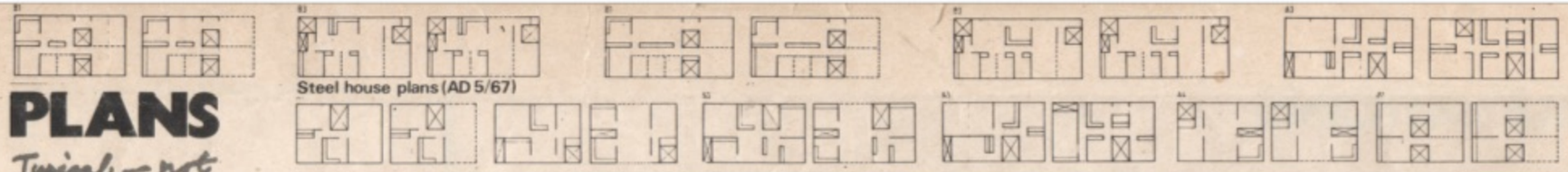
RESEARCH DOCUMENT

ELEVATIONS

Comment

In the second part of this summary a bibliography will be included together with the section headings of the study. The major part will, however, be devoted to showing the physical capacity of the proposed process to accommodate particular life styles and sites rather than merely adapt. I would welcome comment on this work in progress before December 2021.

RESEARCH DOCUMENT



Steel house plans (AD 5/67)

PLANS

Typical — not architypal

Primarily the ability to afford more space makes max. occupancy figures a nonsense.
Intermittent use (INT) as well as permanent use (PERM) must be considered

A 1 max.

PERM: all-age spectrum
INT: weekend; 2nd home; Renta-pad; Communal Crash pad.

D 4 max.

Space for offices, studios, classrooms, shops or chapels must be available.

G 6 max.

↑ a real cosy Whitehouse-happy family home

L 5 max.

A great home for 4 or 8 who hate each other but jointly own the 'fridge. 4 front doors with different keys!

B 2 max.

PERM: all age spectrum
INT: diversion space for communal owners

E 4 max.

H 5 max. Gnd. flr.

H 5 max. 1st. flr.

2 floors really demand pre-agreement on living separations

- water waste outlet
- sewage outlet
- external skin ducts
- external access via porch unit
- stair unit
- external access via door
- wet service area
- food preparation area
- storage unit
- thermal control

LOTS MORE WET SERVICING AREAS.

Or 2 'separate' persons' — all age spectrum

Don't forget that, having watched Open University on T.V., Granny may well want a large store for her geological specimens.

C 3 max.

F 5 max.

X 6 max.

Mezzanine

Gnd. flr.

A primitive spatial allocation — give it 5 years.

X 6 max.

← Split-level should not accomodate the site - it can always be levelled — it should encourage 3-tiered social patterning c both time scale & the collection of personal junk.

Scenario writing by 'lay' folk can often remind designers just how valuable non-defined space is. Eating in bed or loving at the T.V. is not zoned in N.B.A. generic house plans!

see 24hr living toy (AD 1/71)

630 AD/10/71